Ravi Maths Tuition Centre

Time : 1 Mins **STRUCTURE OF ATOM AND NUCLEAR CHEMISTRY 1** **Marks : 1176**

1. The value of Planck's constant is 6.63 x 10^{-34} Js. The velocity of light is 3.0 x 10^{8} ms^{-1}, Which value is closest to the wavelength in nanometers of a quantum of light with frequency of 8 x 10^{15} S^{-1}?
   a) 4 x 10^{1} b) 3 x 10^{7} c) 2 x 10^{-25} d) 5 x 10^{-18}
2. Assertion: The number of electrons ejected from a metal surface depend upon the frequency of light.
   Reason: There is a time lag between the striking of light beam and the ejection of electrons from the metal surface.
   a) If both assertion and reason are true and reason is the correct explanation of assertion
   b) If both assertion and reason are true but reason is not the correct explanation of assertion
   c) If assertion is true but reason is false d) If both assertion and reason are false
3. The radioactive isotope, tritium $\left({}_{1}^{3}\mathrm{H}\right)$ has a half-lilt of 12.3 years. If the initial amount of tritium is 32 mg, how many milligrams of it would remain after 49.2 years?
   a) 8 mg b) 1 mg c) 2 mg d) 4 mg
4. The angular momentum of an electron present in the excited state of hydrogen is $1.5h/\pi$. The electron is present in
   a) Third orbit b) Second orbit c) Fourth orbit d) Fifth orbit
5. Two atoms are said to be isobars if
   a) they have same atomic number but different mass number
   b) they have same number of electrons but different number of neutrons
   c) they have same number of neutrons but different number of electrons
   d) sum of the number of protons and neutrons is same but the number of protons is different
6. What are the speed and de broglie wavelength of an electron that has been accelerated by a potential difference of 500V?
   a) 5.5 x 10^{-11} m b) 4.5 x 10^{-11} m c) 3.5 x 10^{-11}m d) 6.5 x 10^{-11} m
7. According to Planck's Quantum theory, the correct statements are
   I) The vibrating particle in the black body does not emit continuously.
   II) Radiation is emitted in the form of small packets called Quanta
   III) Energy associated with emitted radiations is inversely propotional to frequency
   IV) The emitted radiant energy is propagated in the form of waves.
   a) I,II,III b) II,III c) I,II,IV d) II,IV,III
8. ${}_{92}\mathrm{U}^{235} + {}_{0}n^{1} \rightarrow$ fission product + neutron $+3.2 \times 10^{-11}$ J The energy released, when 1 g of ${}_{92}\mathrm{U}^{235}$ finally undergoes fission, is:

a) 12.75 x 10^8 kJ b) 18.60 x 10^9 kJ c) 8.21 x 10^7 kJ d) 6.55 x 10^6 kJ

9. The de-Broglie wavelength of a particle with mass 1 g and velocity 100 m/s is
   a) 6.63 x 10^{-33} m b) 6.63 x 10^{-34} m c) 6.63 x 10^{-35} m d) 6.65 x 10^{-36} m
10. Total number of spectral lines when electron jumps from 8th orbit to 2nd orbit
    a) 6 b) 36 c) 21 d) 38
11. What is the colour corresponding to the wavelength of light emitted when the electron in a hydrogen atom undergoes transition from n = 4 to n = 2?
    a) Blue b) Red c) Yellow d) Green
12. Uncertainty in position of a minute particle of mass 25g in space is 10^{-5}m. What is the uncertainty in its velocity
    (in ms^{-1})?(h = 6.6 x 10^{-34} Js)
    a) 2.1 x 10^{-34} b) 0.5 x 19^{-34} c) 2.1 x 10^{-28} d) 0.5 x 10^{-23}
13. The energy of an electron in the first Bohr orbit of H atom is -13.6 eV . The possible energy values (s) of the excited state (s) for electrons in Bohr orbits of hydrogen is (are)
    a) -3.4 eV b) -4.2 eV c) -6.8 eV d) +6.8 eV
14. The angular momentum of 3p-orbitals in terms of h* $\left(h* = \frac{h}{2\pi}\right)$ is:
    a) $\sqrt{2h}$* b) 2h* c) $\frac{h*}{\sqrt{2h}}$ d) h*
15. The orientation of an atomic orbitals is governed by
    a) Spin quantum number b) Magnetic quantum number c) Principal quantum number
    d) Azimuthal quantum number
16. In how many elements the last electron will have the following set of quantum numbers, n = 3 and l = 1?
    a) 2 b) 8 c) 6 d) 10
17. If an electron has spin quantum number $+\frac{1}{2}$ and magnetic quantum number -1, it cannot be present in
    a) d - orbital b) f - orbital c) p - orbital d) s - orbital
18. Accrording to the Bohr Theory which of the following transitions in the hydrogen atom will given rise to the least energetic photon?
    a) n = 6 to n = 1 b) n = 5 to n = 4 c) n = 6 to n = 5 d) n = 5 to n = 3
19. The third line of the Balmer series in the emission spectrum of the hydrogen atom is due to the transition from the
    a) fourth Bohr orbit to the first Bohr orbit b) fifth Bohr orbit to the second Bohr orbit
    c) sixth Bohr orbit to the third Bohr orbit d) seventh Bohr orbit to the third Bohr orbit
20. The azimuthal quantum number indicates __ of the orbital
    a) Size b) Shape c) Orientation d) Spin
21. Which of the following is indicated by the magnetic quantum number?
    a) Size b) Shape c) Spatial orientation d) Spin
22. The frequency of the spectral line obtained when the electron in n = 3 of Hydrogen atom drops to the ground state is
    a) 2.925x10^{15} Hertz b) 2.925x10^{13} Hertz c) 2.925x10^{14} Hertz d) 36559x10^{10} Hertz

23. The energy of a photon is $3x10^{-12}$ ergs. What is its wavelength in nm?($h=6.62x10^{-27}$ erg.sec; $c=3x10^{10}cm.s^{-1}$)
    a) 662 nm b) 1324 nm c) 66.2 nm d) 6.62 nm

24. An electron, a proton and an alpha particle have kinetic energies of 16E, 4E and E respectively. What is the qualitative order of their de Broglie wavelengths?
    a) $\lambda_e > \lambda_p = \lambda_a$ b) $\lambda_p = \lambda_a > \lambda_e$ c) $\lambda_p > \lambda_e > \lambda_a$ d) $\lambda_a < \lambda_e >> \lambda_p$

25. The angular momentum of an electron in a given stationary state can be expressed as $m_e vr = n\frac{h}{2\pi}$. Based on this expression an electron can move only in those orbits for which its angular momentum is
    a) equal to n b) integral multiple of $\frac{h}{2\pi}$ c) multiple of n d) equal to $\frac{h}{2\pi}$ only

26. The energy absorbed by each other molecule (A_2) of a substance is 4.4×10^{-19} J and bond energy per molecule is 4.0×10^{-19} J. The kinetic energy of the molecule per atom will be:
    a) 2.2×10^{-19} J b) 2.2×10^{-19} J c) 40×10^{-20} J d) 20×10^{-20} J

27. Consider the following six electronic configurations (remaining inner orbitals are completely filled) and mark the incorrect option.

    a) Stability order: IV > II > III b) Order of spin multiplicity: IV > III = I > II
    c) V does not violate all the three rules of electronic configuration
    d) If IV represents A^+ when kept near a magnet, acts as diamagnetic substance

28. Nitrogen atom has 3 unpaired electrons in its ground state. It can be explained by
    a) Auf-bau principle b) Pauli.s principle c) Hund.s rule d) None of these

29. If highest magnetic quantum number of a given atom is represented by 3, then what will be its principal quantum number?
    a) 2 b) 3 c) 4 d) 1

30. The energy of the electron in the hydrogen atom depends on
    a) The principal quantum number only b) All the quantum numbers
    c) The Azimuthal quantum number d) The principal and azimuthal quantum numbers

31. The schrodinger wave equation for hydrogen atom is $\Psi(\text{radial}) = = \frac{1}{16\sqrt{4}}\left(\frac{z}{a_0}\right)^{3/2}$ $\left[(\sigma-1)\left(\sigma^2-8\sigma+12\right)\right]e^{-\sigma/2}$ where ao and z are the constant in which answer can be expressed and maximum position of radial nodes from nucleus are
    a) $\frac{a_0}{Z}, \frac{3a_0}{Z}$ b) $\frac{a_0}{2Z}, \frac{a_0}{Z}$ c) $\frac{a_0}{2Z}, \frac{3a_0}{Z}$ d) $\frac{a_0}{2Z}, \frac{4a_0}{Z}$

32. The density of electron cloud of the orbital d_{xy} in yz plane is
    a) Zero b) Maximum c) Not determined d) Infinite

33. Consider the following sets of quantum numbers

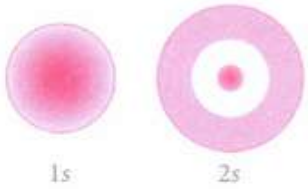
	n	l	m	s
(i)	3	0	0	+1/2

(ii)	2	2	1	+1/2
(iii)	4	3	-2	-1/2
(iv)	1	0	-1	-1/2
(v)	3	2	3	+1/2

Which of the following sets of quantum number is not possible

a) (i), (ii), (iii) and (iv) b) (ii), (iv) and (v) c) (i) and (iii) d) (ii),(iii) and (iv)

34. The probability density plots of Is and 2s atomic orbitals are given in figures.



The density of dots in a region represents the probability density of finding electrons in the region. On the basis of the above diagram, which of the following statements is incorrect?

a) Is and 2s orbitals are spherical in shape

b) The probability of finding the electron is maximum near the nucleus

c) The probability of finding the electron at a given distance is equal in all directions

d)

The probability density of electrons for 2s orbital decreases uniformly as distance from the nucleus increases

35. The hydrogen-like species Li^{2+} is in a spherically symmetric state S_1 with one radial node. Upon absorbing light the ion undergoes transition to a state S_2 The state S_2 has one radial node and its energy is equal to the ground state energy of the hydrogen atom.

The orbital angular momentum quantum number of the state S_2 is

a) 0 b) 1 c) 2 d) 3

36. (A): The energy of ultraviolet radiation is greater than the energy of infrared radiation

(R) : The velocity of ultraviolet radiation is greater than the velocity of infrared radiation

a) Both A and R are true and R is the correct explanation of A

b) Both A and R are true but R is not the correct explanation of A c) A is true and R is false

d) R is true and A is false

37. If n = 6, the correct sequence for filling of electrons will be:

a) $ns \rightarrow (n-1)f \rightarrow (n-1)d \rightarrow np$ b) $ns \rightarrow (n-1)f \rightarrow (n-2)d \rightarrow np$

c) $ns \rightarrow (n-2)f \rightarrow (n-1)d \rightarrow np$ d) $ns \rightarrow np(n-1)d \rightarrow (n-2)f$

38. In photoelectric effect work function of any metal is 2.5 eV. The most energetic emitted electron, are stopped by the potential of -1.5 volt then:

a) energy of incident photons is 4 eV b) energy of incident photons is 1 eV

c) photoelectric current increases when we use photons of high frequency

d) energy of incident photons is 3 eV

39. A cricket ball of mass 0.5 kg is moving with a velocity of 100 $m.s^{-1}$, the wavelength associated with its motion is:

a) 13.25 x 10^{-26}m b) 13.25 x 10^{-34}m c) 13.25 x 10^{-36}m d) 6.6 x 10^{-34}m

40. The impossible set of quantum numbers is

a) n = 2, l = 0, m = 0, s = + 1/2 b) n = 2, l = 1, m = 0, s = +1/2

c) n = 2, l = 0, m = 1, s =-1/2 d) n = 3, l = 1 m = -1 , s = -1/2

41. The wavelength of moving electron in 3rd Bohr orbit of H-atom is
a) 1 x 10^{-9} m b) 2 x 10^{-7}m c) 1 x 10^{-7} m d) 1 x 10^{-8} m

42. The ratio of the wave lengths of the first line in the Lyman series of the spectrum of Hydorgen atom and the first line in the Balmer series of the spectrum of He^{+} is :
a) 20/27 b) 27/20 c) 27/5 d) 5/27

43. An ion of a d-block elements has magnetic moment 5.92 B.M. Select the Ion among the following.
a) Zn^{+2} b) Sc^{+2} c) Mn^{+2} d) Cr^{3+}

44. If the velocity of an electron in Bohr's first orbit is 2.19 x 10^{6} ms^{-1}, what will be the de Broglie wavelength associated with it?
a) 2.19 x 10^{-6} m b) 4.38 x 10^{-6} m c) 3.32 x 10^{-10} m d) 3.32 x 10^{10} m

45. The number of spherical nodes in 3p-orbital is/are:
a) one b) two c) three d) none of the above

46. If n = 6, the correct sequence for filling of electrons will be:
a) ns → (n - 2)f →(n - 1)d → np b) ns⟶ (n-2)f⟶np⟶ (n-l)d c) ns⟶np⟶(n-1)d⟶ (n-2)f
d) ns⟶(n -2)f⟶ (n -1)d⟶ np

47. The de Brogiie wavelength associated with a moving particle of fixed mass is inversely proportional to:
a) Its kinetic energy b) Square root of its kinetic energy c) Square of its kinetic energy
d) Cube of its kinetic energy

48. Electromagnetic radiation of wavelength 242 nm is just sufficient to ionise the sodium atom. What is the ionisation energy of sodium per atom?
a) 494.5 x 10^{-6} J/atom b) 8169.5 x 10^{-10} J/atom c) 5.85 x 10^{-15} J/atom
d) 8.214 x 10^{-19} J/atom

49. Match the column I with column II and mark the appropriate choice.

Column I (Atom)		**Column II (No. of unpaired electrons)**	
(A)	$_{15}P$	(i)	6 unpaired electrons
(B)	$_{24}Cr$	(ii)	2 unpaired electrons
(C)	$_{26}Fe$	(iii)	3 unpaired electrons
(D)	$_{14}Si$	(iv)	4 unpaired electrons

a) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (iv) b) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (iv)
c) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (ii) d) (A) ⟶ (iv), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iii)

50. Which of the following electron transistions in hydrogen atom will require largest amount of energy?
a) From n = 1 to n = 2 b) From n = 1 to n =3 c) From n = 2 to n =1
d) From n = 3 to n =4

51. The pair of ions having same electronic configuration is _____
a) Cr^{3+}, Fe^{3+} b) Fe^{3+}, Mn^{2+} c) Fe^{3+}, Co^{3+} d) Sc^{3+}, Cr^{3+}

52. An excited hydrogen atom emits a photon of wavelength λ while returning to the ground state. If R is the Rydberg's constant, then the quantum number n of the excited state is

a) $\sqrt{\lambda R}$ b) $\sqrt{\lambda R - 1}$ c) $\sqrt{\frac{\lambda R}{\lambda R - 1}}$ d) $\sqrt{\lambda R(\lambda R - 1)}$

53. Table-tennis ball has a mass 10 g and a speed of 100 m/s. If speed can be measured within an accuracy of 10%, what will be the uncertainty in speed and position respectively?
a) 10, 4 x 10^{-33} b) 10, 5.27 x 10^{-34} c) 0.1, 5 x 10^{-34} d) None of these

54. The probability of finding electron in XY plane for P_z- orbital is
a) 100% b) 50% c) 99.9% d) 0%

55. Orbital angular momentum depends on _____
a) l b) n and l c) n and m d) m and s

56. The incorrect electronic arrangement is:
a) 2, 8, 13, 1 b) 2, 8, 12, 2 c) 2, 8, 8, 1 d) 2, 8, 8, 2

57. If r is the radius of the first orbit, the radius of nth orbit of H-atom is given by :
a) rn^2 b) rn c) r/n d) r^2n^2

58. The total energy of electron in an atom is a combination of potential energy (P.E) and kinetic energy (K.L). If total energy is -E for an electron in an atom, then. its (K.E) and (P.E) respectively are
a) 2E, -E b) 2E, E c) E, -2E d) E, -E

59. In Bohr series of lines of hydrogen spectrum, the third line from the red end corresponds to which one of the following inter - orbit jumps of the electron for Bohr orbits in all atom of hydrogen?
a) 3⟶2 b) 5⟶2 c) 4⟶1 d) 2⟶5

60. Assertion: Orbit and orbital are synonymous.
Reason: A circular path around the nucleus in which an electron moves is called orbit or orbital.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

61. The electron in Bohr's model of hydrogen atom is pictured as revolving around the nucleus in order for it to
a) possess energy b) emit protons c) keep from being pulled into the nucleus
d) keep from being repelled by the nucleus

62. A human body required 0.01 M activity of radioactive substance after 24 hours. Half-life of radioactive substances is 6 hours. Half-life of radioactive substance is 6 hours. The injection of maximum activity of radioactive substance that can injected will be
a) 0.08 M b) 0.04 M c) 0.32 M d) 0.16 M

63. The radius of which of the following orbit is same as that of the first Bohr's orbit of hydrogen atom?
a) He^+ (n = 2) b) Li^{2+} (n = 2) c) Li^{2+} (n = 3) d) Be^{3+} (n = 2)

64. A wave has a frequency of $3x10^{15}$ sec^{-1}. The energy of that photon is
a) 1.6 x 10^{-12} erg b) 3.2 x 10^{-11} erg c) 2.0 x 10^{-11} erg d) 3x 10^{15} erg

65. Uncertainty in position of an electron (mass = 9.1 x 10^{-28}g) moving with a velocity of 3 x 10^4 cm/s accurate upto 0.001% will be (use $\frac{h}{4\pi}$ in uncertainty expression where h = 6.626 x 10^{-27}erg -s)
    a) 5.76 cm b) 7.68 cm c) 1.93 cm d) 3.84 cm

66. The uncertainity in the position of an electron (mass 9.1 x 10^{-28}g) moving with a velocity of 3.0 x 10^4 cm.s^{-1} accurate up to 0.011% will be:
    a) 0.192 cm b) 7.68 cm c) 0.175 cm d) 3.84 cm

67. If travelling at same speeds, which of the following matter waves have the shortest wavelength?
    a) Electron b) Alpha particle (He^{2+}) c) Neutron d) Proton

68. The ratio of energies of two photons of wavelengths 2000 A° and 4000 A°

    a) 1:4 b) 4:1 c) 1:2 d) 2:1

69. How many electrons in an atom with atomic number 105 can have (n + l) = 8?
    a) 30 b) 15 c) 17 d) 16

70. An electron is allowed to move freely in a closed cubic box of length of side 10cm. The uncertainty in its velocity will be :
    a) 3.35 x 10^{-4}m sec^{-1} b) 5.8 x 10^{-4}m sec^{-1} c) 4 x 10^{-5}m sec^{-1} d) 4 x 10^{-6}m sec^{-1}

71. $_{92}U^{253}$, nucleus absorbs a neutron and disintegrates into $_{54}Xe^{139}$, $_{38}Sr^{94}$ and x. So what will be the product x?
    a) 3 - neutrons b) 2 - neutrons c) α-particle d) β-particle

72. **Assertion:** Scientific notation for the number 100 is expressed as 1 x 10^2.
    Reason: The number 1 x 10^2 has two significantfigures.
    a) If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.

73. The momentum of a particle having a de_Broglie wavelength of 10^{-17} m is (Given. h = 6.625 x 10^{-34} m)
    a) 3.3125 x 10^{-7} kg m s^{-1} b) 2.65 x 10^{-7} kg m s^{-1} c) 6.625 x 10^{-17} kg m s^{-1}
    d) 13.25 x 10^{-17} kg m s^{-1}

74. Match the constants given in column I with their values given in column II and mark the appropriate choice.

Column I		Column II	
(A)	Rydberg constant	(i)	6.626 x 10^{-34} J s
(B)	Planck's constant	(ii)	3.00 x 10^8 m s^{-1}
(C)	Velocity of light	(iii)	750 x 10^{-9} m
(D)	Wavelength of red light	(iv)	109,677 cm^{-1}

    a) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iv) b) (A) ⟶ (ii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (iii)
    c) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (ii) d) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii)

75. How many electrons maximum can have n + 1 = 4 in an atom.

a) 8 b) 2 c) 6 d) 18

76. Maximum number of radial nodes is present in:
a) 5s b) 5p c) 5d d) all have same number of nodes

77. Which of the following explains the sequence of filling electrons in different subshells?
a) Hund's rule b) Aufbau principle c) Pauli's principle d) All of these

78. In the radioactive decay, $_{92}X^{232} \rightarrow {}_{89}Y^{220}$, how many α and β-particles are ejected from X to form Y?
a) 3α and 2β b) 5α and 3β c) 3α and 3β d) 3α and 3β

79. Which experiment is responsible for finding out the charge on an electron?
a) Millikan's oil drop experiment b) Cathode ray discharge tube experiment
c) Rutherford's α-rays scattering experiment d) Photoelectric experimen

80. What is the trend of energy of Bohr's orbits?
a) Energy of the orbit increases as we move away from the nucleus
b) Energy of the orbit decreases as we move away from the nucleus
c) Energy remains same as we move away from the nucleus
d) Energy of Bohr's orbit cannot be calculated

81. If uncertainty principle is applied to an object of mass 1 microgram, the uncertainty value of velocity and position will be
a) 0.2 x 10^{-4} m^2s^{-1} b) 0.52 x 10^{6} m^2s^{-1} c) 0.52 x 10^{-28} m^2s^{-1} d) 2 x 10^{-34} m^2s^{-1}

82. The total number of electrons that can be accommodated in all the orbitals having principal quantum number 2 and azimuthal quantum number 1 are:
a) 2 b) 4 c) 6 d) 8

83. The circumference of 3rd Bohr orbit in H-atom is:
a) 3 x 10^{-7}cm b) 3 x 10^{-8}cm c) 3 x 10^{-6}cm d) 4.3 x 10^{-9}cm

84. A 0.66 kg ball is moving with a speed of 100 m/s. The associated wavelength will be (h = 6.6 x 10^{-34} Js) :
a) 1.0 x 10^{-32}m b) 6.6 x 10^{-32}m c) 6.6 x 10^{-34}m d) 1 x 10^{-35}m

85. The frequency of radiation emitted when the electron falls from n = 4 to n = 1 in a hydrogen atom will be (Given ionisation energy of H = 2.18 x 10^{-18}J $atom^{-1}$ and h = 6.625 x 10^{-34} J-s):
a) 1.03 x $10^{15}s^{-1}$ b) 2.00 x $10^{15}s^{-1}$ c) 3.08 x $10^{15}s^{-1}$ d) 1.54 x $10^{15}s^{-1}$

86. Which of the following conclusions regarding the structure of atom is based on Rutherford's α-particle scattering experiment?
a) The positive charge is concentrated in a very small volume of the atom
b) The positive charge is scattered with the electrons throughout the atom
c) The volume occupied by the nucleus is half of the volume of atom
d) Most of the space in the atom is occupied by the neutrons

87. Which of the following species is not stable?
a) $[GeCl_6]^2$ b) $[Sn(OH)_6]2$ c) $[SiCl_6]^{2-}$ d) $[SiF_6]^2$

88. What will be the uncertainty in velocity of a bullet with a mass of 10 g whose position is known with ± 0.01 mm?
a) 5.275 x 10^{-33} m s^{-1} b) 5.275 x 10^{-25} m s^{-1} c) 5.275 x 10^{-5} m s^{-1} d) 5.275 x 10^{-28} ms^{-1}

89. Given below are the spectral lines for an atom of hydrogen. Mark the lines which are not correctly matched with the value of n_1 and n_2?

	Series	n_1	n_2	Region
(i)	Lyman	1	2,3,....	Ultraviolet
(ii)	Balmer	2	3,4,....	Infrared
(iii)	Paschen	3	4,5,....	Infrared
(iv)	Pfund	4	5,6,...	Infrared

a) (i) and (ii) b) (i) and (iii) c) only (iv) d) (i) and (iv)

90. The energy of photon is given as : $\triangle$E/atom= 3.03 x 10^{-19}J $atom^{-1}$, then the wavelength (λ) of the photon is:
a) 6.56 nm b) 65.6 nm c) 656 nm d) 0.656 nm

91. Two values of spin quantum numbers i.e., $\pm$1/2 and -1/2 represent:
a) up and down spin of the electrons respectively
b) two quantum mechanical spin states which refer to the orientation of spin of the electron
c) clockwise and anti-clockwise spin of the electrons respectively
d) anti-clockwise and clockwise spin of the electrons respectively

92. Which of the following series of lines are the only lines in hydrogen spectrum which appear in the visible region.
a) Lyman b) Balmer c) Paschen d) Brackett

93. What will be the wavelength of an electron moving with $\frac{1}{10}$ th of velocity of light?
a) 2.43 x 10^{-11} m b) 243 x 10^{-11} m c) 0.243 m d) 2.43 x 10^{-4} m

94. Which atom (X) is indicated by the following configuration?
X $\longrightarrow$ [Ne] $3s^2$ $3p^3$
a) Nitrogen b) Chlorine c) Phosphorus d) Sulphur

95. Which of the following is not correctly matched?
a) Energy associated with Bohr's orbit, E = $\frac{-2.18\times10^{-18}J\times Z^2}{n^2}$
b) Energy gap between two orbits, $\Delta E=R_H = \left(\frac{1}{n_1^2}-\frac{1}{n_2^2}\right)$
c) Kinetic energy of the ejected electron, $hv=hv_0+\frac{1}{2}mv^2$
d) Energy of one mole of photons, $E=N_0\frac{h\lambda}{c}$

96. The maximum probability of finding an electron of a particular energy in an orbital is about
a) 80% b) 85% c) 95% d) 99%

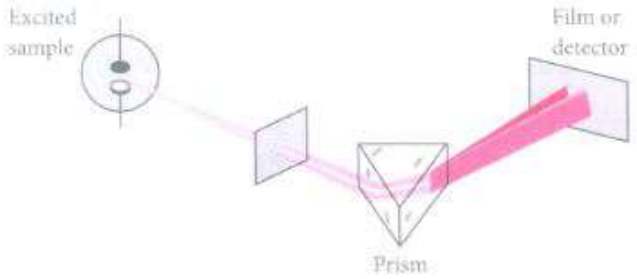
97. Effective nuclear charge (Z_{eff}) for a nucleus of an atom is defined as
a)
shielding of the outermost shell electrons from the nucleus by the innermost shell electrons
b) the net positive charge experienced by electron from the nucleus
c) the attractive force experienced by the nucleus from electron
d) screening of positive charge on nucleus by innermost shell electrons

98. The mass of electron is 9.11 x 10^{-31}kg, Planck's constant is 6.626x 10^{-34}Js, then the uncertainty involved in the measurement of velocity within a distance of 0.1Å is :
a) 5.79 x 10^5 ms^{-1} b) 5.79 x $10^7$$ms^{-1}$ c) 5.79 x 10^8 ms^{-1} d) 5.79 x 10^5 ms^{-1}

99. When an electron makes a transition from (n+1) state to n^{th} state, the frequency of emitted radiations is related to 'n' according to (n>>1):

a) v= $\frac{2CRZ^2}{n^3}$ b) v= $\frac{CRZ^2}{n^4}$ c) v= $\frac{CRZ^2}{n^2}$ d) v= $\frac{2CRZ^2}{n^2}$

100. Which of the following types of spectrum is best depicted by the given figure?



a) Atomic absorption spectra b) Atomic emission spectra c) Continuous spectra

d) None of these

101. Which one of the following expressions represent the electron probabilitv function (D)

a) $4\pi r dr\Psi^2$ b) $4\pi r^2 dr\Psi$ c) $4\pi r^2 dr\Psi^2$ d) $4\pi r dr\Psi$

102. The Correct set of four quantum numbers for the valence electron of Rubidium (Z = 37) is

a) 5, 0, 0, +1/2 b) 5, 1, 0, +1/2 c) 5, 1, 1, +1/2 d) 6, 0, 0, +1/2

103. Maximum number of electrons in a sub-shell with 1 = 3 and n = 4 is :

a) 14 b) 16 c) 10 d) 12

104. After 3d-sub level is completely filled the differentiating electron enters into __ sub level.

a) 4s b) 4p c) 4f d) 5s

105. Study the orbital diagrams of two atoms 'X and 'y. Which subshell will be more stable and why?

a) X, exchange energy is maximum, so is stability.

b) Y, exchange energy is maximum, so is stability.

c) X, exchange energy is minimum, so stability is maximum.

d) Y, exchange energy is minimum, so stability is maximum.

106. Few electrons have following quantum numbers,

(i) n = 4, l = 1

(ii) n = 4, l= 0

(iii) n = 3, l= 2

(iv) n = 3, l= 1

Arrange them in the order of increasing energy from lowest to highest

a) (iv) < (ii) < (iii) < (i) b) (ii) < (iv) < (i) < (iii) c) (i) < (iii) < (ii) < (iv) d) (iii) < (i) < (iv) < (ii)

107. Calculate the energy in joule corresponding to light of wavelength 45 nm (Planck's constant, h= 6.63 x 10^{-34}Js, speed of light, c= 3 x 10^8 ms^{-1}.) :

a) 6.67 x 10^{15} b) 6.67 x 10^{11} c) 4.42 X 10^{-15} d) 4.42 x 10^{-18}

108. The number of neutrons in the dipositive zinc ion (Mass number or Zn = 65)

a) 35 b) 33 c) 65 d) 67

109. Number of possible spectral lines which may be emitted in Brackett series in H atom, if electrons present in 9th excited level returns to ground level, are
a) 21 b) 6 c) 45 d) 5

110. The frequency of radiation absorbed or emitted when transition occurs between two stationary states with energies E_1 (lower) and E_2 (higher) is given by
a) $v=\frac{E_1+E_2}{h}$ b) $v=\frac{E_1-E_2}{h}$ c) $v=\frac{E_1\times E_2}{h}$ d) $v=\frac{E_2-E_1}{h}$

111. The Bohr's orbit radius for the hydrogen atom (n=1) is approximately 0.53 A. The radius for the first excited state (n = 2) orbit is:
a) 0.27 A b) 1.27 A c) 2.12 A d) 3.12 A

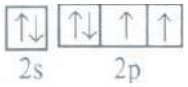
112. Electronic configuration for Cu(Z = 29) is
a) $[Ar]3d^9\ 4s^2$ b) $[Ar]3d^{10}\ 4s^1$ c) $[Ar]3d^5\ 4s^2$ d) $[Ar]3d^6\ 4s^2$

113. The uncertainity in the momentum of a particle is 3.31×10^{-2} $kgms^{-1}$. The uncertainity in its position is(in meters)
a) 1.59×10^{-33} b) 0.33×10^{-30} c) 0.4 x 10-^{20} d) 3.3×10^{-24}

114. Which of the following configurations does not follow Hund's rule of maximum multiplicity?
a) $Is^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2$ b) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^6$ c) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1\ 3d^5$
d) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4\ 4s^2$

115. If the radius of first Bohr orbit is x pm, then the radius of the third orbit would be
a) (3 × x) pm b) (6 × x) pm c) $\left(\frac{1}{2}\times x\right)$pm d) (9 × x) pm

116. A helium atom at 300 K is moving with a velocity of 2.40×10^2 ms^{-1}. The de-Broglie wavelength is about [At. Wt. of He = 4.0]
a) 0.416 nm b) 0.83 nm c) 803 Å d) 8000 Å

117. In which of the following Aufbau principle is violated?
a) 

b)

c)

d)

118. The number of different spatial arrangements for the orbital with l = 2 is
a) 1 b) 3 c) 5 d) 7

119. The following quantum numbers are possible for how many orbitals(s) n = 3, l = 2, m = +2?
a) 1 b) 3 c) 2 d) 4

120. Energy equal to the mass of one electron is:
a) 8.2 x 10-^{7}erg b) 9.2 x 10-^{8}erg c) 8.2 x 10-^{10}erg d) 4.1 x 10-^{8}erg

121. What is the velocity of electron present in first Bohr orbit of hydrogen atom?
a) 2.18×10^5 m/s b) 2.18×10^5 m/s c) 2.18×10^6 m/s d) 2.18×10^{-9} m/s

122. The orbital angular momentum of a p-electron is given as
a) $\sqrt{\frac{h}{\sqrt{2\pi}}}$ b) $\sqrt{3}\frac{h}{\sqrt{2\pi}}$ c) $\sqrt{\frac{3}{2}}\frac{h}{2\pi}$ d) $\sqrt{6}\cdot\frac{h}{2\pi}$

123. Bohr's theory is applicable to
a) Li^{2+} b) Li^{+} c) He^{+} d) Both 1 and 3

124. The de-Broglie's wavelength (A) of the electron subjected to an accelerating potential of V volts is given by
a) $\frac{eh}{\sqrt{2mV}}$ b) $\frac{h}{\sqrt{2meV}}$ c) $\frac{h}{\sqrt{2me}}\times V$ d) $\frac{mh}{\sqrt{2eV}}$

125. The electronic configuration of Cu (Atomic No. = 29) is :
a) $1s^2, 2s^2\ 2p^6, 3s^2\ 3p^6, 4s^2, 3d^9$ b) $1s^2, 2s^2 2p^6, 3s^2 3p^6, 3d^{10}, 4s^1$
c) $1s^2, 2s^2\ 2p^6, 3s^2\ 3p^6, 4s^2\ 4p^6, 5s^2\ 5p^l$ d) $1s^2, 2s^2\ 2p^6, 3s^2\ 3p^6, 4s^2\ 4p^6, 3d^3$

126. In hydrogen atom, energy of first excited state is - 3.4 eV. Then, KE of same orbit of hydrogen atom is:
a) + 3.4 eV b) + 6.8 eV c) -13.6 eV d) + 13.6 eV

127. The number of d-electrons retained in Fe^{2+} (atomic number Fe = 26) ion is
a) 3 b) 4 c) 5 d) 6

128. The total number of atomic orbitals in fourth energy level of an atom is:
a) 8 b) 16 c) 32 d) 4

129. If uncertainity in position and velocity are equal then uncertainity in momentum will be:
a) $\frac{1}{2}\left(\frac{mh}{\pi}\right)^{\frac{1}{2}}$ b) $\frac{1}{2}\sqrt{\frac{h}{\pi m}}$ c) $\frac{h}{4\pi m}$ d) $\frac{mh}{4\pi}$

130. In an hydrogen atom which of the following transition should be associated with highest absorption of energy
a) n = 1 to n = 4 b) n = 2 to n = 3 c) n = 4 to n = 1 d) n = 3 to n = 2

131. Radius of 3rd Bohr orbit of hydrogen atom is:
a) 6.529A° b) 2.116A° c) 4.761A° d) 8.464A°

132. The orbitals are called degenerate when:
a) they have the same wave functions
b) they have the same wave functions but different energies
c) they have different wave functions but same energy d) they have the same energy

133. When an electron with charge 'c' and mass 'm ' moves with velocity 'v' around the nucleus having nuclear charge 'Z' in a circular orbit of radius 'r', the potential energy of electron is
a) $\frac{Ze^2}{r}$ b) $\frac{Ze^2}{r^2}$ c) $\frac{-Ze^2}{r}$ d) $\frac{mv^2}{r}$

134. The momentum of a particle of wave length 1Å is
a) 6.625×10^{-27} g. cm.s $^{-1}$ b) 6.625×10^{-19} g.cm.s^{-1} c) 6.625×10^{-16} g.cm.s^{-1}
d) 6.625×10^{-23} g. cm.s^{-1}

135. Energy of a photon with a wave length of 450 nm is
a) 4.36×10^{-12} ergs b) 4.36×10^{-13} ergs c) 4.36×10^{-20} ergs d) 4.36×10^{-11} ergs

136. An electron can enter into the orbital when
a) value of n is minimum b) value of l is minimum c) value of (n + l) is minimum
d) value of (n + m) is minimum

137. Which of the following sets of four quantum numbers, an electron will have the highest energy?

a)

	n	l	m	s
(a)	3	2	1	$\frac{1}{2}$

b)

	n	l	m	s
(b)	4	2	-1	$\frac{1}{2}$

c)

	n	l	m	s
(c)	4	1	0	$-\frac{1}{2}$

d)

	n	l	m	s
(d)	5	0	0	$-\frac{1}{2}$

138. Which of the following observations was not correct during Rutherford's scattering experiment?

a) Most of the α-particles passed through the gold foil undeflected

b) A small fraction of the α-particles was deflected by small angles

c) A large number of the α-particles were bounced back

d) A very few α-particles (~1 in 20,000) were bounced back

139. Which of the following ions has the least magnetic moement?
a) Cu^{2+} b) Ni^{2+} c) Co^{3+} d) Fe^{2+}

140. Rutherford's alpha ray scattering experiment showed for the first time that the atom has
a) Nucleus b) Proton c) Electron d) Neutron

141. An atom differs from its ion in
a) Nuclear charge b) Mass number c) Number of electrons d) Number of neutrons

142. What are the possible values of n, l and m_1 for an atomic orbital 4f?
a) n = 4, l = 0, 1, 2, 3, m_1 = -2, -1, 0, +1, +2 b) n = 4, l = 3, m_1 = -3, -2, -1, 0, +1, +2, +3
c) n = 4, l = 2, m_1 = -2, -1, 0, +1, +2, +3 d) n = 4, l = 0, 1, m_1 = -1, 0, +1

143. The maximum number of electrons in a sub-shell is given by the expression.
a) (l + 2) b) (2l + 2) c) (4l + 2) d) (l + 1)

144. The hydrogen-like species Li^{2+} is in a spherically symmetric state S_1 with one radial node. Upon absorbing light the ion undergoes transition to a state S_2 The state S_2 has one radial node and its energy is equal to the ground state energy of the hydrogen atom.
The state S_1 is
a) 1s b) 2s c) 2p d) 3s

145. The age of most ancient geological formation is estimated by
a) potassium-argon method b) carbon-14 dating method c) radium- silicon method
d) uranium-lead method

146. The correct set of quantum numbers for the unpaired electron of chlorine atom is:
a) $2,0,0,+\frac{1}{2}$ b) $2,1,-1,+\frac{1}{2}$ c) $3,1,1,\pm\frac{1}{2}$ d) $3,0,0,\pm\frac{1}{2}$

147. What is the atomic number of the element which has $3d^6$ as its outermost configuration?
a) 12 b) 32 c) 26 d) 24

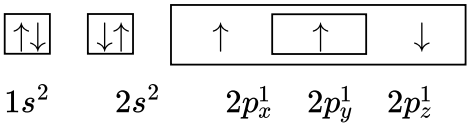
148. An electron in excited hydrogen atom falls from fifth energy level to second energy level. In which of the following regions, the spectral line will be observed and is part of which series of the atomic spectrum?
a) Visible, Balmer b) Ultraviolet, Lyman c) Infrared, Paschen d) Infrared, Brackett

149. What minimum amount of energy is required to bring an electron from ground state of Be^{3+} to in infinity?
a) 4.358×10^{-18} J/atom b) 2.179×10^{-18} J/atom c) 3.4864×10^{-17} J/atom
d) 8.716×10^{-18} J/atom

150. In hydrogen atom the kinetic energy of electron is 3.4 eV. The distance of that electron from the nucleus
a) $2.11A^\circ$ b) $0.529A^\circ$ c) $1.587A^\circ$ d) $21.16A^\circ$

151. If r is the radius of the first orbit, the radius of nth orbit of H-atom is given by
a) rn^2 b) rn c) $\frac{r}{n}$ d) r^2n^2

152. What are the maximum number of electrons that can be associated with the following set of quantum numbers? n = 3, 1 = 1 and m = 1.
a) 10 b) 6 c) 4 d) 2

153. Which one is a wrong statement?
a) Total orbital angular momentum of electron in 's' orbital is equal to zero.
b)
An orbital is designated by three quantum numbers while an electron in an atom is designated by four quantum numbers.
The electronic configuration of N atom is
c) 

d) The value of m for dz^2 is zero

154. Which of the following configuration is correct for iron ?
a) $1\ s^2, 2\ s^2 2p^6, 3\ s^2 3p^6 3\ d^5$ b) $1\ s^2, 2\ s^2 2p^6, 3\ s^2 3p^6, 4\ s^2, 3\ d^5$
c) $1\ s^2, 2\ s^2 2p^6, 3\ s^2 3p^6, 4\ s^2, 3\ d^7$ d) $1\ s^2, 2\ s^2 2p^6, 3\ s^2 3p^6 3\ d^6, 4\ s^2$

155. Which of the following is diamagnetic?
a) He^{+2} b) Sc^{+3} c) Mg^{+2} d) O^{-2}

156. If the ionisation energy of hydrogen atom is 13.6 eV, the energy required to excite it from ground state to the next higher state is approximately:
a) 3.4 eV b) 10.2 eV c) 17.2 eV d) 13.6 eV

157. The radius of which of the following orbit is same as radius of pt orbit of H
a) He^+(n=2) b) Li^{2+}(n=2) c) Li^{2+}(n=3) d) Be^{3+}(n=2)

158. The number of electrons which will together weigh one gram
a) 1.098 x 10^{27} electrons b) 9.1096 x 10^{31} electrons c) 1 electron d) 1 x 10^4 electrons

159. The electrons, identified by n & l; (i) n = 4,l = 1 (ii) n = 4, l = 0(iii) n = 3, l = 2 (iv) n = 3, l = 1 can be placed in order of increasing energy, from the lowest to highest as :
a) (iv) < (ii) < (iii) < (i) b) (ii) < (iv) < (i) < (iii) c) (i) < (iii) < (ii) < (iv) d) (iii) < (i) < (iv) < (ii)

160. The minimum and maximum values of wavelength in the Lyman series of a H atom are, respectively:
a) 364.3 nm and 653.4 nm b) 91.2 nm and 121.5 nm c) 41.2 nm and 102.6 nm
d) 9.12 nm and 121. 5 nm

161. The position of both, an electron and a helium atom is known within 1.0 mm. Further the momentum of the electron is known within 5.0 x 10^{-26} kg ms^{-1}. The minimum uncertainty in the measurement of the momentum of the helium atom is :
a) 50 kg ms^{-1} b) 80 kg ms^{-1} c) 80 x 10^{-26} kg ms^{-1} d) 5.0 x 10^{-26} kg ms^{-1}

162. The ratio of wavelength values of series limit lines($n_2=\infty$) of Balmer series and paschen series are
a) 4:9 b) 9:4 c) 2:3 d) 3:2

163. Which one of the following pairs of ions have the same electronic configuration:
a) Cr^{3+}, Fe^{3+} b) Fe^{3+}, Mn^{2+} c) Fe^{3+}, Co^{3+} d) Sc^{3+}, Cr^{3+}

164. In the photoelectron emission, the energy of the emitted electron is
a) greater than the incident photon b) same as that of the incident photon
c) smaller than the incident photon d) proportional to the intensity of incident photon

165. An electron has magnetic quantum number as '-3'. Its principal quantum number is
a) 3 b) 2 c) 1 d) 4

166. The two electrons occupying an orbital are distinguished by
a) Principal quantum number b) Azimuthal quantum number
c) Magnetic quantum number d) Spin quantum number

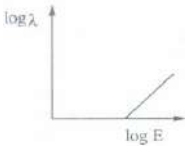
167. The energy of the electron when it is at an infinite distance from the nucleus is
a) Infinity b) Zero c) Minimum d) Can not be predicted

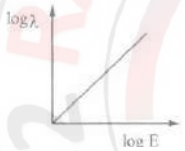
168. The energy of an electron in the nth Bohr orbit of hydrogen atom is:
a) $-\frac{13.6}{n^4}\text{eV}$ b) $-\frac{13.6}{n^3}\text{eV}$ c) $-\frac{13.6}{n^2}\text{eV}$ d) $-\frac{13.6}{n}\text{eV}$

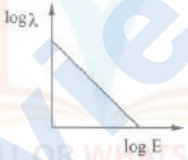
169. The wavelength of radiation required to remove the electron of hydrogen atom (Ionisation energy 21.7 x 10^{-12}erg) from n = 2 orbit to n =∞ is
a) 3.664x10^{-4} cm b) 3.66x10^{-5} cm c) 3.66x10^{-6} cm d) 3.66x10^{-7} cm

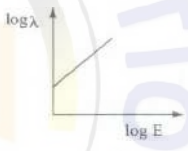
170. As an electron is brought from an infinite distance close of nucleus of the atom, the energy of electron:
a) Increases to a greater +ve value b) Decreases to a smaller +ve value
c) Increases to a greater -ve value. d) Decreases to a smaller -ve value

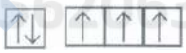
171. The correct set of four quantum numbers for the valence electron of rubidium atom (Z=37) is:
a) 5, 1 + 1/2 b) 6, 0, 0 + 1/2 c) 5, 0, 0 + 1/2 d) 5, 1, 0 + 1/2

172. The graph between energy of an electron and its de-Broglie wavelength λ is
a) 

b) 

c) 

d) 

173. The orbital diagram in which the Aufbau principle is violated is
a) b) c)  d)

174. The value of planck's constant is 6.63 x 10^{-34} Js. The velocity of light is 3.0 x 10^8 ms^{-1}. Which value is closet to the wavelength in nonometers of a quantum of light with frequency, of 8 x 10^{15} s^{-1}?
a) 3 x 10^7 b) 2 x 10^{-25} c) 5 x 10^{18} d) 4 x 10^1

175. Radial part of the wave function depends on quantum numbers
a) n and l b) n and s c) l and m d) l and s

176. The ratio of the orbit of the 1st three radii in an atom of hydrogen is
a) 1 : 4 : 9 b) 9 : 4 : 1 c) 1 : 2 : 3 d) 3 : 2 : 1

177. Sulphur = 35 (34.96903 u) emits a β-particle but no γ-ray . The product is chlorine = 35 (34.96885 u). The maximum energy emitted by the β-particle is:
a) 16.758 MeV b) 1.6758 MeV c) 0.16758 MeV d) 0.016758 MeV

178. What will be the wave number of yellow radiation having wavelength 240 nm?
a) 1.724 x 10^4 cm^{-1} b) 4.16 x 10^6 m^{-1} c) 4 x 10^{14} Hz d) 219.3 x 10^3 cm^{-1}

179. If the energy of H-atom in the ground state is -E, the velocity of photo-electron emitted when a photon having energy E_p strikes a stationary Li^{2+} ion in ground state, is given by:

a) $v = \sqrt{\frac{2(E_p - E)}{m}}$ b) $v = \sqrt{\frac{2(E_p + 9E)}{m}}$ c) $v = \sqrt{\frac{2(E_p - 9E)}{m}}$

d) $v = \sqrt{\frac{2(E_p - 3E)}{m}}$

180. The police are monitoring an automobile of mass 2.0 tons speeding along a high way. They are certain about location of the vehicle only to with in 1m; what is the minimum uncertainty in the speed of the vehicle?
a) 3.9 x 10^{-38} ms-1 b) 12.4 x 10^{-38} ms^{-1} c) 2.63 x 10^{-38} ms^{-1} d) 0.62 x 10^{-38} ms^{-1}

181. A nuclide of an alkaline earth metal undergoes radioactive decay by emission of the $\alpha-$ particles is succession. The group of the periodic table to which the resulting daughter element would belong to:
a) Gr.4 b) Gr.16 c) Gr.14 d) Gr.16

182. The number of angular nodal planes are same in the orbitals:
a) 3p and 4p b) 3s and 4d c) 4s and 3p d) 4s and 3d

183. Number of neutrons in a parent nucleus X, which gives ${}_7\mathrm{N}^{14}$ nucleus after two successive β -emissions would be
a) 9 b) 6 c) 7 d) 8

184. Bohr's theory can also be applied to the ions like
a) He^+ b) Li^{2+} c) Be^{3+} d) all of these

185. If the shortest wavelength in Lyman series of H atom is x, then longest wavelength in Balmer series of He^+ is
a) $\frac{36x}{5}$ b) $\frac{x}{4}$ c) $\frac{9x}{5}$ d) $\frac{5x}{9}$

186. Two electrons present in M shell will differ in
a) principal quantum number b) azimuthal quantum number
c) magnetic quantum number d) spin quantum number

187. An element E loses one α and two -particles in three successive stages. The resulting element will be
a) an isobar of E b) an isotone of E c) an isotope of E d) E itself

188. A proton and an α-particle are accelerated through the same potential difference. The ratio of their De Broglie wavelength is:
a) $\sqrt{2}$ b) $\frac{1}{\sqrt{2}}$ c) $2\sqrt{2}$ d) 2

189. Which of the following designation is impossible?
a) 4f b) 5g c) 2d d) 6p

190. If ionisation potential for hydrogen atom is 13.6 eY, then ionisation potential for He^+ will be:
a) 54.4 eV b) 6.8 eV c) 13.6 eV d) 24.5 eV

191. A hydrogen like species(atomic number Z) is present in a higher exited state of quantum number n. This excited atom can make a transition to the first excited state by successive emission of two photons of energies 10.20 eV and 17.0 eV respectively. Alternatively, the atom

from the same excited state can make a tranition to the second excited state by sucessive emission of two photons of energy 4.25 eV and 5.95 eV respectively. Determine the value of Z,
a) 1 b) 2 c) 3 d) 4

192. The equation corresponding to the wave number of spectral lines in Pfund series is
a) $R\left[\frac{1}{4^2}-\frac{1}{5^2}\right]$ b) $R\left[\frac{1}{3^2}-\frac{1}{4^2}\right]$ c) $R\left[\frac{1}{2^2}-\frac{1}{3^2}\right]$ d) $R\left[\frac{1}{5^2}-\frac{1}{6^2}\right]$

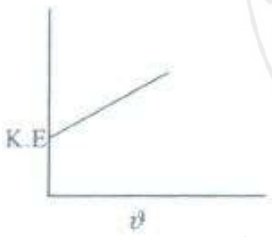
193. What will be the mass of a particle if uncertainty in its position is 10^{-8} m and velocity is 5.26 x 10^{-25} ms^{-1}?
a) 0.01 kg b) 0.1 kg c) 1 kg d) 10 kg

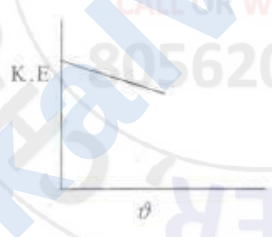
194. If first ionization potential of an atom is 16 V, then the first excitation potential will be:
a) 10.2 V b) 12 V c) 14 V d) 16 V

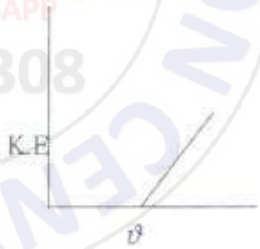
195. Wavelength of an electron is $5A^{\circ}$. Velocity of the electron is:
a) 1.45 x 10^{8} cm/s b) 1.6 x 10^{-8} cm/s c) 3.2 x 10^{-27} cm/s d) 3.2 x 10^{27} cm/s

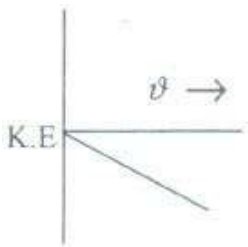
196. The energy of an electromagnetic radiation is 3 x 10^{-12}ergs. What is its wavelength in nanometers?
(h = 6.625 x 10^{-27} erg. sec, C = 3 x 10^{10} cm, sec^{-1})
a) 400 b) 228.3 c) 3000 d) 662.5

197. The de Broglie wave length of a riffle bullet of mass 2 grams moving with a velocity of 2m/sec is
a) $\frac{6.6\times10^{-34}}{2\times2}m$ b) $\frac{6.6\times10^{-27}}{2\times10^{-3}\times2}cm$ c) $\frac{6.6\times10^{-34}}{2\times10^{-3}\times2}m$ d) $\frac{6.6\times10^{-27}}{2\times2}m$

198. Which of the following graphs represents photoelectric effect
a) 

b) 

c) 

d) 

199. How many number of electrons are present in a particle which carries a charge of 5.5 x 10^{-16} C?
a) 3432 b) 1560 c) 8240 d) 2432

200. The uncertainity in position and velocity of a particle are 10^{-10}m and 5:27 x $10^{-24}ms^{-1}$ respectively, Calculate the mass of the particle. (h = 6.625 x 10^{-34} J-s).
a) 0.099 kg b) 1 kg c) 2 kg d) 10 kg

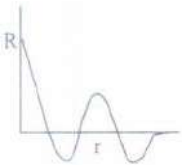
201. The measurement of the electron position if associated with an uncertainty in momentum, which is equal to 1 x 10^{18} g cm s^{-1}. The uncertainty in electron velocity is, (mass of an electron is 9 x 10^{-28} g).
a) 1 x 10^{9} cms^{-1} b) 1 x 10^{6} cms^{-1} c) 1 x 10^{5} cms^{-1} d) 1 x 10^{11} cms^{-1}

202. The change in velocity when electron jumps from the first orbit to the second orbit is
a) Half its original velocity b) Twice its original velocity c) One fourth its original velocity
d) Equal to its original velocity

203. The Schrodinger wave equation for hydrogen atom is $\Psi_{2s}= \frac{1}{4\sqrt{2\pi}}\left(\frac{1}{a_0}\right)^{3/2}\left(2-\frac{r_0}{a_0}\right)e^{-r/a_0}$ where a_0 is is Bohr's radius. If the radial node in 2s be at r_0 would be equal to:
a) $\frac{a_0}{2}$ b) $2a_0$ c) $\sqrt{2a_0}$ d) $\frac{a_0}{\sqrt{2}}$

204. Three energy levels P. Q, R of a certain atom are such that $E_p < E_Q < E_R$. If λ_1, $\lambda_2$and λ_3 are the wave length or radiation corresponding to transition R → Q ; Q → P and R → P respectively. The correct relationship between λ_1, λ_2 and λ_3 is
a) $\lambda_1+\lambda_2=\lambda_3$ b) $\frac{1}{\lambda_3}=\frac{1}{\lambda_1}+\frac{1}{\lambda_2}$ c) $\lambda_3=\sqrt{\lambda_1\lambda_2}$ d) $\frac{2}{\lambda_3}=\frac{1}{\lambda_1}+\frac{1}{\lambda_2}$

205. For azimuthal quantum number 1 = 3, the maximum number of electrons will be :
a) 2 b) 6 c) 0 d) 14

206.  represents
a) 4s b) 5p c) 3s d) $6d_{xy}$

207. When an electron of charge e and mass m moves with a velocity V about the nuclear charge Ze in circular orbit of radius r, the potential energy of the electrons is given by :
a) Z^2e^2/r b) $-Ze^2/r$ c) Ze^2/r d) mv^2/r

208. The numerical value $\Psi_{4,3,0}$ denotes:
a) 3d-orbital b) 4f-orbital c) 2s-orbital d) 4d-orbital

209. Emission of an alpha particle leads to a
a) decrease of 2 units in the charge of the atom
b) increase of 2 units in the mass of the atom
c) decrease of 2 units in the mass of the atom
d) increase of 4 units in the mass of the atom

210. Which of the following configurations represents a noble gas?
a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 5s^2$ b) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4f^{14}\ 5s^2$
c) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 5s^2\ 5p^6$
d) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 5s^2\ 5p^3$

211. Which one of the following statements is wrong?
a) The uncertainty principle is
b)
Half filled and fully filled orbitals have greater stability due to greater exchange energy, greater symmetry and more balanced arrangement
c)
The energy of 2s orbitals is less than the energy of - 2p orbitals in case of Hydrogen like atoms
d)
de-Broglie's wavelength is given by $\lambda=\frac{h}{mv}$ where m = mass of particle, v = velocity of the particle

212. Kinetic energy of photoelectrons is independence _____of incident radiation

a) Wavelength b) Wave number c) Frequency d) Intensity

213. The orbital angular momentum of an electron in p-orbital makes an angle of 45° from Z-axis. Hence Z-component of orbital angular momentum of electron is :

a) $\frac{h}{\pi}$ b) $\left(\frac{h}{2\pi}\right)$ c) $-\frac{h}{\pi}$ d) $\left(-\frac{h}{2\pi}\right)$

214. Which of the following is responsible to rule out the existence of defence of definite paths or trajectories of electrons?

a) Pauli's exclusion principle b) Heisenberg's uncertainty principle

c) Hunds rule of maximum multiplicity d) Aufbau principle

215. Assertion: In electromagnetic spectrum, the small portion around 10^{15} Hz is called visible light.
Reason: Visible region is only a small part of the entire spectrum which our eyes can see.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

216. Read the following statements and mark the incorrect statement.

a) No two electrons in an atom can have all the four quantum numbers same

b) All the orbitals in a subshell are first occupied singly with parallel spins

c) The outer electronic configuration of chromium atom is $3d^4\ 4s^2$

d) Lyman series of hydrogen spectrum lies in ultraviolet region

217. A particle of mass one microgram is confined to move along one direction (x-axis) within a region 1 mm in extension. What is the uncertainity in its velocity?

a) $3.313 \times 10^{-20}\ cm^{-1}$ b) $5.012 \times 10^{-20}\ cm^{-1}$ c) $8.325 \times 10^{-20}\ cm^{-1}$ d) $5.27 \times 10^{-21}\ cm^{-1}$

218. The ratio of number of spectral lines obtained when an e^- jumps from 7th to ground to 6th to 3rd

a) 7 b) 3.5 c) 10 d) 2.5

219. The given diagram indicates the energy levels of certain atom. When an electron moves from 2E level to E level, a photon of wavelength λ is emitted. The wavelength of photon emitted during its transition from $\frac{4E}{3}$ level to E level is

a) $\frac{\lambda}{3}$ b) $\frac{3\lambda}{4}$ c) $\frac{4\lambda}{3}$ d) 3λ

220. When alpha particles are sent through a thin metal foil, most of them go straight through the foil because

a) Alpha particles are much heavier than electrons

b) Alpha particles are positively charged c) Most part of the atom is empty

d) Alpha particles move with high velocity

221. In a hydrogen atom, energy of first excited state is -3.4 eV. Find out KE of the same orbit of hydrogen atom

a) +3.4 eV b) +6.8 eV c) -13.6 eV d) +13.6 eV

222. The kinetic energy of the photo electrons does not depend upon
a) Intensity of incident radiation b) Frequency of incident radiation
c) Wavelength of incident radiation d) Wave number of the incident radiation

223. What does the negative electronic energy (negative sign for all values of energy) for hydrogen atom means
a)
The energy of an electron in the atom is lower than the energy of a free electron at rest which is taken as zero
b)
When the electron is free from the influence of nucleus it has a negative value which becomes more negative
c)
When the electron is attracted by the nucleus the energy is absorbed which means a negative value
d) Energy is released by hydrogen atom in ground state

224. The number of photons of light wave number 'x' in 10 J of energy source is:
a) 10 hcx b) $\frac{hc}{10x}$ c) $\frac{10}{hcx}$ d) $\frac{hcx}{10}$

225. Few statements are given regarding nodes in the orbitals. Mark the statement which is not correct.
a) In case of p_z - orbital, xy plane is a nodal plane b) ns - orbital has (n + 1) nodes
c) The number of angular nodes is given by l
d)
The total number of nodes is given by (n - 1) i.e. sum of l angular nodes and (n -l- 1) radial nodes

226. How many electrons in an atom have the following quantum numbers?
n=4, m_s =-1/2
a) 32 b) 18 c) 8 d) 16

227. Which of the following statements is not correct about the characteristics of cathode rays?
a) They start from the cathode and move towards the anode
b) They travel in straight line in the absence of an external electrical or magnetic field
c)
Characteristics of cathode rays do not depend upon the material of electrodes in cathode ray tube
d)
Characteristics of cathode rays depend upon the nature of gas present in the cathode ray tube

228. Compare the energies of two radiations E_1 with wavelength 800 nm and E_2 with wavelength 400 nm.
a) $E_1=2E_2$ b) $E_1=E_2$ c) $E_2=2E_1$ d) $E_2=-\frac{1}{2}E_1$

229. The kinetic energy of an electron in an orbit of hydrogen atom is 3.4ev/atom. Then identify the correctly matched set for that electron

List 1	List 2
A) Potential energy	1.09x 10^{8} cm/sec
B) Total energy	2.116x 10^{-8} cm
C) Velocity	-6.8ev/atom
D) Its distance from nucleus	-3.4 ev/atom

The correct match is

a)

A	B	C	D
4	3	2	1

b)

A	B	C	D
2	1	4	3

c)

A	B	C	D
3	4	1	2

d)

A	B	C	D
3	4	2	1

230. In potassium the order of energy levels is
a) 4s > 3d b) 4s < 3d c) 4s < 3p d) 4s = 3d

231. An ion has 18 electrons in the outermost shell, it is:
a) Cu^{+} b) Th^{4+} c) Cs^{+} d) K^{+}

232. An electron of velocity 'x' is found to associate with a wave. The velocity to be possessed by the neutron to have half the de-Broglie wavelength possessed by electron is
a) $\frac{x}{1840}$ b) $\frac{x}{1480}$ c) $\frac{x}{920}$ d) 1840 x

233. The electronic configuration of an element with atomic number 29 is:
a) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^9, 4s^2$ b) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10}, 4s^1$
c) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^8, 4s^2, 3p^1$ d) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^7, 4s^2, 4p^2$

234. The charge of an electron is 1.6 x 10^{-19} coulombs. What will be the value of charge on Na^{+} ion?
a) 1.6 x 10^{-19} C b) 3.2 x 10^{-19} C c) 2.4 x 10^{-19} C d) 11x1.6 x 10^{-19} C

235. What will be the energy of one photon of radiation whose frequency is 5 x 10^{14} Hz?
a) 199.51 kJ b) 3.3 x 10^{-19} J c) 6.626 x 10^{-34} J d) 2.31 x 10^{5} J

236. The probability of finding an electron in p_y orbital along the x-axis is:
a) Maximum b) Zero c) Not determined d) Infinite

237. Which of the following species is isoelectronic with CO?
a) HF b) N_2 c) N_2^{+} d) O_2^{-}

238. The maximum orbital angular momentum of an electron with n = 5 is
a) $\sqrt{6}\frac{h}{2\pi}$ b) $\sqrt{12}\frac{h}{2\pi}$ c) $\sqrt{42}\frac{h}{2\pi}$ d) $\sqrt{20}\frac{h}{2\pi}$

239. The energy absorbed by the electron is
a) 8.5 eV b) 3.4 eV c) 68 eV d) 3.78 eV

240. Assertion: X-rays are used to study the interior of the objects.
Reason: X-rays are of very short wavelengths and possess electromagnetic character.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

241. The energy of separation of an electron in a Hydrogen like atom in excited state is 3.4 eV The de-Broglie wave length (in Å) associated with the electron is:
a) 3.33 b) 6.66 c) 13.31 d) 16.65

242. The quantum numbers of four electrons (e_1 to e_4) are given below

	n	l	m	s
e_1	3	0	0	$\pm$1/2
e_2	4	0	0	1/2
e_3	3	2	2	-1/2
e_4	3	1	-1	1/2

The correct order of decreasing energy of these electrons is:
a) $e_4 > e_3 > e_2 > e_1$ b) $e_2 > e_3 > e_4 > e_1$ c) $e_3 > e_2 > e_4 > e_1$ d) $e_1 > e_3 > e_4 > e_2$

243. No of revolutions made by the electron in one sec in 2nd orbit of Be^{3+}
a) 1.31×10^{16} b) 2.13×10^{16} c) 1.23×10^{15} d) 2.68×10^{14}

244. Be^{+3} and a proton are accelerated by the same potenatial, their de-Broglie wavelengths have the ratio (assume mass of proton = mass of neutron).
a) 1: 2 b) 1: 4 c) 1: 1 d) $1 : 3\sqrt{3}$

245. Match the values of column II with column I and mark the appropriate choice.

Column I		Column II	
(A)	Mass of electron	(i)	1.673×10^{-27} kg
(B)	Mass of proton	(ii)	-1.602×10^{-19} C
(C)	Charge of electron	(iii)	9.1×10^{-31} kg
(D)	e/m for an electron	(iv)	1.76×10^{8} C/g

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (iii) b) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iv)
c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i) d) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (iv)

246. Which of the following statements about the electron is incorrect?
a) It is a negatively charged particle.
b) The mass of electron is equal to the mass of neutron.
c) It is a basic constituent of all atoms. d) It is a constituent of cathode rays.

247. According to Bohr's theory, the angular momentum of an electron in 5th orbit is
a) $\frac{10h}{\pi}$ b) $\frac{25h}{\pi}$ c) $\frac{1.5h}{\pi}$ d) $2.5\frac{h}{\pi}$

248. Which of the following radiation following has highest wave number?
a) Microwaves b) X-rays c) I.R.-rays d) Radiowaves

249. In electromagnetic radiation, which of the following has greater wavelength than visible light?
a) U.V-rays b) I.R-rays c) Gamma rays d) X-rays

250. An electron is revolving in the 2nd orbit of He^+ ion. To this if 12.1 eV of energy supplied. Then to which orbit it will be excited.
a) 6 b) 8 c) 4 d) 2

251. What is the maximum number of emission lines obtained when the excited electron of a H atom in n = 5 drops to the ground state?
a) 12 b) 15 c) 21 d) 10

252. One microgram of radioactive sodium $_{11}Na^{24}$ with a half-life of 15 h was injected into a living system for a bio assay. How long will it take for the radioactivity to fall to 25% of the initial value?
a) 60 h b) 22.5 h c) 375 h d) 30 h

253. The number of nodes possible in radial probability distribution curve of 3d orbital is
a) 1 b) 2 c) 3 d) 0

254. The de Broglie wavelength associated with a ball of mass 200 g and moving at a speed of 5 metres/hour, is of the order of (h = 6.625 x 10^{-34} Js) is:
a) 10^{-15} m b) 10^{-20} m c) 10^{-25} m d) 10^{-30} m

255. What will be the uncertainty in velocity of an electron when the uncertainty in its position is 1000 Å?
a) 5.79 x 10^{2} ms^{-1} b) 5.79 x 10^{8} ms^{-1} c) 5.79 x 10^{4} ms^{-1} d) 5.79 x 10^{-10} ms^{-1}

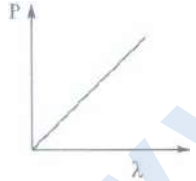
256. The spectrum of white light ranging from red to violet is called a continuous spectrum because
a) different colours are seen as different bands in the spectrum
b) the colours continuously absorb energy to form a spectrum
c) the violet colour merges into blue, blue into green, green into yellow and so on
d) it is a continuous band of coloured and white light separating them

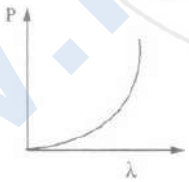
257. What is the maximum numbers of electron that can be associated with the following set of quantum numbers? n = 3, l = 1, m_1 = -l
a) 6 b) 4 c) 2 d) 10

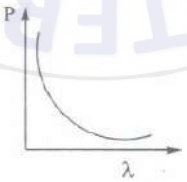
258. Atomic number of element in 4th period and 5th column will be
a) 89 b) 71 c) 73 d) 75

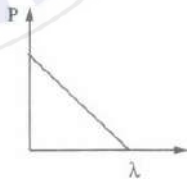
259. Which of the sequences given below shows the correct increasing order of energy?
a) 3s, 3p, 4s, 4p, 3d, 5s, 5p, 4d b) 3s, 3p, 3d, 4s, 4p, 4d, 5s, 5p
c) 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p d) 3s, 3p, 4s, 4p, 5s, 3d, 4d, 5p

260. The graph between momentum p and de-Broglie wavelength λ of photon is

a) 

b) 

c) 

d) 

261. The radius of the stationary state which is also called Bohr radius is given by the expression $r_n = n^2a_o$ where the value of a_o is
a) 52.9 pm b) 5.29 pm c) 529 pm d) 0.529 pm

262. Number of angular nodes for 4d orbital is _____
a) 4 b) 3 c) 2 d) 1

263. What is the ratio of time periods(T_1/T_2) in second orbit of H atom to 3rd orbit of He^+
a) 8/27 b) 32/27 c) 27/32 d) 27/8

264. What will the ratio of the wavelength of the first line to that of second line of Paschen series of H atom?
a) 256 : 175 b) 175 : 256 c) 15 : 16 d) 16 : 15

265. Which of the following sets of quantum numbers describes the electron which is removed most easily from a potassium atom in its ground state?

a) n = 3, l = 1, m_1 = 1, ms = $-\frac{1}{2}$ b) n = 2, l= 1 m_1 = 0, m_s = $-\frac{1}{2}$

c) n = 4, l=0,m_1 = 1,m_s= $+\frac{1}{2}$ d) n = 4 , 1=0,m_1 = 0,m_s = $+\frac{1}{2}$

266. Electrons never pair, if there are empty orbitals in a given sub-shell. This is:

a) Aufbau principle b) Pauli's exclusion principle c) Hund's rule of maximum multiplicity d) Heisenberg's uncertainity principle

267. Which of the following has highest value of magnetic moment?

a) Fe^{2+} b) Mn^{+2} c) Cr^{+3} d) V^{+3}

268. No two electrons in an orbital can have parallel spin. This statement emerges from:

a) Hund's rule b) Aufbau principle c) Pauli's exclusion principle d) (n + 1) rule

269. If the value of principal quantum number is 3, the total possible values for magnetic quantum number will be

a) 5 b) 9 c) 8 d) 10

270. Two electrons occupying the same orbital are distinguished by :

a) azimuthal quantum number b) spin quantum number c) principal quantum number d) magnetic quantum number

271. If the Planck's constant h = 6.6 x 10^{-34} Js, the dc-Broglies wave length ofa particle having momentum of 3.3 x 10^{-24} $kg.ms^{-1}$ will be:

a) 2 x 10^{-10} m b) 1 x 10^{-15} m c) 10^{-5} m d) 4 x 10^{-10} m

272. The frequency of the matter wave of a particle is given by

a) $\frac{2K.E}{h}$ b) $\frac{K.E}{2h}$ c) $\frac{h}{2K.E}$ d) $\frac{K.E}{h}$

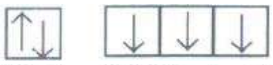
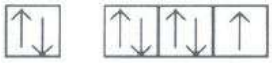
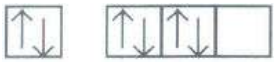
273. An electron is in one of the 3d-orbitals. What are the possible values of n, l and m for this electron?

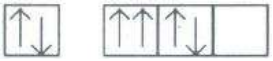
a) n = 3, l = 0, m_1 = 0 b) n=3, l=1, m_1=-1,0,+1 c) n=3, l=2, m_1=-2,-1,0,+1,+2 d) n=4, l=0, 1, m_1=-1,0,+1

274. For an e^- in a hydrogen atom, the wave function Ψ.If is proportional to $e^{-(r/a_0)}$ where a_0 as Bohrs radius; what is the ratio of probability of finding the e^- at the nucleus to the probability of finding it at a_0 the wave function is $\Psi = \frac{1}{\sqrt{\pi}}\left(\frac{1}{a_0}\right)^{3/2} e^{-(r/a_0)}$

a) e b) e^2 c) $1/e^2$ d) Zero

275. The orbital diagram in which both the Pauli's cxclusing principle and Hund's rule are violated, is:

a)  b)  c) 

d) 

276. For a particular value of azimuthal quantum number (l), the total number of magnetic quantum number values (m) is given by

a) $l = \frac{m+1}{2}$ b) $l = \frac{m-1}{2}$ c) $l = \frac{2m+1}{2}$ d) $n = \frac{2l+1}{2}$

277. A certain metal when irradiated by light (v = 3.2 x 10^{16} Hz) emits photoelectrons with twice of K.E. as did photoelectrons when the same metal is irradiated by light (v = 2.0 x 10^{16} Hz). The Vo of the metal is
a) 1.2 x 10^{14} Hz b) 8 x 10^{15} Hz c) 1.2 X 10^{16} Hz d) 4 x 10^{12} Hz

278. If uncertainty in measurement of position and momentum are equal calculate the uncertainty in velocity
a) $\frac{\Delta p}{m}$ b) $\frac{m}{\Delta p}$ c) mΔp d) $\frac{1}{m\Delta p}$

279. The kinetic energy of the electron is:
a) 3.4 eV b) 5.1 eV c) 13.6 eV d) 10.2 eV

280. Which of the following options does not represent ground state electronic configuration of an atom?
a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^8\ 4s^2$ b) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^9\ 4s^2$
c) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^1$ d) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p6\ 3d^5\ 4s^1$

281. Assertion: According to de Broglie, the wavelengths associated with electrons and other subatomic particles can be detected experimentally.
Reason: The wavelength associated with any material particle is directly proportional to its mass.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

282. What is the maximum number of orbitals that can be identified with the following quantum numbers?
n = 3, l = +1, m_1 = 0
a) 1 b) 2 c) 3 d) 4

283. The spectrum of helium is expected to be similar to that of:
a) H b) Na c) Li^+ d) He^+

284. Consider following statements
i) Splitting of spectral line occurs when placed in a magnetic field or in an electric field
ii) In case of 1s-orbital. the density of the charge cloud is the greatest at the nucleus and falls off with the distance. The density (at a particular distance) is uniform
iii) Electron-density is concentrated along a particular direction in case of 2-orbital.
iv) A p-orbital can take maximum of six electrons.
Select the correct option
a) i, ii, iv b) i, ii, iii c) ii, iii, iv d) i, iii, iv

285. The Bohr's energy of a stationary state of hydrogen atom is given as $E_n = \frac{-2\pi me^4}{n^2h^2}$. Putting the values of m and e for n^{th} energy level which is not the correct value?
a) $E_n = \frac{-21.8\times10^{-19}}{n^2}$ J atom^{-1} b) $E_n = \frac{-13.6}{n^2}$ eV atom^{-1} c) $E_n = \frac{-1312}{n^2}$ kJ mol^{-1}
d) $E_n = \frac{-12.8\times10^{-19}}{n^2}$ erg^{-1} atom^{-1}

286. What is the lowest value of n that allows g orbital to exist?
a) 6 b) 7 c) 4 d) 5

287. The radius of first Bohr's orbit for hydrogen is $0.53A^{\circ}$. The radius of third Bohr's orbit would be
a) $0.79A^{\circ}$ b) $1.59A^{\circ}$ c) $3.18A^{\circ}$ d) $4.77A^{\circ}$

288. The velocity of an e^- in excited state of H-atom is 1.093×10^6 m/s. What is the circumference of this orbit?
a) 3.32×10^{-10}m b) 6.64×10^{-10}m c) 13.30×10^{-10}m d) 13.28×10^{-8}m

289. The radioactive isotope $^{60}_{27}\mathrm{Co}$ which is used in treatment of cancer can be made (n, p) reaction. For this reaction the target nucleus is
a) $^{59}_{28}\mathrm{Ni}$ b) $^{59}_{27}\mathrm{Co}$ c) $^{60}_{28}\mathrm{Ni}$ d) $^{60}_{27}\mathrm{Co}$

290. The uncertainty in momentum of an electron is 1×10^{-5} kg/ms. The uncertainty in its position will be (Given. h = 6.62×10^{-34} kg m^2/s).
a) 1.05×10^{-28} m b) 1.05×10^{-26} m c) 5.27×10^{-30} m d) 5.25×10^{-28} m

291. In a given atom no two electrons can have the same values of all the four quantum numbers. This is called:
a) Hund's rule b) Aufbau principlc c) Uncertainty principle d) Pauli's exclusion principle

292. Electronic configuration of calcium atom can be written as :
a) [Ne]$4p^2$ b) [Ar]$4s^2$ c) [Ne]$4s^2$ d) [Kr]$4p^2$

293. The value of e/m for an element is
a) 1.78×10^8 c/g b) 1.6724×10^{-24} c/g c) 0.005486 c/g d) 1.00866 c/g

294. The wavelength of an electron moving with velocity of 10^7 ms^{-1} is:
a) 7.27×10^{-11} m b) 3.55×10^{-11} m c) 8.25×10^{-4} m d) 1.05×10^{-16} m

295. The ionization potential of He^+ in ground state is
a) 2427 kJ mol^{-1} b) 5249 kJ mol^{-1} c) 7116 kJ mol^{-1} d) 9811 kJ mol^{-1}

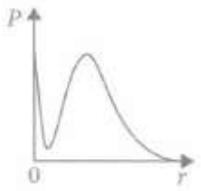
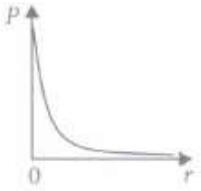
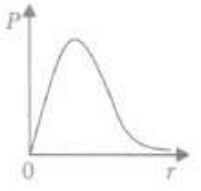
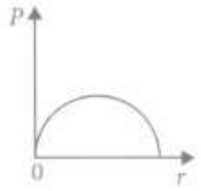
296. In the radial probability distribution curve for the 2s orbital of the hydrogen atom, the minor maximum, the node and the major maximum occur at the following distances from the nucleus respectively
a) 1.1A°,0.53A°,2.6A ° b) 0.53A°, 1.1A°,2.6A° c) 2.6A°,1.1A° ,0.53A°
d) 0.53A°,2.116A°,2.6A°

297. According to law of photochemical equivalence the energy absorbed (in ergs/mole) is given as (h = 6.62×10^{-27} ergs, $C = 3 \times 10^{10}\ \mathrm{cm\ s^{-1}}) \mathrm{N_A} = 6.02 \times 10^{23}\ \mathrm{mol^{-1}}$
a) $\frac{1.196 \times 10^{16}}{\lambda}$ b) $\frac{1.196 \times 10^{8}}{\lambda}$ c) $\frac{2.859 \times 10^{5}}{\lambda}$ d) $\frac{2.859 \times 10^{16}}{\lambda}$

298. If $^a_b\mathrm{X}$ emits firstly a positron, then two α and two β in the last α is emitted and finally it converts to $^c_d\mathrm{Y}$. The correct relation is
a) a = c + 12, d = b - 5 b) a = c + 8, d = b - 1 c) a = c + c6, d = b - 2
d) a = c + 4, d = b - 2

299. The potential energy of electron in the ground state of He^+ ion is
a) 4.358×10^{-18} J/atom b) -7.112×10^{-18} J/atom c) -1.743×10^{-17} J/atom
d) -8.279×10^{-18} J/atorn

300. P is the probability of finding the Is electron of hydrogen atom in a spherical shell of infinitesimal thickness dr, at a distance r from the nucleus. The volume of this shell is $4\pi r^2$ dr? The qualitative sketch of the dependence of P on r is

a)  b)  c)  d) 

301. A body of mass 10 g is moving with a velocity of 100 ms^{-1}. The wavelength associated with it is

a) 6.626×10^{-7} m b) 6.626×10^{-34}m c) 6.626×10^{-4} m d) 6.626×10^{-35} m

302. Consider the ground state of Cr atom (Z = 24). The numbers of electrons with azimuthal quantum numbers, ℓ =1 and 2, are respectively:

a) 12, 4 b) 12, 5 c) 16, 4 d) 16, 5

303. The uncertainty in momentum of an electron is 1×10^{-5} kg.m/s.The uncertainity in its position will be (h = 6.63×10^{-34} Js)

a) 1.05×10^{-28} m b) $l.05 \times 10^{-26}$ m c) 5.28×10^{-30} m d) 5.27×10^{-28} m

304. Assertion: The maximum number of electrons in the shell with principal quantum number n is equal to $2n^2$.

Reason: Two electrons can have the same value of three quantum numbers n, l and m, but must have the opposite spin quantum number.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

305. There is no difference between a 2p and 3p orbitals regarding:

a) Value of n b) Size c) Energy d) Shape

306. Which of the following statements do not form a part of Bohr's model of hydrogen atom?

a) Energy of the electrons in the orbits are quantised.

b) The electron in the orbit nearest to the nucleus has the lowest energy.

c) Electrons revolve in different orbits around the nucleus.

d) The position and velocity of electrons in the orbit cannot be determined simultaneously.

307. If an isotope of hydrogen has two neutrons in its atom, its atomic number and atomic mass respectively be

a) 2 and 1 b) 1 and 1 c) 3 and 1 d) 1 and 3

308. An ion with mass number 56 contains 3 units of positive charge and 30.4% more neutrons than electrons. What would be the symbol of this ion?

a) ${}^{56}_{26}Fe^{3+}$ b) ${}^{56}_{26}Fe^{2+}$ c) ${}^{56}_{27}Co^{2+}$ d) ${}^{58}_{27}Co^{3+}$

309. Which of the following are true for cathode rays?

a) It travels along a straight line b) It emits X-rays when strikes a metal

c) It is an electromagnetic wave d) It is not deflected by magnetic field

310. Assertion: In hydrogen and hydrogen like species, orbital energy depends only on the quantum number n whereas in multi-electron atoms it depends on quantum numbers n and l.

Reason: The principal quantum number determines the size and the energy of the orbital.

a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

311. How many electrons can fit in the orbital for which n = 3 and 1= 1?
a) 2 b) 6 c) 10 d) 14

312. What will be the orbital angular momentum of an electron in 2s-orbital?
a) Zero b) One c) Two d) Three

313. What is the K.E. of photo electrons.
a) 6.23×10^{-20} J b) 6.25×10^{-22} J c) 6.625×10^{-18} J d) 6.625×10^{-19} J

314. Sodium ion is isoelectronic with the atom
a) Mg^{2+} b) Al^{3+} c) Ne d) N^{3-}

315. Assertion: When an iron rod is heated in a furnace, the radiation emitted goes from a lower frequency to a higher frequency as the temperature increases.
Reason: The energy of a quantum of radiation is proportional to its frequency.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

316. The ratio of wavelength for II line of Balmer series and I line of Lyman series is
a) 1 b) 2 c) 3 d) 4

317. The configuration $1s^2\ 2S^2\ 2p^5\ 3s^1$ shows
a) Ground state of fluorine b) Excited state of fluorine c) Exited state of neon atom
d) Excited state of argon

318. The wavelength of the first member of the Balmer series in hydrogen spectrum is x A° Then the wavelength(in A°) of the first member of Lyman series in the same spectrum is
a) $\frac{5}{27}$x b) $\frac{4}{3}x$ c) $\frac{27}{5}$x d) $\frac{5}{36}$x

319. Assertion: In Rutherford's α-particle scattering experiment, most of the α-particles were deflected by nearly 180^0.
Reason: The positive charge of the atom is spread throughout the atom that repelled and deflected the positively charged α-particles.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

320. Splitting of spectral lines under the influence of magnetic field is called
a) Stark effect b) Zeeman effect c) photoelectric effect d) screening effect

321. Which of the following properties of atom could be explained correctly by Thomson model of atom?
a) Overall neutrality of atom b) Spectra of hydrogen atom
c) Position of electrons, protons and neutrons in atom d) Stability of atom

322. Ionisation energy of He^+ is 19.6×10^{-18} J $atom^{-1}$. The energy of the first stationary state (n = 1) of Li^{2+} is
a) -4.41×10^{-18} J.$atom^{-1}$ b) -4.41×10^{-17} J.$atom^{-1}$ c) -4.41×10^{-16} J.$atom^{-1}$
d) -8.72×10^{-18} J.$atom^{-1}$

323. The electronic configuration of gadolinium (Atomic number 64) is
a) [Xe]$4f^8$, $5d^9$, $6s^2$ b) [Xe]$4f^7$, $5d^1$, $6s^2$ c) [Xe)$4f^6$, $5d^2$, $6s^2$ d) [Xe)$4f^3$, $5d^5$, $6s^2$

324. Which of the following is not permissible arrangement of electrons in an atom?
a) $n = 5, l = 3, m = 0, s = +1/2$ b) $n = 3, l = 2, m = -3, s = -1/2$
c) $n = 3, l = 2, m = -2, s = -1/2$ d) $n = 4, l = 0, m = 0, s = +1/2$

325. The nucleus of tritium consists of
a) 1 proton+1 neutron b) 1 proton+3 neutrons c) 1 proton+zero neutrons
d) 1 proton+2 neutrons

326. Which statement about energy level in H-atom is correct?
a) Only n and l decide energy level b) Only l decides energy level
c) Only n decides energy level d) n, l and m decide energy level

327. Half-life for radioactive ^{14}C is 5760 yr. In how many years, 200 mg of ^{14}C will be reduced to 25 mg?
a) 5760 yr b) 11520 yr c) 17280 yr d) 23040 yr

328. The number of elements in the third period of the periodic table is:
a) 2 b) 8 c) 18 d) 32

329. The energy of an electron in the first Bohr's orbit ofa hydrogen atom is 2.18 x 10^{-18}J. Its energy in the second orbit would be
a) -1.09 x 10^{-18} J b) -4.36 x 10^{-18} J c) -5.45 x 10^{-19} J d) -8.72 x 10^{-18} J

330. Which quantum number defines the orientation of orbital in the space around the nucleus ?
a) Principal quantum number (n) b) Angular momentum quantum number
c) Magnetic quantum number (m_l) d) Spin quantum number (m_s)

331. What is the electronic configuration of O^{2-} ion?
a) $1s^2\ 2s^2\ 2p^6$ b) $1s^2\ 2s^2\ 2p^4$ c) $1s^2\ 2s^2\ 2p^5$ d) $1s^2\ 2s^2\ 2p^3$

332. The angular momentum of electron in 'd' orbital is equal to:
a) $2\sqrt{3}\hbar$ b) $\hbar$ c) $\sqrt{6}\hbar$ d) $\sqrt{2}\hbar$

333. The order of filling of electrons in the orbitals of an atom will be
a) 3d, 4s, 4p, 4d, 5s b) 4s, 3d, 4P, 5s, 4d c) 5s, 4p, 3d, 4d, 5s d) 3d, 4P, 4s, 4d, 5s

334. If the wavelength of the electron is numerically equal to the distance travelled by it in one second, then
a) $\lambda = \sqrt{\frac{h}{m}}$ b) $\lambda = \frac{h}{p^2}$ c) $\lambda = \frac{h}{m}$ d) $\lambda = \sqrt{\frac{h}{p}}$

335. Difference between incident frequency and threshold frequency is
a) 9.4 x 10^{13} Hz b) 8.5 x 10^{12} Hz c) 9.4 x 10^{12} Hz d) 8.4 x 10^{10} Hz

336. The electrons identified by quantum numbers n and 1 can be placed in the order of increasing energy as:
1. n = 4, l = 1
2. n = 4, l = 0
3. n = 3, l = 2
4. n = 3, l = 1
a) 3 > 4 < 2 < 1 b) 4 < 2 < 3 < 1 c) 2 < 4 < 1 ≤ 3 d) 1 < 3 ≤ 2 < 4

337. Which of the following is isoelectroic?
a) CO_2, NO_2 b) NO_3^-, CO_3^{2-} c) CN, CO d) SO_2, CO_2

338. Time taken for an electron to complete one revolution in Bohr orbit of hydrogen atom is
a) $\frac{4\pi^2 mr^2}{nh}$ b) $\frac{nh}{4\pi^2 mr}$ c) $\frac{2\pi mr}{n^2h^2}$ d) $\frac{h}{2\pi mr}$

339. Which of the following has maximum unpaired d-electrons?
a) Zn^+ b) Fe^{2+} c) Ni^{3+} d) Cu^+

340. An orbital is described with the help of a wave function. Since many wave functions are possible for an electron, there are many atomic orbitals. When atom is placed in a magnetic field the possible number of orientations for an orbital of azimuthal quantum number 3 is:
a) three b) two c) five d) seven

341. The ratio of charge to mass of an electron in coulombs per gram was determined by J.J. Thomson. He determined this ratio by measuring the deflection of cathode rays in electric and magnetic fields. What value did he find for this ratio?
a) -1.76 x 10^8 coulombs/g b) 1.76 x 10^{-8} coulombs/g c) -1.76 x 10^{10} coulombs/g
d) -1.76 x 10^{-10} coulombs/g

342. The value of X-intercept:
a) 9 x 10^4 Hz b) 10.2 x 10^5 Hz c) 8.6 x 10^5 Hz d) 9 x 10^{14} Hz

343. If radiation correcsponding to second line of "Balmer series" of Li^{2+} ion, knocked out electron from first excited state of H-atom, then kinetic energy of ejected electron would be:
a) 2.55 eV b) 4.25 eV c) 11.25 eV d) 19.55 eV

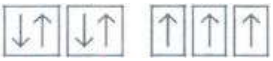
344. The energy of the electron in a hydrogen atom has a negative sign for all possible orbits because:
a)
when the electron is attracted by the nucleus and is present in orbit n, the energy is emitted and its energy is lowered.
b)
when the electron is attracted by the nucleus and is present in orbit n, the energy is absorbed and its energy is increased.
c)
when the electron is repelled by the nucleus, the energy is released and its energy is lowered.
d) none of these.

345. The half-life of a substance in a certain enzyme -catalyzed reaction is 138 s. The time required for the concentration of the substance to fall from 1.28 $1.28 \mathrm{mg L^{-1}}$ to $0.04 \mathrm{mg L^{-1}}$ is:
a) 414 s b) 552 s c) 690 s d) 276 s

346. The number of nodes for 4f orbital is:
a) 0 b) 1 c) 2 d) 3

347. Which of the following relates a photon, both as a wave and as a stream or particles?
a) $E = mc^2$ b) Photoelectric effect c) Diffraction d) $E = h\upsilon$

348. Ground state electronic configuration of nitrogen atom can be represented by:

a) b)  c)

d)

349. The velocity of an electron in a certain Bohr orbit of H-atom bears the ratio 1:275 to the velocity of light. The quantum number (n) of the orbit is
a) 3 b) 2 c) 1 d) 4

350. The energy difference between the ground state of an atom and its excited state is 3×10^{-19} J. What is the wavelength of the photon required for this transition?
a) 6.6×10^{-34} m b) 3×10^{-8} m c) 1.8×10^{-7} m d) 6.6×10^{-7} m

351. Which of the following is not an electromagnetic radiation?
a) X-rays b) Gamma-rays c) Infrared -rays d) Cathode -rays

352. The electronic configuration of sodium is
a) $[Ne]3s^2$ b) $[Ne]3s^1$ c) $[Ar]4s^1$ d) $[Ar]4s^2$

353. The atomic number of an element 'M' is 26. How many electrons are present in the M-shell of the element in its M^{3+} state?
a) 11 b) 15 c) 14 d) 13

354. Consider the ground state of Cr atom (Z = 24). The numbers of electrons with the azimuthal quantum numbers, l = 1 and 2 are, respectively
a) 12 and 4 b) 16 and 5 c) 16 and 4 d) 12 and 5

355. The number of nodes and nodal planes in 4p orbital are respectively
a) 2,1 b) 1,2 c) 2,3 d) 3,2

356. Describe the orbital with following quantum numbers:
(i) n=3, l=2
(ii) n=4,l=3
a) (i) 3p, (ii) 4f b) (i) 3d, (ii) 4d c) (i) 3f, (ii) 4f d) (i) 3d, (ii) 4f

357. The probability of finding out an electron at a point within an atom is proportional to the
a) square of the orbital wave function i.e., Ψ^2 b) orbital wave function i.e., Ψ
c) Hamiltonian operator i.e., H d) principal quantum number i.e., n

358. The energy of a I,II and III energy levels of a certain atom are E, $\frac{4E}{3}$ and 2E respectively A photon of wavelength λ is emitted during a transition from III to I. What will be the wavelength of emission for transition II to I?
a) $\frac{\lambda}{2}$ b) λ c) 2λ d) 3λ

359. Which of the following sets of quantum numbers is correct for an electron in 4f orbital?
a) n = 4, l= 3, m = + 4, s = +1/2 b) n = 3, l= 2, m = -2, s = +1/2
c) n = 4, l= 3, m = + 1, s = + 1/2 d) n = 4, l= 0, m_1 = 0, m_s = + 1/2

360. The value of Planck's constant is 6.63×10^{34} Js. The speed of light is 3×10^{17} nm s^1. Which value is closest to the wavelength in nanometer of a quantum of light with frequency of 6×10^{15} s^1?
a) 25 b) 50 c) 75 d) 10

361. The maximum number of electrons that can be present in an orbital with s = +1/2 and l = 2
a) 1 b) 2 c) 5 d) 7

362. The hydrogen-like species Li^{2+} is in a spherically symmetric state S_1 with one radial node. Upon absorbing light the ion undergoes transition to a state S_2 The state S_2 has one radial node and its energy is equal to the ground state energy of the hydrogen atom. Energy of the state s_1 in units of the hydrogen atom ground state energy is
a) 0.75 b) 1.50 c) 2.25 d) 4.50

363. The increasing order of e/m values for electron, proton, neutron and alpha particle is
a) e, p, n, α b) n, p, e, α c) n. p, α, e d) n, α, p, e

364. What will be the energy of a photon which corresponds to the wavelength of 0.50 Å?
a) 3.98×10^{-15}J b) 3×10^{15} J c) 3.9×10^{8} J d) 3×10^{-34}J

365. Which of the following configurations represents the most electronegative element?
a) $1s^2\ 2s^2\ 2p^6\ 3s^1$ b) $1s^2\ 2s^2\ 2p^5$ c) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$ d) $1s^2\ 2s^2\ 2p^4$

366. The half-life of ${}_6C^{14}$, $\left(\lambda = 2.31 \times 10^{-4} \text{ per year}\right)$ is
a) $2 \times 10^2 \text{yr}$ b) $3 \times 10^3 \text{yr}$ c) $3.3 \times 10^4 \text{yr}$ d) $4 \times 10^3 \text{yr}$

367. Mark the incorrect statement regarding the photoelectric effect.
a)
There is no time lag between the striking of light beam and the ejection of electrons from the metal surface
b) The number of electrons ejected is inversely proportional to the intensity of light
c) Photoelectric effect is not observed below threshold frequency
d) The kinetic energy of the electrons increases with increase in frequency of light used

368. Which is the correct order of increasing energy of the listed orbitals in the atom of titanium? (Atomic Number Z = 22)
a) 4s 3s 3p 3d b) 3s 3p 3d 4s c) 3s 3p 4s 3d d) 3s 4s 3p 3d

369. Total number of orbitals associated with third shell will be _____ .
a) 2 b) 4 c) 9 d) 3

370. If an ion of ${}_{25}Mn$ has a magnetic of 3.873 B.M. Then Mn is in which state.
a) + 2 b) + 3 c) + 4 d) + 5

371. How many orbitals in total are associated with 4th energy level?
a) 4 b) 9 c) 16 d) 7

372. Three elements 'X, 'Y' and 'Z' have atomic numbers 18, 19 and 20 respectively. How many electrons are present in the M shells of these elements?
a) 8,9,10 b) 8,10,13 c) 8,8,8 d) 8,9, 12

373. A 100 watt bulb emits monochromatic light of wavelength 400 nm. Calculate the number of photons emitted per second by the bulb.
a) $3 \times 10^{20}\ s^{-1}$ b) $2 \times 10^{-20}\ s^{-1}$ c) $2 \times 10^{20}\ s^{-1}$ d) $1 \times 10^{-20}\ s^{-1}$

374. Energy of an electron in n^{th} Bohr orbit is given as
a) $-\dfrac{n^2h^2}{4\pi^2mZe^2}$ b) $-\dfrac{2\pi^2Z^2me^4}{n^2h^2}$ c) $-\dfrac{2\pi Ze^2}{nh}$ d) $-\dfrac{n^2h^2}{2\pi^2Z^2me^4}$

375. Number of unpaired electrons in N^{2+} is/are
a) 2 b) 0 c) 1 d) 3

376. Who modified Bohr's theory by introducing elliptical orbits for electron path?

a) Hund b) Thomson c) Rutherford d) Sommerfeld

377. The quantum number which is equal for all the d-electrons in an atom is
a) 1 b) m c) s d) n

378. A hydrogen atom in the ground state is excited by monochromatic ratiation of wavelength λ $\overset{\circ}{A}$. The resulting spectrum consists of maximum 15 different lines. What is the wavelength λ ?
a) 937.3$\overset{\circ}{A}$ b) 1025$\overset{\circ}{A}$ c) 1236$\overset{\circ}{A}$ d) 1120$\overset{\circ}{A}$

379. A proton and an electron are accelerated by the same potential difference. If λ_e and λ_p denote the De-broglie wavelength of electron and proton then
a) $\lambda_e = \lambda_p$ b) $\lambda_e < \lambda_p$ c) $\lambda_e > \lambda_p$ d) No releation between λ_e and λ_p

380. The spin-only magnetic moment of free ion is $\sqrt{8}$ B.M. The spin angular momentum of electron will be
a) $\sqrt{2}\frac{h}{2\pi}$ b) $\sqrt{8}\frac{h}{2\pi}$ c) $\sqrt{6}\frac{h}{2\pi}$ d) $\sqrt{\frac{3}{4}}\frac{h}{2\pi}$

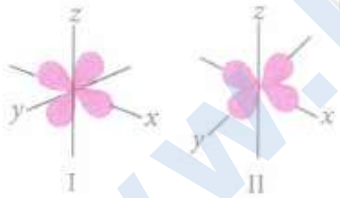
381. Carbon- 14 dating method is based on the fact that
a) carbon-14 fraction is same in all objects b) carbon-14 is highly insoluble
c) ratio of carbon-14 and carbon-12 is constant d) All of the above

382. Maximum number of electrons in a subshell of an atom is determined by the following:
a) 2l + 1 b) 4l - 2 c) $2n^2$ d) 4l + 2

383. The electron was originally in
a) n = 3 b) n = 4 c) n = 5 d) n = 2

384. The d-orbital with out two nodal surfaces formed one is:
a) $3d_{x^2-y^2}$ b) $3d_{x^2}$ c) $3d_{xy}$ d) $4d_{xy}$

385. Observe the given boundary surface diagrams of two orbitals I and II and choose the correct option.



a) I-$d_{x^2-y^2}$, II-d_{yz} b) I-d_{yz}, II-$d_{x^2-y^2}$ c) I-d_{xz}, II-d_{z^2} d) I-d_{xy}, II-dxz

386. A particle X moving with a certain velocity has a debroglie wave length of $1A^0$. If particle Y has a mass of 25% that of X and velocity 75% that of X, debroglies wave length of Y will be:
a) 3 A^0 b) 5.33 A^0 c) 6.88 A^0 d) 48 A^0

387. The region where probability density function reduces to zero is called
a) probability density region b) nodal surfaces c) orientation surfaces d) wave function

388. Which of the following quantum numbers are correct for the outermost electron of sodium atom?
a) n = 4, 1 = 0, m = 0, s = +1/2 b) n = 3, l = 0, m = 0, s = -1/2 c) n=3, l= 1, m=+1, s=+1/2
d) n=3, l=2, m=-l, s=-1/2

389. An element with mass number 81 contains 31.7% more neutrons as compared to protons. Assign the atomic symbol.

a) ${}^{81}_{34}Br$ b) ${}^{81}_{35}Br$ c) ${}^{81}_{36}Sr$ d) ${}^{81}_{37}Sr$

390. The orbitals are called degenerate when:
a) they have the same wave functions
b) they have the same wave functions but different energies
c) they have different wave functions but same energy d) they have the same energy

391. What will be the value of modified Rydberg's constant, if the nucleus having mass m_N and the electron having mass m_e revolve around the centrer of the mass?
a) $R_H \times \frac{m_N}{m_e}$ b) $R_H \times \frac{m_e}{m_N}$ c) $R_H \times \frac{m_e}{m_N + m_e}$ d) $R_H \times \frac{m_N}{m_N + m_e}$

392. The longest wavelength doublet absorption transition is observed at 589 and 589.6 nm. Energy difference between two excited states is :
a) 3.31 x 10^{-22} kJ b) 3.31 x 10^{-22} J c) 2.98 x 10^{-21} J d) 3.0 x 10^{-21} kJ

393. How many subshells and electrons are associated with n = 4?
a) 32, 64 b) 16, 32 c) 4, 16 d) 8, 16

394. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Uncertainty of an object	(i)	$\frac{5.29 \times n^2}{Z}$
(B)	Bohr's radius of an orbit	(ii)	$\frac{h}{4\pi m}$
(C)	Angular momentum of an electron	(iii)	$\frac{h}{mv}$
(D)	de Broglie wavelength	(iv)	$n.\frac{h}{2\pi}$

a) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii) b) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (iii)
c) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶ (ii) d) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (iii)

395. For the electrons of oxygen atom, which of the following statements is correct?
a) Z_{eff} for an electron in a 2s orbital is the same as Z_{eff} for an electron in a 2p orbital
b) An electron in the 2s orbital has the same energy as an electron in the 2p orbital
c) Z_{eff} for an electron in ls orbital is the same as Z_{eff} for an electron in a 2s orbital
d)
The two electrons present in the 2s orbital have spin quantum numbers, m_s but of opposite sign

396. Chlorine exists in two isotopic forms, Cl-37 and Cl-35 but its atomic mass is 35.5. This indicates the ratio of Cl-37 and Cl-35 is approximately
a) 1:2 b) 1:1 c) 1:3 d) 3:1

397. The ratio of magnetic moments of Fe (III) and Co (II) is
a) $\sqrt{7} : \sqrt{3}$ b) $\sqrt{35} : \sqrt{15}$ c) 7:3 d) $\sqrt{24} : \sqrt{15}$

398. Though the five d-orbitals are degenerate, the first four d-orbitals are similar to each other in shape whereas the fifth d-orbital is different from others. What is the name of the fifth orbital?
a) $d_{x^2-y^2}$ b) d_z^2 c) d_{xz} d) d_{xy}

399. An element has 13 electrons in its M shell and 1 electron in N shell in ground state. Identify the element.
a) Copper b) Chromium c) Iron d) Manganese

400. The mass of a praticle is 10^{-10}g and its radius is 2x10^{-4} cm. If its velocity is 10^{-6} cm sec^{-1} with 0.0001% uncertainity in measurement. the uncertainty in its position is:

a) 5.2 x 10^{-8}m b) 5.2 x 10^{-7}m c) 5.2 x 10^{-6}m d) 5,2 x 10^{-9}m

401. The de-Broglie wavelength of an electron accelerated by an elelctric field of 'V' volts is given by:

a) $\lambda = \frac{1.23}{\sqrt{m}}$ b) $\lambda = \frac{1.23}{\sqrt{h}}m$ c) $\lambda = \frac{1.23}{\sqrt{V}}nm$ d) $\lambda = \frac{1.23}{V}$

402. Wavelength of the wave associated with a moving electron

a) Decreases with increase in speed of electron

b) Increases with increase in speed of electron

c) Remains same irrespective of speed of electron d) is zero

403. The incorrect statement regarding cathode rays is

a) They travel in straight line b) They depend on the nature of the gas

c) They are deflected by magnetic as well as electric fields

d) They produce mechanical effects

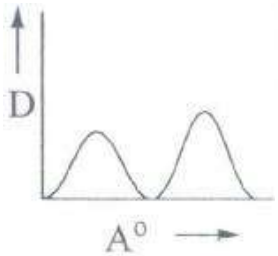
404. The energy of second lohrorbit of the hydrogen atom is -328 kJ mol^{-1}; hence, the energy of fourth Bohr orbit would be:

a) -41 kJ mol^{-1} b) -82 kJ mol^{-1} c) -164 kJ mol^{-1} d) -1312 kJ mol^{-1}

405. Number of nodal spaces in 4s orbital is

a) 0 b) 1 c) 3 d) 4

406. The set of quantum numbers 'n' and 'l', possible for the orbital shown in the radial probability curve are



a) n=3;l=2 b) n = 4; l= 1 c) n = 2; l=0 d) n=3;l=3

407. The number of radial nodes for 3p orbital is _____

a) 3 b) 4 c) 2 d) 1

408. Assertion: All the isotopes of a given element show same chemical behaviour.

Reason: Isotopes have different number of neutrons present in the nucleus.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

409. Match the following.

List-I	List-II
a) n = 2, l= 1, m = -1	p) $2p_x$ or $2p_y$
b) n = 4, l = 2, m = 0	q) $4dz^2$
c) n=3,l=1,m=±1	r) $3P_x$ or $3p_y$
d) n = 4, l= 0, m = 0	s) 4s
e) n = 3, l= 2, m = ±2	t) $3dx^2 - y^2$ or 3dxy

a) a-q , b-r , c-p ,d-s e-t b) a-t,b-r, c-s, d-p, e-t c) a-p,b-q, c-r, d-s, e-t
d) a-s,b-t,c-r,d-s, e-p

410. The number of d-electrons in Fe^{2+} (Z = 26) is not equal to the number of electrons in which one of the following?
a) d-electrons in Fe (Z = 26) b) p-electrons in Ne (Z = 10) c) s-electrons in Mg (Z = 12)
d) p-electrons in Cl (Z = 17)

411. The uncertainities in the velocities of two particles A and B are 0.05 and 0.02m sec^{-1} respectively. The mass of B is five times to that of mass A. What is the ratio of uncertainities $\left(\frac{\Delta x_A}{\Delta x_B}\right)$ in that positions
a) 2 b) 0.25 c) 4 d) 1

412. If n and l are principle and azimuhtal quantum numbers respectively, then the expression for calculating the total number of electrons in any energy level is
a) $\sum_{l=0}^{l=n} 2(2l+1)$ b) $\sum_{l=1}^{l=n} 2(2l+1)$ c) $\sum_{l=0}^{l=n} (2l+1)$ d) $\sum_{l=0}^{l=n-1} 2(2l+1)$

413. The 3d-orbitals having electron density in all the three axes is
a) $3d_{xy}$ b) $3d_{z^2}$ c) $3d_{yz}$ d) $3d_{zx}$

414. The number of radial nodes and angular nodes for d-orbital can be represented as
a) (n - 2) radial nodes + 1 angular node = (n - 1) total nodes
b) (n - 1) radial nodes + 1 angular node = (n - 1) total nodes
c) (n - 3) radial nodes + 2 angular nodes = (n - l - 1) total nodes
d) (n - 3) radial nodes + 2 angular nodes = (n - 1) total nodes

415. Which of the following configuration is correct for iron?
a) $1s^2, 2s^22p^6, 3s^23p^6\ 3d^5$ b) $1s^2,2s^22p^6, 3s^23p^6, 4s^2, 3d^5$ c) $1s^2,2s^22p^6, 3s^23p^6, 4s^2,3d^7$
d) $1s^2,2s^22p^6, 3s^23p^6\ 3d^6,4s^2$

416. The wavelength of visible light is
a) 200 nm - 370 nm b) 780 nm - 890 nm c) 380 nm - 760 nm d) 900 nm - 2000 nm

417. For an electron to have the same de broglie wave length as that of a Deutron. its velocity should be times that of Deutron
a) 1836 b) 1/1836 c) 3672 d) 1/3672

418. Based on equation $\mathrm{E} = -2.178 \times 10^{-18}\left(\frac{Z^2}{n^2}\right)\mathrm{J}$ certain conclusion are written. which of them is not correct?
a) Larger the value of n, the larger is the orbit radius
b) equation can be used to calculate the change in energy when the electron changes orbit.
c)
For n = 1. tire electron has a more negative energy, than it does for n = 6 which mean that the electron is more loosely board in the smallest allowed orbit.
d)
The negative sign in equation simply means that the energy or electron bound to the nucleus is lower than it wouid be if the electron were at the infinite distance from the nucleus.

419. The radius of hydrogen atom in the ground state is 0.53 A. one radius of Li^{2+} ion (at no = 3) in a similar state is:

a) 0.17 A b) 0.53 A c) 0.265 A d) 1.06 A

420. The size of a mircorscopic particle is 1 micron and its mass is 6 x 10^{-13}g. If its position may be measured to within 0.1 % of its size, the uncertainiry in velocity (in cm^{-1}) is approximately

a) $\frac{10^{-7}}{4\pi}$ b) $\frac{10^{-5}}{4\pi}$ c) 10^{-5} d) 10^{-8}

421. How many nodal planes are there in the atomic orbitals for the principal quantum number n=3?

a) 10 b) 9 c) 11 d) 2

422. The energy absorbed by each molecule (A_2) of a substance is 4.4 x 10^{-19}J and bond energy per molecule is 4.0 x 10^{-19}J. The kinetic energy of the molecule per atom will be :

a) 2.0 x 10^{-20}J b) 2.2 x 10^{-19}J c) 2.0 x 10^{-19}J d) 4.0 x 10^{-20}J

423. Assertion: Elements like Rb, Cs, Tl, In, Ga and Sc were discovered when their minerals were analysed by spectroscopic methods.

Reason: The characteristic lines in atomic spectra can be used in chemical analysis to identify unknown atoms.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

424. For a 3s-orbital $\Psi(3s) = \frac{1}{9\sqrt{3}}\left(\frac{1}{a_0}\right)^{3/2}$ $(6-6\sigma+\sigma^2)e^{-\sigma/2}$; where $\sigma = \frac{2r.Z}{3a_0}$ what is the maximum radial distance of node from nucleus?

a) $\frac{\left(3+\sqrt{3}\right)a_0}{z}$ b) $\frac{a_0}{Z}$ c) $\frac{3}{2}\frac{\left(3+\sqrt{3}\right)a_0}{z}$ d) $\frac{2a_0}{Z}$

425. The above statement is known as :

a) de-Broglie's principle b) Pauli's exclusion principle

c) Heisenberg's Uncertainity principle d) Autbau principle

426. Which of the following conclusions could not be derived from Rutherford's a-particle scattering experiment?

a) Most of the space in the atom is empty.

b) The radius of the atom is about 10^{-10} m while that of nucleus is 10^{-15} m.

c) Electrons move in a circular path of fixed energy called orbits.

d) Electrons and the nucleus are held together by electrostatic forces of attraction.

427. The maximum number electrons in a subshell is given by the expression

a) 4l - 2 b) 4l + 2 c) 2l + 2 d) $2n^2$

428. Which of the following is not a correct statement regarding the energies of orbitals?

a) The lower the value of (n + l) for an orbital, lower is its energy

b) Electrons in the same subshell have equal energy

c) Energy of s-orbital is lower than the p-orbital and that of p-orbital is lower than the d-orbital

d)

If two orbitals have same value for (n + l), the orbital with higher value of n will have lower energy

429. The emission spectrum of He+ involves transition of electron from $n_1 \dashrightarrow n_2$ such that $n_2 + n_1 = 8$ and $n_2 - n_1 = 4$. What will be the total number of lines in the spectrum?
a) 10 b) 15 c) 20 d) 21

430. In a multi - electron atom, which of the following orbitals described by the three quantum numbers will have the same energy in the absence of magnetic and electric field
i) n = 1, l= 0, m = 0 ii) n = 2, l = 0, m = 0 iii) n = 2, l = 1, m = 1
iv) n = 3,l = 2 m = 1 v) n = 3,l = 2,m = 0
a) i and ii b) ii and iii c) iii and iv d) iv and v

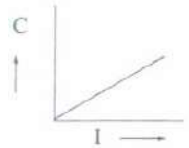
431. How many neutrons are there in $^{88}_{38}Sr$?
a) 38 b) 50 c) 126 d) 88

432. If uncertainty in position and momentum are equal, then uncertainty in velocity is :
a) $\frac{1}{2m}\sqrt{\frac{h}{\pi}}$ b) $\sqrt{\frac{h}{2\pi}}$ c) $\frac{1}{m}\sqrt{\frac{h}{\pi}}$ d) $\sqrt{\frac{h}{\pi}}$

433. According to Bohr's theory, the electronic energy of H-atom in Bohr's orbit is given by
a) $E_n = -\frac{2.18\times10^{-19}\times Z}{2n^2}$ J b) $E_n = -\frac{2.179\times10^{-18}\times Z^2}{n^2}$ J c) $E_n = -\frac{21.79\times10^{-18}\times Z}{2n^2}$ J
d) $E_n = -\frac{21.8\times10^{-21}\times Z^2}{n^2}$ J

434. Consider the following pairs of ions
i) Sc^{+3} and Ti^{+4} ii) Mn^{+2} and Fe^{+2} iii) Fe^{+2} and CO^{+3} iv) Cu^{+} and Zn^{+2}
Among these pairs of ions, isoclcctronic pairs would include
a) ii, iii and iv b) i, iii and iv c) i, ii and iv d) i, ii and iii

435. For s-orbitals, since Ψ (orbital) is independent of angles, the probability (Ψ^2) is
a) also independent of angles b) spherically symmetric c) both (1) and (2) are correct
d) both (1) and (2) are incorrect

436. The graph between photo electron current (c) and intensity of photon (I)
a)  b) c) d)

437. Assertion: The outer electronic configurations of Cr and Cu are $3d^5 4s^1$ and $3d^{10} 4s^1$ respectively.
Reason: Electrons are filled in orbitals in order of their increasing energies given by (n + l) rule.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

438. The work function of a metal is 4.2 eV. If radiations of $2000A^0$ fall on the metal. then the kinetic energy of the fastest photoelectron is
a) 1.6×10^{-19} J b) 16×10^{10} J c) 6.4×10^{-10} J d) 3.2×10^{-19} J

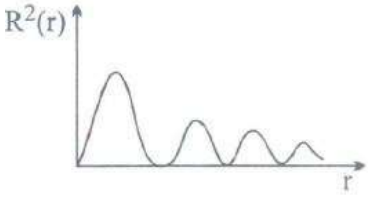
439. In a radioactive decay, an emitted electron comes from
a) the nucleus of atom b) the orbit with principal quantum number
c) the inner orbital of the atom d) the outermost orbit of the atom

440. The wave length of light having wave number 4000 cm^{-1} is
a) 2.5μm b) 250μm c) 25μm d) 25 nm

441. The electron was shown experimentally to have wave properties by :
a) de-Broglie b) N Bohr c) Davisson and Germer d) Schrodinger

442. The emission spectrum of hydrogen is found to satisfy the expression for the energy change $\Delta E = 2.18 \times 10^{-18} \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$ J where n_1 = 1, 2, 3, ... and n_2 = 2, 3, 4. The spectral lines corresponds to Paschen series if
a) n_1 = 1 and n_2 = 2, 3, 4 b) n_1 = 3 and n_2 = 4, 5, 6 c) n_1 = 1 and n_2 = 3, 4, 5
d) n_1 = 2 and n_2 = 3,4,5

443. From the following observations predict the type of orbital :
Observation I: x y plane acts as a nodal plane
Observation 2: The angular function of the orbital intersect the three axis at origin only.
Observation 3: $R^2(r)$ v / sr curve is obtained for the orbital is



a) $5p_z$ b) $6d_{xy}$ c) 6 dx^2-y^2 d) 6 d_{yz}

444. The number of sub levels in the quantum level n = 3 is
a) 1 b) 2 c) 3 d) 4

445. The configuration of the valence orbital of an element with atomic number 22 is
a) $3d^5\ 4s^1$ b) $3d^2 4s^2$ c) $4s^1\ 4p^1$ d) $3d^2\ 4s^1\ 4p^1$

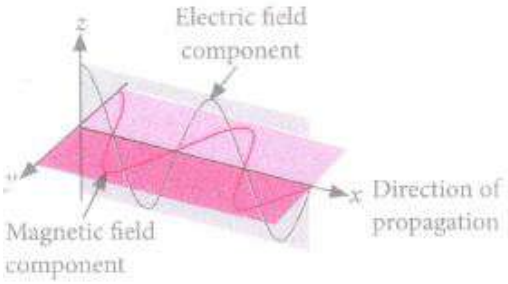
446. The ions $O^{2-}, F^-, Na^+, Mg^{2+}$ and Al^{3+} are isoelectronic. Their ionic radii show :
a) A decrease from O^{2-} to F^- and then increase from Na^+ to Al^{3+}
b) A significant increase from O^{2-} to Al^{3+} c) A significant decrease from O^{2-} to Al^{3+}
d) An increase from O^{2-} to F and then decrease from Na^+ to Al^{3+}

447. Assertion: The characteristics of cathode rays do not depend upon the material of electrodes and the nature of the gas present in the cathode ray tube.
Reason: Cathode rays consist of negatively charged particles, called electrons.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

448. Which one is not in agreement with Bohr's model of the atom?
a) Line spectra of hydrogen atom b) Pauli's exclusion principle c) Planck's theory
d) Heisenberg's uncertainty principle

449. Assertion: For l = 2, m, can be -2, -1,0, + 1 and +2.
Reason: For a given value of l, (2l + 1) values of m_1 are possible.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

450. Consider the figure of electromagnetic wave, and choose the correct information related to it.



a) These components have same wavelength and speed

b) They vibrate in two mutually perpendicular planes

c) Electromagnetic waves do not require medium and can move in vacuum d) All of these

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Ravi Maths Tuition Centre

Time : 200 Mins **BASIC CONCEPTS OF CHEMISTRY 1** **Marks : 542**

1. What volume of 5 M Na_2SO_4 must be added to 25 mL of 1 M $BaCl_2$ to produce 10 g of $BaSO_4$?
   a) 8.57 mL b) 7.2 mL c) 10 mL d) 12 mL
2. The empirical formula of a compound is CH_2O_2 What could be its molecular formula?
   a) $C_2H_2O_2$ b) $C_2H_2O_4$ c) $C_2H_4O_4$ d) CH_4O_4
3. The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphite ion in acidic solution is :
   a) 4/5 b) 2/5 c) 1 d) 3/5
4. The number of moles of oxygen in 1 L of air containing 21%oxygen by volume, under standard conditions, is :
   a) 0.0093 mole b) 2.10 moles c) 0.186 mole d) 0.21 mole
5. What quantity of copper oxide will react with 2.80 L of hydrogen at NTP?
   a) 79.5 g b) 2 g c) 9.9 g d) 22.4 g
6. What should be the volume of the milk (in m^3)which measures 5 L?
   a) 5×10^{-3} m^3 b) 5×10^3 m^3 c) $5 \times 10000 m^3$ d) 5×10^6 m^3
7. How many significant figures are present in 0.010100×10^{-3}?
   a) 7 b) 5 c) 3 d) 10
8. One litre hard water contains 12.00 mg Mg^{2+} Milliequuivalents of washing soda required to remove its hardness is
   a) 1 b) 12.16 c) 1×10^{-3} d) 12.16×10^{-3}
9. Boron has two stable isotopes, ^{10}B (19%) and ^{11}B (81%). Average atomic weight for boron in the periodic table is:
   a) 10.8 b) 10.2 c) 11.2 d) 10.0

10. The statements for laws of chemical combinations are given below. Mark the option which is not correctly matched.

a) Matter can neither be created nor destroyed: Law of conservation of mass

b)

A compound always contains exactly the same proportion of elements by weight: Law of definite proportions

c) When gases combine they do so in a simple ratio by weight: Gay Lussac's Law

d)

Equal volumes of gases at same temperature and pressure contain same number of molecules: Avogadro's Law

11. A solution is prepared by adding 5 g of a solute 'X' to 45 g of solvent 'Y. What is the mass per cent of the solute 'X'?

a) 10% b) 11.1% c) 90% d) 75%

12. HCl is produced in the stomach which can be neutralised by $Mg(OH)_2$ in the form of milk of , magnesia. How much $Mg(OH)_2$ is required to : neutralise one mole of stomach acid?

a) 29.16 g b) 34.3 g c) 58.33 g d) 68.66 g

13. The number of gram molecules of oxygen in 6.02×10^{24} CO molecules is :

a) 10 g molecules b) 5 g molecules c) 1 g molecule d) 0.5 g molecules

14. An organic compound contains carbon, hydrogen and oxygen. Its elemental analysis gave C 38.71% and H9.67%. The empirical formula of the compound would be:

a) CH_3O b) CH_2O c) CHO d) CH_4O

15. The number of oxygen atoms in 4.4 g of CO_2 is :

a) 1.2×10^{23} atoms b) 6×10^{23} atoms c) 6×10^{23} atoms

d) 12×10^{23} atoms

16. Specific volume of cylindrical virus particle is 6.02×10^{-2} cc/gm. Whose radius and length 6 A respectively. If $N_A = 6.02 \times 10^{23}$, find molecular weight of virus

a) 3.08×10^3 kg/mol b) 3.08×10^4 kg/mol c) 1.54×10^4 kg/mol

d) 15.4 Kg/mol

17. Two students performed the same experiment separately and each one of them recorded two readings of mass which are given below. Correct reading of mass is 3.0 g. On the basis of given data, mark the correct option out of the following

statements.

Student	Readings	
	(i)	(ii)
A	3.01	2.99
B	3.05	2.95

a) Results of both the students are neither accurate nor precise.
b) Results of student A are both precise and accurate.
c) Results of student B are neither precise nor accurate.
d) Results of student B are both precise and accurate.

18. 4.28 g of NaOH is dissolved in water and the solution is made to 250 cc. What will be the molarity of the solution?
a) 0.615 mol L^{-1} b) 0.428 mol L^{-1} c) 0.301 mol L^{-1} d) 0.99 mol L^{-1}

19. A compound contains two elements 'X' and 'Y' in the ratio of 50% each. Atomic mass of 'X' is 20 and 'Y' is 40. What can be its simplest formula?
a) XY b) X_2Y c) XY_2 d) X_2Y_3

20. What mass of hydrochloric acid is needed to decompose 50 g of limestone?
a) 36.5g b) 73 g c) 50 g d) 100 g

21. 2.82 g of glucose is dissolved in 30 g of water. The mole fraction of glucose in the solution is
a) 0.01 b) 0.99 c) 0.52 d) 1.66

22. The following data are obtained when dinitrogen and dioxygen react together to form different compounds:

Mass of dinitrogen	Mass of dioxygen
14 g	16 g
14 g	32 g
28 g	32 g
28 g	96 g

Which law of chemical combination is obeyed by the above experimental data?
a) Law of conservation of mass b) Law of definite proportions
c) Law of multiple proportions d) Avogadro's Law

23. **Assertion:** Temperature below 0°C is possible in Celsius scale but on Kelvin scale, negative temperature is not possible.
Reason: The Kelvin scale is related to Celsius scale as K = 0°C + 273

a)
Both assertion and reason are correct and reason is correct explanation for assertion.
b)
Both assertion and reason are correct but reason is not correct explanation for assertion.
c) Assertion is correct but reason is incorrect.
d) Assertion is incorrect but reason is correct.

24. The number of oxygen atoms present in 1 mole of oxalic acid dihydrate is :
a) 6×10^{23} b) $6..022 \times 10^{34}$ c) 7.22×10^{23} d) 36.13×10^{23}

25. The result of the operation 2.5 x 1.25 should be which of the following on the basis of significant figures?
a) 3.125 b) 3.13 c) 3.1 d) 31.25

26. 0.24 g of a volatile gas. upon vapourisation. gives 45 mL, vapour at NTP. What will be the vapour density of the substance? (Density of H_2 = 0.089)
a) 95.93 b) 59.93 c) 95.39 d) 5.993

27. Which of the following pairs illustrates the law of multiple proportions?
a) PH_3,HCl b) PbO, PbO_2 c) H_2S,SO_2 d) $CuCl_2$,$CuSO_4$

28. The number of atoms present in one mole of an element is equal to Avogadro number. Which of the following element contains the greatest number of atoms?
a) 4 g He b) 46 g Na c) 0.40 g Ca d) 12 g He

29. Percentage of Se in peroxidase anhydrase enzyme is 0.5% by weight (at. weigh = 78.4), then minimum molecular weight of peroxidase anhydrase enzyme is :
a) 1.568×10^3 b) 15.68 c) 2.168×10^3 d) 1.568×10^4

30. The molecular weight of O_2 and SO_2 are 32 and 64 respectively. At 15°C and 150 mm Hg pressure, l L of O_2 contains 'N' molecules. The nunber of molecules in 2 L of SO_2 , under the same conditions of temperature and pressure will he
a) N/2 b) N c) 2N d) 4N

31. A mixture having 2 g of hydrogen and 32 g of oxygen occupies how much volume at NTP?
a) 44.8 L b) 22.4 L c) 11.2 L d) 67.2 L

32. For everyone ^{37}Cl isotope there are three ^{35}Cl isotopes in a sample of chlorine. What will be the average atomic mass of chlorine?

a) 35 b) 37 c) 35.5 d) 35.6

33. The empirical formula and molecular mass of a compound are CH_2O and 180 g respectively. What will be the molecular formula of the compound?
a) $C_9H_{18}O_9$ b) CH_2O c) $C_6H_{12}O_6$ d) $C_2H_4O_2$

34. A mixture of 2.3 g formic acid and 4.5 g oxalic acid is treated with cone. H_2SO_4, The evolved gaseous mixture is passed through KOH pellets. Weight (in g) of the remaining product at STP will be :
a) 1.4 b) 3.0 c) 2.8 d) 4.4

35. What is the concentration of copper sulphate (in mol L^{-1}) if 80 g of it is dissolved in enough water to make a final volume of 3L?
a) 0.0167 b) 0.167 c) 1.067 d) 10.67

36. A compound of magnesium contains 21.9% magnesium, 27.8% phosphorus and 50.3% oxygen. What will be the Simplest formula of the compound?
a) $Mg_2P_2O_7$ b) $MgPO_3$ c) $Mg_2P_2O_2$ d) MgP_2O_4

37. How many grams of CaO are required to react with 852 g of P_4O_{10}?
a) 852 g b) 1008 g c) 85 g d) 7095 g

38. **Assertion:** In laboratory, a solution of a desired concentration is prepared by diluting a stock solution.
Reason : Stock solution is the solution of higher concentration.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) If both assertion and reason are false.

39. The maximum number of molecules is present in:
a) 15 L of H_2 gas at STP b) 15 L of N_2 gas at STP c) 0 5 g of H_2 gas
d) 10 g of O_2 gas

40. Chlorine gas is prepared by reaction of H_2SO_4 with MnO_2 and NaCl. What volume of Cl_2 will be produced at STP if 50 g of NaCl is taken in the reaction?
a) 1.915 L b) 22.4 L c) 11.2 L d) 9.57 L

41. The weight of AgCl precipitated when a solution containing 5.85 g of NaCl is added to a solution containing 3.4 g of $AgNO_3$ is
a) 28 g b) 9.25 g c) 2.870 g d) 58 g

42. What is the mass of carbon dioxide which contains the same number of molecules as are contained in 40 g of oxygen?
a) 40 g b) 55 g c) 32 g d) 44 g

43. What will be the molality of chloroform in the water sample which contains 15 ppm chloroform by mass?
a) 1.25×10^{-4} m b) 2.5×10^{-4} m c) 1.5×10^{-3} m d) 1.25×10^{-5} m

44. Match the prefixes present in column I with their multiples in column II and mark the appropriate choice.

Column I(Prefixes)		Column II(Multiples)	
(A)	plco	(i)	10^{9}
(B)	femto	(ii)	10^{-3}
(C)	milli	(iii)	10^{-12}
(D)	glga	(iv)	10^{-15}

a) (A) $\rightarrow$ (i), (B) $\rightarrow$ (ii), (C) $\rightarrow$ (iii), (D) $\rightarrow$ (iv)
b) (A) $\rightarrow$ (ii), (B) $\rightarrow$ (i), (C) $\rightarrow$ (iv), (D) $\rightarrow$ (iii)
c) (A) $\rightarrow$ (iv), (B) $\rightarrow$ (iii), (C) $\rightarrow$ (i), (D) $\rightarrow$ (ii)
d) (A) $\rightarrow$ (iii), (B) $\rightarrow$ (iv), (C) $\rightarrow$ (ii), (D) $\rightarrow$ (i)

45. At NTP, 1 L of O_2 reacts with 3 L of carbon monoxide. What will be the volume of CO and CO_2 after the reaction?
a) 1 L CO_2, 1 L CO b) 2 L CO_2, 2 L CO c) 1 LCO_2,2 LCO d) 2 L CO_2, 1 L CO

46. Concentrated aqueous sulphuric acid is 98% H_2SO_4 by mass and has a density of 1.80 g mL^{-1}. Volume of acid required to make one litre of 0.1 M H_2SO_4 solution is
a) 16.65 mL b) 22.20 mL c) 5.55 mL d) ll.l0 mL

47. The number of moles of hydrogen molecules required to produce 20 moles of ammonia through Haber's process is:
a) 20 b) 30 c) 40 d) 10

48. Few quantities with their units are listed below. Mark the units which are not correctly matched.
(i) Density: kg m^{-3}
(ii) Velocity of light: m S^{-1}

(iii) Planck's constant :J^{-1} S^{-1}

(iv) Acceleration: m S^{-2}

(v) Force: kg m

a) (ii) and (iv) b) (i) and (iii) c) (iii) and (v) d) (iv) and (v)

49. **Assertion:** One mole of a substance always contain the same number of entities, no matter what the substance may be.

Reason: One mole is the amount of a substance that contains as many particles or entities as there are atoms in exactly 12 g of the ^{12}C isotope.

One mole of a substance always contain the same number of entities, no matter what the substance may be.

a)

Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

b)

Both Assertion and Reason are correct but Reason is not the correct explanationof Assertion

c) Assertion is correct but Reason is incorrect

d) Both Assertion and Reason are incorrect.

50. A solution is made by dissolving 49 g of H_2S0_4 in 250 mL of water. The molarity of the solution prepared is

a) 2 M b) 1 M c) 4 M d) 5 M

51. 0.48 g of a sample of a compound containing boron and oxygen contains 0.192 g of boron and 0.288 g of oxygen. What will be the percentage composition of the compound?

a) 60% and 40% B and O respectively b) 40% and 60% B and O respectively

c) 30% and 70% B and O respectively d) 70% and 30% B and O respectively

52. How many grams of concentrated nitric acid solution should be used to prepare 250 mL of 2.0 M HNO_3? The concentrated acid is 70% HNO_3.

a) 45.0 g conc. HNO_3 b) 90.0 g conc. HNO_3 c) 70.0 g conc. HNO_3

d) 540 g conc. HNO_3

53. Number of atoms in 4.25 g of NH_3 is:

a) 6.023×10^{23} b) $4 \times 6.023 \times 10^{23}$ c) 1.7×10^{24} d) $4.5 \times 6.023 \times 10^{23}$

54. Number of moles of MnO^-_4 required to oxidize one mole of ferrous oxalate completely in acidic medium will be:
    a) 0.6 moles b) 0.4 moles c) 7.5 moles d) 0.2 moles

55. **Assertion:** 12 parts by mass of carbon in CO and CO_2 molecules combine with 16 and 32 parts by mass of oxygen.
    Reason: A given compound always contains exactly the same proportion of elements by weight.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false.
    d) If both assertion and reason are false.

56. Which has maximum number of molecules?
    a) 7 g N_2 b) 2 g H_2 c) 16 g NO_2 d) 16 g O_2

57. Mark the conversion factor which is not correct.
    a) 1 atm = 1.01325 x 10^5 Pa b) 1 metre = 39.37 inches c) 1 litre = 10^{-3} m^3
    d) 1 inch = 3.33 cm

58. The number of atoms in 0.1 mole of a triatomic gas is (N_A= 6.02 X 10^{23} mol^{-1})
    a) 6.026 x 10^{22} b) 1.806 x 10^{23} c) 3.6 x 10^{23} d) 1.8 x 10^{22}

59. What volume of dioxygen is required for complete combustion of 2 volumes of acetylene gas at NTP?
    a) 2 Volumes b) 5 Volumes c) 10 Volumes d) 4 Volumes

60. Assuming fully decomposed, the volume of CO_2, released at STP on heating 9.85 g of $BaCO_3$ (Atomic mass, Ba = 137)will be
    a) 2.24 l b) 4.96 l c) 1.12 l d) 0.84 l

61. Which of the following correctly represents 180 g of water?
    (i) 5 moles of water
    (ii) 10 moles of water
    (iii) 6.023 x 10^{23}molecules of water
    (iv) 6.023 x 10^{24}molecules of water

a) (i) b) (ii) c) (iii) d) (iv)

62. If the concentration of glucose ($C_6H_{12}O_6$) in blood is 0.9 g L^{-1}, what will be the molarity of glucose in blood?
a) 5 M b) 50 M c) 0.005 M d) 0.5 M

63. Which of the following statements about Avogadro's hypothesis is correct?
a)
Under similar conditions of temperature and pressure, gases react with each other in simple ratio.
b)
Under similar conditions of temperature and pressure, equal volumes of all gases contain same number of molecules.
c) At NTP all gases contain same number of molecules.
d) Gases always react with gases only at the given temperature and pressure.

64. How many number of aluminium ions are present in 0.051 g of aluminium oxide?
a) 6.023×10^{20} ions b) 3 ions c) 6.023×10^{23} ions d) 9 ions

65. Chemical reactions involve interaction of atoms and molecules. A large number of atoms/molecules (approximately 6.023×10^{23}) are present in a few grams of any chemical compound varying with their atomic/molecular masses. To handle such large numbers conveniently, the mole concept was introduced. This concept has implications in diverse areas such as analytical chemistry, biochemistry, electrochemistry and radiochemistry. The following example illustrates a typical case, involving chemical! electrochemical reaction, which requires a clear understanding of the mole concept.
A 4.0 molar aqueous solution of NaCI is prepared and 500 mL of this solution is electrolysed. This leads to the evolution of chlorine gas at one of the electrodes (atomic mass: Na = 23, Hg = 200; lfaraday = 96500 coulombs).
If the cathode is a Hg electrode, the maximum weight (g) of amalgam formed from this solution is
a) 200 b) 225 c) 400 d) 446

66. **Assertion:** Matter can neither be created nor destroyed.
Reason: This is law of definite proportions.

a)
If both assertion and reason are true and reason is the correct explanation of assertion

b)
If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false.

d) If both assertion and reason are false.

67. What is $[OH^-]$ in the final solution prepared by mixing 20.0 mL of 0.050 M HCl with 30.0 mL of 0. 10 M $Ba(OH_2)$?
a) 0.40M b) 0.0050M c) 0.12M d) 0.10M

68. Chemical reactions involve interaction of atoms and molecules. A large number of atoms/molecules (approximately 6.023×10^{23}) are present in a few grams of any chemical compound varying with their atomic/molecular masses. To handle such large numbers conveniently, the mole concept was introduced. This concept has implications in diverse areas such as analytical chemistry, biochemistry, electrochemistry and radiochemistry. The following example illustrates a typical case, involving chemical! electrochemical reaction, which requires a clear understanding of the mole concept.
A 4.0 molar aqueous solution of NaCI is prepared and 500 mL of this solution is electrolysed. This leads to the evolution of chlorine gas at one of the electrodes (atomic mass: Na = 23, Hg = 200; lfaraday = 96500 coulombs).
The total charge (coulombs) required for complete electrolysis is
a) 24125 b) 48250 c) 96500 d) 193000

69. **Assertion:** Solids have definite volume and shape.
Reason: In solids, the constituent particles are very close to each other and there is not much freedom of movement
a)
If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false.

d) If both assertion and reason are false.

70. Total number of atoms present in 34 g of NH_3 is
a) 4×10^{23} b) 4.8×10^{21} c) 2×10^{23} d) 48×10^{23}

71. **Assertion:** On heating, a solid usually changes to a liquid and the liquid on further heating changes to the gaseous state.
Reason : Arrangement of constituent particles is different in solid, liquid and gaseous state.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false.

d) If both assertion and reason are false.

72. Liquid benzene (C_6H_6) burns in oxygen according to the equation, $2C_6H_6(l) + 15O_2(g) \longrightarrow 12CO_2(g) + 6H_2O(g)$ How many litres of O_2 at STP are needed to complete the combustion of 39 g of liquid benzene? (Mol. weight of $O_2 = 32$, $C_6H_6 = 78$)
a) 74 L b) 11.2 L c) 22.4 L d) 84 L

73. The number of water molecules is maximum in:
a) 1.8 gram of water b) 18 gram of water c) 18 moles of water
d) 18 molecules of water

74. When 22.4 L of H_2 (g) is mixed with 11.2 L of Cl_2 (g), each at STP, the moles of HCl (g) formed is equal to:
a) 1 mole of HCl (g) b) 2 moles of HCl (g) c) 0.5 mole of HCl (g)
d) 1.5 moles of HCl (g)

75. The final molarity of a solution made by mixing 50 mL of 0.5 M HCl, 150 mL of 0.25 M HCl and water to make the volume 250 mL is
a) 0.5 M b) 1 M c) 0.75 M d) 0.25 M

76. **Assertion :** Molecular formula shows the exact number of different types of atoms present in a molecule of a compound.
Reason: Molecular formula can be obtained directly from empirical formula which represents the simplest whole number ratio of various atoms present in a compound.
a)
Both Assertion and Reason are correct and Reason is the correct explantion for Assertion
b)
Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion
c) Assertion is correct but Reason is incorrect
d) Both Assertion and Reason are incorrect

77. In the reaction $4NH_3(g) + 5O_2(g) - 4NO(g) + 6H_2O(l)$ When I mole of ammonia and I mole of O_2 are made to react to completion, then
a) 1.0 mole of H_2O is produced b) 1.0 mole of NO will be produced
c) all the oxygen will be consumed d) all the ammonia will be consumed

78. What will be the mass of 100 atoms of hydrogen?
a) 100 g b) 1.66×10^{-22} g c) 6.023×10^{23}g d) $100 \times 6.023 \times 10^{23}$ g

79. The mass of carbon anode consumed (giving only carbon dioxide) in the production of 1279 kg of aluminium metal from bauxite by the hall process is (Atomic mass: A1= 27)
a) 270 kg b) 540 kg c) 90 kg d) 180 kg

80. Oxygen occurs in nature as a mixture of isotopes ^{16}O, ^{17}O and ^{18}O having atomic masses of 15.995 u, 16.999 u and 17.999 u and relative abundance of 99.763%, 0.037% and 0.200% respectively. What is the average atomic mass of oxygen?
a) 15.999 u b) 16.999 u c) 17.999 u d) 18.999 u

81. Suppose the elements X and Y combine to form two compounds XY_2 and X_3Y_2. When 0.1 mole of XY_2 weighs 10 g and 0.05 mole of X_3Y_2 weighs 9 g, the atomic weights of X and Y are:
a) 40, 30 b) 60, 40 c) 20, 30 d) 30, 20

82. The mass of one mole of a substance in grams is called its
a) molecular mass b) molar mass c) Avogadro's mass d) formula mass

83. The number of atoms in 0.1 mol of a triatomic gas is:
(N_A = 6.02 x 10^{23} mol^{-l})
a) 6.026 x 10^{22} b) 1 .806 x 10^{23} c) 3.600 x 10^{23} d) 1.800 x 10^{22}

84. 10 g of hydrogen and 64 g of oxygen were filled in a steel vessel and exploded. Amount of water produced in this reaction will be :
a) 2 moles b) 3 moles c) 4 moles d) 1 moles

85. The percentage weight of Zn in white vitriol ($ZnSO_4.7H_2O$) is approximately equal to (at. mass of Zn = 65, S = 32, O = 16 and H = 1) :
a) 33.65% b) 32.65% c) 23.65% d) 22.65%

86. One mole of any substance contains 6.022 x 10^{23} atoms/molecules. Number of molecules of H_2SO_4 present in 100 mL of 0.02 M H_2SO_4 solution is _____ molecules.
a) 12.044 x 10^{20} b) 6.022 x 10^{23} c) 1 x 10^{23} d) 12.044 x 10^{23}

87. Volume occupied by one molecule of water (density = 1 g cm-3) is :
a) 9.0 x $10^{-23}cm^3$ b) 6.023 x $10^{-23}cm^3$ c) 3.0 x $10^{-23}cm^3$ d) 5.5 x $10^{-23}cm^3$

88. If Avogadro number N_A, is changed from 6.022 x 10^{23} mol^{-1} to 6.022 x 10^{20} mol^{-1} this would change:
a) the definition of mass in units of grams.
b) the mass of one mole of carbon.
c) the ratio of chemical species to each other in balanced equation.
d) the ratio of elements to each other in a compound.

89. **Assertion :** One atomic mass unit is defined as one twelfth of the mass of one carbon -12 atom.
Reason : Carbon-12 isotope is the most abundant isotope of carbon and has been chosen as standard.
One atomic mass unit is defined as one twelfth of the mass of one carbon - 12 atom.
a)
Both Assertion and Reason are correct and Reason is the correct explanation for Assertion
b)
Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion

c) Assertion is correct but Reason is incorrect

d) Both Assertion and Reason are incorrect

90. How many number of molecules and atoms respectively are present in 2.8 litres of a diatomic gas at STP?

a) $15 \times 10^{22}, 7.5 \times 10^{23}$ b) $6.023 \times 10^{23}, 7.5 \times 10^{23}$ c) $6.023 \times 10^{23}, 15 \times 10^{22}$

d) $7.5 \times 10^{22}, 15 \times 10^{22}$

91. In a reaction container, 100 g of hydrogen and 100 g of Cl_2 are mixed for the formation of HCl gas. What is the limiting reagent and how much HCl is formed in the reaction?

a) H_2 is limiting reagent and 36.5 g of HCl are formed.

b) Cl_2 is limiting reagent and 104.28 g of HCl are formed.

c) H_2 is limiting reagent and 142 g of HCl are formed.

d) Cl_2 is limiting reagent and 73 g of HCl are formed.

92. 20.0 g of a magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 g magnesium oxide. What will be the percentage purity of magnesium carbonate in the sample? (At. Wt. Mg = 24)

a) 75 b) 96 c) 60 d) 84

93. What volume of oxygen gas (O_2) measured at 0^oC and 1 atm, is needed to burn completely lL of propane gas., (C_3H_8) measured under the same conditions

a) 7 L b) 6 L c) 5 L d) 10 L

94. At STP, the density of CCL_4 vapour in g/Lwill be nearest

a) 6.87 b) 3.42 c) 10.26 d) 4.57

95. 1.4 moles of phosphorus trichloride are present in a sample. How many atoms are there in the sample?

a) 5.6 b) 34 c) 2.4×10^{23} d) 3.372×10^{24}

96. The density of a gas is 1.78 g L^{-1} at STP. The weight of one mole of a gas is

a) 39.9 g b) 22.4 g c) 3.56 g d) 29 g

97. How many moles of lead (II) chloride will be formed from a reaction between 6.5 g of PbO and 3.2 g of HCl? (Atomic wt. of Pb = 207)

P bO + 2HCl $\longrightarrow$ $PbCl_2 + H_2O$

a) 0.044 b) 0.333 c) 0.011 d) 0.029

98. Which of the following options is not correct?

a) 2.300 + 0.02017 + 0.02015 = 2.340 b) 126, 000 has 3 Significant figures

c) 15.15 μs = 1.515×10^{-5} s d) 0.0048 = 48×10^{-3}

99. If 500 mL of a 5 M solution is diluted to 1500 ml, what will be the molarity of the solution obtained?

a) 1.5 M b) 1.66 M c) 0.017 M d) 1.59 M

100. The total number of valence electrons in 4.2 g of $N3^-$ ion is (N_A is the Avogadro's number)

a) $2.1N_A$ b) 4.2 N_A c) 1.6 N_A d) 3.2 N_A

101. The density of 3 molal solution of NaOH is 1.110 g mL^{-1} The molarity of the solution is

a) 2.69 M b) 2.97 M c) 4.57 M d) 6.70 M

102. In an experiment, it showed that 10 mL of 0.05 M solution of chloride required 10 mL of 0.1 M solution of $AgNO_3$, which of the following will be the formula of the chloride (X stands for the symbol of the element other than chlorine):

a) X_2Cl b) X_2Cl_2 c) XCl_2 d) XCl_4

103. In which case is the number of molecules of water maximum?

a) 18 mL of water b) 0.18 g of water

c) 0.00224 L of water vapours at 1 atm and 273 K d) 10^{-3} mol of water

104. Packing of Na^+ and Cl^- ions in sodium chloride is depicted by the given figure. Choose the correct option regarding formula mass of sodium chloride.

a) In the solid state, sodium chloride does not exist as a single entity.

b) Formula mass of NaCl is 68.0 u

c) Formula mass of NaCl is the sum of atomic masses of Na and Cl.

d) Both (a) and (c)

105. 4.88 g of $KClO_3$ when heated produced 1.92 g of O_2 and 2.96 g of KCl. Which of the following statements regarding the experiment is correct?

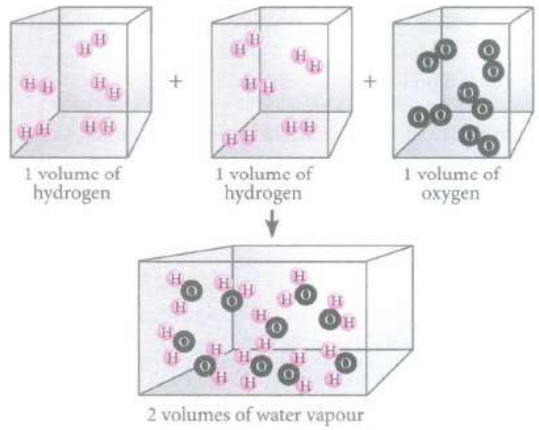
a) The result illustrates the law of conservation of mass.

b) The result illustrates the law of multiple proportions.

c) The result illustrates the law of constant proportion.

d) None of the above laws is followed.

106. Which of the following law of chemical combination is satisfied by the figure?



a) Law of multiple proportion b) Dalton's law c) Avogadro law

d) Law of conservation of mass

107. 1 cc N_2O at NTP contains

a) $\frac{1.8}{224} \times 10^{22}$ atoms b) $\frac{6.02}{22400} \times 10^{23}$ molecules c) $\frac{1.32}{224} \times 10^{23}$ electrons

d) all of the above

108. The reactant which is entirely consumed in reaction is known as limiting reagent. In the reaction 2A + 4B → 3C + 4D, when 5 moles of A react with 6 moles of B, then (a) which is the limiting reagent?

(b) calculate the amount of C formed?

a) C, 4.5 mol b) B, 4.5 mol c) B, 3.5 mol d) C,4.0 mol

109. How many moles of oxygen gas can be produced during electrolytic decomposition of 180 g of water?

a) 2.5 moles b) 5 moles c) 10 moles d) 7 moles

110. In a mixture of gases, the volume content of a gas is 0.06% at STP. Calculate the number of molecules of the gas in 1 L of the mixture.

a) 1.613×10^{23} b) 6.023×10^{23} c) 1.61×10^{27} d) 1.61×10^{19}

111. Hydrogen gas is prepared in the laboratory by reacting dilute HCl with granulated zinc. Following reaction takes place:

$Zn + 2HCl \rightarrow ZnCl_2 + H_2$

What would be the volume of hydrogen gas liberated at STP when 32.65 g of zinc reacts with HCl?

a) 10.03 L b) 11.35 L c) 11.57 L d) 9.53 L

12. **Assertion:** The reactant which is present in larger amount limits the amount of product formed is called limiting reagent.
Reason : Amount of product formed does not depend upon the amount of reactants taken.
a)
Both Assertion and Reason are correct and Reason is the correct explanation for Assertion
b)
Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion
c) Assertion is correct but Reason is incorrect
d) Both Assertion and Reason are incorrect

13. 18.72 g of a substance ' X ' occupies 1.81 cm^3 What will be its density measured in correct significant figures?
a) 10.3 g cm^{-3} b) 10.34 g cm^{-3} c) 10.4 g cm^{-3} d) 10.3425 g cm^{-3}

14. How much mass of sodium acetate is required to make 250 mL of 0.575 molar aqueous solution?
a) 11.79 g b) 15.38 g c) 10.81 g d) 25.35g

15. What is the mass per cent of oxygen in ethanol?
a) 52.14% b) 13.13% c) 16% d) 34.73%

16. **Assertion:** Molarity of a solution does not depend upon temperature whereas molality depends.
Reason : Molarity and molality both depend only on the number of moles of solute particles.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) If both assertion and reason are false.

17. Which of the following rules regarding the significant figures and calculations involving them is not correct?

a)
The result of an addition or subtraction is reported to the same number of decimal places as present in number with least decimal places
b)
Result of multiplication or division should have same number of Significant figures as present in most precise figure.
c)
The result of multiplication or division should be rounded off to same number of significant figures as present in least precise figure.
d) The non-significant figures in the measurements are rounded off.

18. In an experiment, 2.4 g ofiron oxide on reduction with hydrogen gave 1.68 g of iron. In another experiment, 2.7 g of iron oxide gave 1.89 g of iron on reduction. Which law is illustrated from the above data?
a) Law of constant proportions b) Law of multiple proportions
c) Law of reciprocal proportions d) Law of conservation of mass

19. A metal oxide has the formula Z_2O_3 . It can be reduced by hydrogen to give free metal and water .0.1596 g of the metal oxide requires 6 mg of hydrogen for complete reduction. The atomic weight of the metal is
a) 27.9 b) 159.6 c) 79.8 d) 55.8

20. What mass of sodium chloride would be decomposed by 9.8 g of sulphuric acid if 12 g of sodium bisulphate and 2.75 g of hydrogen chloride were produced in a reaction?
a) 14.75 g b) 3.8 g c) 4.95 g d) 2.2 g

21. Which has the maximum number of molecules among the following?
a) 44 g CO_2 b) 48 g O_3 c) 8gH_2 d) 64gSO_2

22. How many oxygen atoms will be present in 88 g of CO_2?
a) 24.08×10^{23} b) 6.023×10^{23} c) 44×10^{23} d) 22×10^{24}

23. Liquid benzene (C_6H_6) burns in oxygen according to the equation, $2C_6H_6(l) + 15O_2(g) \rightarrow 12CO_2(g) + 6H_2O(g)$ How many litres of O_2 at STP are needed to complete the combustion of 39 g of liquid benzene? (Mol. weight of O_2, = 32,C_6H_6 = 78)
a) 74 L b) 11.2 L c) 22.4 L d) 84 L

24. Which mode of concentration does not change with temperature?

a) Molarity b) Normality c) Molality d) All of these

125. In the final answer of the expression $\frac{(29.2-20.2)\quad(1.79\times10^5)}{1.37}$ The number of significant figures is :
a) 1 b) 2 c) 3 d) 4

126. What will be the standard molar volume of He, if its density is 0.1784 g/L at STP?
a) 11.2 L b) 22.4 L c) 5.6 L d) 2.8 L

127. **Assertion:** Elements and compounds are the examples of pure substances.
Reason: The properties of a compound are different from those of its constituent elements.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
I
f both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false.

128. An element, X has the following isotopic composition ^{200}X : 90%, ^{199}X: 8.0%, ^{202}X: 2.0%. The weighted average atomic mass of the naturally occurring element X is closest to :
a) 201 amu b) 202 amu c) 199 amu d) 200 amu

129. Carbon occurs in nature as a mixture of ^{12}C and ^{13}C. The average atomic mass of carbon is 12.011.what is the % abundance of ^{12}C in nature?
a) 88.9% b) 98.9% c) 89.9% d) 79.9%

130. The number of moles of $KMnO_4$ reduced by 1 mol of KI in alkaline medium is:
a) 1/5 b) 2 c) 3/2 d) 4

131. Ratio of C_p and C_v - of a gas 'X' C is 1: 4- The number of atoms of the gas 'X' present in 11.2 L of it at NTP will be
a) 6.02×10^{23} b) 1.2×10^{23} c) 3.01×10^{23} d) 2.01×10^{23}

132. **Assertion**: Scientific notation for the number 100 is expressed as 1×10^2.
Reason: The number 1×10^2 has two significantfigures

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false.

33. 45.4 L of dinitrogen reacted with 22.7 L of dioxygen and 45.4 L of nitrous oxide was formed. The reaction is given below:
$2N_2(g) + O_2(g) \rightarrow 2N_2O(g)$
Which law is being obeyed in this experiment?
a) Gay Lussac's law b) Law of definite proportion
c) Law of multiple proportion d) Avogadro's law

34. Choose the molecular formula of an oxide of iron in which the mass per cent of iron and oxygen are 69.9 and 30.1 respectively and its molecular mass is 160.
a) FeO b) Fe_3O_4 c) Fe_2O_3 d) FeO_2

35. Which of the following is dependent on temperature?
a) Molality b) Molarity c) Mole fraction d) Weight percentage

36. What volume of water is to be added to 100 cm^3 of 0.5 M NaOH solution to make it 0.1 M solution?
a) 200 cm^3 b) 400 cm^3 c) 500 cm^3 d) 100 cm^3

37. What is the mass of precipitate formed when 50 mL of 16.9% (w/v) solution of $AgNO_3$ is mixed with 50 mL of 5.8% NaCl solution? (Ag = 107.8, N = 14, O= 16, Na = 23, Cl = 35.5) :
a) 3.5 g b) 7.16 g c) 14 g d) 28 g

38. An impure sample of silver (1.5 g) is heated with S to form 0.124 g of Ag_2S. What was the per cent yield of Ag_2S?
a) 21.6% b) 7.2% c) 1.7% d) 24.8%

139.

Choose the correct statement about I, II and III.

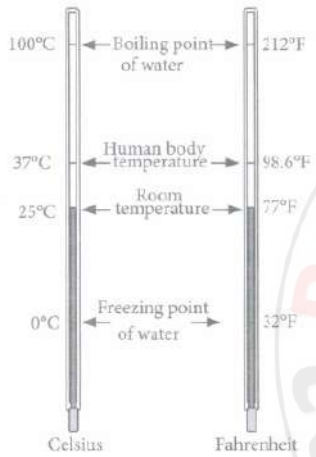
a) I and II have definite volume but III does not have this property.

b)

I, II and III are interconvertible by changing the conditions of temperature and pressure.

c) In the particles of I, freedom of movement is large. d) Both (a) and (b).

140. Consider the following figure,



The correct relationship between fahrenheit and celsius scale is

a) $^{\circ}F = {}^{\circ}C + 273.15$ b) $^{\circ}F = \frac{2}{5}{}^{\circ}C + 16$ c) $^{\circ}F = \frac{9}{5}{}^{\circ}C + 32$ d) $^{\circ}F = \frac{1}{3}{}^{\circ}C + 32$

141. 6.02 X 10^{20} molecules of urea are present in 100 mL of its solution. The concentration of solution is :

a) 0.02 M b) 0.01 M. c) 0.001 M d) 0.1 M

142. How much copper is present in 50 g of $CuSo_4$?

a) 19.90 g b) 39.81 g c) 63.5 g d) 31.71 g

143. Mole fraction of the solute in a 1.00 molal aqueous solution is :

a) 0.0177 b) 0.0344 c) 1.7700 d) 0.1770

144. What is the weight of oxygen required for the complete combustion of 2.8 kg of ethylene?

a) 2.8 kg b) 6.4 kg c) 9.6 kg d) 96 kg

45. A compound, on analysis, gave the following percentage composition:
Na = 14.31%, S = 9.97%, H = 6.22%, O= 69.5%
What would be the molecular formula of the compound assuming that all the hydrogen in the compound is reset in combination with oxygen as water of crystallisation. Molecular weight of the compound is 322.
a) Na_2SO_4 b) $Na_2SO_4 \cdot 10H_2O$ c) Na_2SH_{l0O12} d) $Na_2SO_4 \cdot 7H_2O$

46. If 40 g of $CaCO_3$ is treated with 40 g of HCl, which of the reactants will act as limiting reagent?
a) $CaCO_3$ b) HCl c) Both (a) and (b) d) None of these

47. Few figures are expressed in scientific notation.Mark the incorrect one.
a) 234000 = 2.34 x 10^5 b) 8008 = 8 x 10^3 c) 0.0048 = 4.8 x 10^{-3}
d) 500.0 = 5.00 X 10^2

48. What will be the molarity of the solution in which 0.365 g of HCl gas is dissolved in 100 mL of solution?
a) 2 M b) 0.2 M c) 1 M d) 0.1 M

49. Which will make basic buffer?
a) 100 mL of 0.1 MCH_3COOH+ 100ml of 0.l MNaOH
b) 100 mL of 0.1 M HCl + 200 mL of 0.1 MNH_4OH
c) 100 mL of 0.1 MHCl + 100ml of 0.l MNaOH
d) 50 mL of 0. 1 MNaOH + 25 mL of 0. I MCH_3COOH

50. How many seconds are there in 3 days?
a) 259200 s b) 172800 s c) 24800 s d) 72000 s

51. In the final answer of the expression $\frac{(29.2-20.2)(1.79\times10^5)}{1.37}$ the number of significant figures is
a) 1 b) 2 c) 3 d) 4

52. In Haber process 30 litres of dihydrogen and 30 litres of dinitrogen were taken for reaction which yield only 50% of the expected product. What will be composition of gaseous mixture under the aforesaid condition in the end?
a) 20 litres ammonia, 25 litres nitrogen, 15 litres hydrogen
b) 20 litres ammonia, 20 litres nitrogen, 20 litres hydrogen
c) 10 litres ammonia, 25 litres nitrogen, 15 litres hydrogen
d) 20 litres ammonia, 10 liters nitrogen, 30 litres hydrogen

53. A gas has molecular formula (CH)n If vapour density of the gas is 39, what should be the formula of the compound?
a) C_2H_3 b) C_4H_4 c) C_2H_2 d) C_2H_6

54. **Assertion:** Components of a homogeneous mixture cannot be separated by using physical methods.
Reason : Composition of homogeneous mixture is uniform throughout as the components react to form a single compound.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false.

55. Which of the following formulae is not correctly depicted?
a) Molar mass = $\frac{Mass\ of\ substance}{moles\ of\ substance}$
b) Mass of one molecule of a substance = $\frac{gram\ molecular\ mass\ of\ the\ substance}{Avogadr'o\ number}$
c) Number of molecules = $\frac{Mass\ of\ the\ substance}{Molar\ mass}$ x Agvogasro's no
d) Number of moles x molar mass = number of molecules

56. Match the column I with column II and mark the appropriate choice

	Column - I		**Column - II**
(A)	Mass of H_2 produced when 0.5 mole of zinc reacts with excessof HCl	(i)	3.01 x 10^{23} molecules
(B)	Mass of all atoms of a compound with formula $C_{70}H_{22}$	(ii)	6.023 x 10^{23} molecules
(C)	Number of molecules in 35.5 g of Cl_2	(iii)	1.43 x 10^{-21}g
(D)	Number of molecules in 64 g of SO_2	(iv)	1g

a) (A) → (ii), (B) → (i), (C) → (iv), (D) → (iii)
b) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)
c) (A) → (iv), (B) → (iii), (C) → (i), (D) → (ii)
d) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)

57. Iron can be obtained by reduction of iron oxide (Fe_3O_4)With CO according to the reaction;

$Fe_3O_4 + 4CO \rightarrow 3Fe + 4CO_2$

How many kg of Fe_3O_4 should be heated with CO to get 3 kg of iron?

a) 8.12 kg b) 4.14 kg c) 6.94 kg d) 16.8 kg

58. Specific volume of cylindrical virus particle is 6.02×10^{-2} cc/gm, whose radius and length are 7 Å and 10 Å respectively. If $N_A = 6.02 \times 10^{23}$, find molecular weight of virus:

a) 1.54 kg/mol b) 1.54×10^4 kg/mol c) 3.08×10^4 kg/mol

d) 3.08×10^3 kg/mol

59. What will be the molarity of a solution, which contains 5.85 g of NaCl(s) per 500 mL?

a) 4 $molL^{-1}$ b) 20 $molL^{-1}$ c) 0.2 $molL^{-1}$ d) 2 $molL^{-1}$

60. Which of the following statements best explains the law of conservation of mass?

a) 100 g of water is heated to give steam

b)

A sample of N_2 gas is heated at constant pressure without any change in mass.

c) 36 g of carbon combines with 32 g of oxygen to form 68 g of CO_2

d) 10 g of carbon is heated in vacuum without any change in mass

61. **Assertion:** The mass of a substance is constant whereas its weight may vary from one place to another.

Reason : Mass of a substance is the amount of matter present in it while weight is the force exerted by gravity on an object.

a)

Both Assertion and Reason are correct and Reason is the correct explanation for Assertion

b)

Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion

c) Assertion is correct but Reason is incorrect

d) Both Assertion and Reason are incorrect

62. Chemical reactions involve interaction of atoms and molecules. A large number of atoms/molecules (approximately 6.023×10^{23}) are present in a few grams of any chemical compound varying with their atomic/molecular masses. To handle such large numbers conveniently, the mole concept was introduced. This concept has implications in diverse areas such as analytical chemistry, biochemistry, electrochemistry and radiochemistry. The following example illustrates a typical case, involving chemical! electrochemical reaction, which requires a clear understanding of the mole concept.
A 4.0 molar aqueous solution of NaCl is prepared and 500 mL of this solution is electrolysed. This leads to the evolution of chlorine gas at one of the electrodes (atomic mass: Na = 23, Hg = 200; faraday = 96500 coulombs).
The total number of moles of chlorine gas evolved is
a) 0.5 b) 1.0 c) 2.0 d) 3.0

63. The reference standard used for defining atomic mass is
a) H - 1 b) C - 12 c) C - 13 d) C - 14

64. Match the mass of elements given in column I with the no. of moles given in column II and mark the appropriate choice.

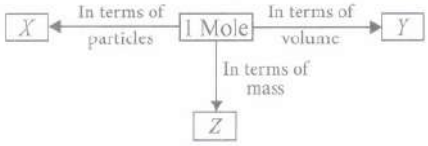
	Column I		Column II
A.	28 g of He	(i)	2 moles
B.	46 g of Na	(ii)	7 moles
C.	60 g of Ca	(iii)	1 mole
D.	27 g of Al	(iv)	1.5 moles

a) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)
b) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)
c) (A) → (iii), (B) → (ii), (C) → (i), (D) → (iv)
d) (A) → (ii), (B) → (i), (C) → (iv), (D) → (iii)

65. What will be the molality of the solution made by dissolving 10 g of NaOH in 100 g of water?
a) 2.5 m b) 5 m c) 10 m d) 1.25 m

66. What will be the answer in appropriate significant figures as a result of addition of 3.0223 and 5.041?
a) 80.633 b) 8.0633 c) 8.063 d) 806.33

167. Fill in the blanks by choosing the correct options.



a)

X	Y	Z
6.023 x 10^{23} molecules	22.4 L at any pressure	Gram Molecular mass

b)

X	Y	Z
6.023 x 10^{23} atoms/molecules	22.4 L at NTP	Gram atomic mass

c)

X	Y	Z
6.023 x 10^{23} atoms	22.4 L at any temperature	1 gram

d)

X	Y	Z
6.023 x 10^{23} particles	11.2 L at NTP	Molar volume

168. In Haber's process 30 L of dihydrogen and 30 L of dinitrogen were taken for reaction which yielded only 50% of the expected product. What will be the composition of gaseous mixture under the aforesaid condition in the end?

a) 20L ammonia, 10L nitrogen, 30L hydrogen

b) 20 L ammonia, 25 L nitrogen, 15L hydrogen

c) 20 L ammonia, 20 L nitrogen, 20 L hydrogen

d) 10L ammonia, 25 L nitrogen, 15L hydrogen

169. Which set of figures will be obtained after rounding up the following up to three significant figures?

34.216,0.04597, 10.4107

a) 34.3,0.0461,10.4 b) 34.2, 0.0460, 10.4 c) 34.20,0.460,10.40

d) 34.21,4.597, 1.04

170. Which of the following statements is correct about the reaction given below? $4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(g)$

a)

The total mass of reactants = Total mass of the products. It follows the law of conservation of mass.

b)

Total mass of reactants = total mass of product; therefore, law of multiple proportions is followed.

c)

Amount of Fe_2O_3 can be increased by taking anyone of the reactants (iron or oxygen) in excess.

d)

Amount of Fe_2O_3 produced will decrease if the amount of anyone of the reactants (iron or oxygen) is taken in excess.

171. How much oxygen is required for complete combustion of 560 g of ethene?
a) 6.4 kg b) 1.92 kg c) 2.8 kg d) 9.6 kg

172. Which one of the following has maximum number of atoms :
a) 1 g of Ag (s) Atomic mass of Ag = 108
b) 1 g of O_2 (g) Atomic mass of O = 16 c) 1 g of Li (s) Atomic mass of Li = 7
d) 1 g of Mg (s) Atomic mass of Mg = 24

173. Given below are few statements. Mark the statement which is not correct.
a) Atoms are neighter created nor destroyed in a chemical reaction
b)

Law of definite proportion states that a given compound always contains exactly the same proportion of elements by weight
c) Gay Lussac's law of chemical combination is valid for all substances.
d)

A pure compound has always a fixed proportion of masses of its constituents.

174. Which of the following is the most accurate measurement?
a) 9 m b) 9.0 m c) 9.00 m d) 9.000 m

175. One atom of an element weighs 3.32×10^{-23} g. How many number of gram atoms are there in 20 kg of the element?
a) 2000 b) 20 c) 200 d) 1000

176. Molarity equation of a mixture of solutions of same substance is given by
a) $M_1 + V_1 \times M_2 + V_2 \times M_3 + V_3 + ... = M_1 + M_2 + M_3$
b) $M_1V_1 + M_2V_2 + M_3V_3 + ...= M(V_1+V_2+V_3)$
c) $\frac{M_1}{V_1} + \frac{M_2}{V_2} + \frac{M_3}{V_3} + \ldots = M\left(\frac{1}{V_1} + \frac{1}{V_2} + \frac{1}{V_3}\right)$
d) $\frac{M_1}{V_1} + \frac{M_2}{V_2} + \frac{M_3}{V_3} + \ldots = M_1\left(\frac{1}{V_1} + \frac{1}{V_2} + \frac{1}{V_3}\right)$

177. 1 g of Mg is burnt in a closed vessel containing 0.5 g of O_2.Which reactant is limiting reagent and how much of the excess reactant will be left?

a) 0_2 is a limiting reagent and Mg is in excess by 0.25 g.
b) Mg is a limiting reagent and is in excess by 0.5 g.
c) 0_2 is a limiting reagent and is in excess by 0.25 g.
d) 0_2 is a limiting reagent and Mg is in excess by 0.75 g.

178. 1.0 g of magnesium is burnt with 0.56 g of oxygen in a closed vessel. Which reactant is left in excess and how much? (At. weight of Mg = 24, O= 16)
a) Mg, 0.16 g b) O_2, 0.16 g c) Mg, 0.44 g d) O_2, 0.28 g

179. What will be the weight of CO having the same number of oxygen atoms as present in 22 g of CO_2?
a) 28 g b) 22 g c) 44 g d) 72 g

180. If the density of a solution is 3.12 g mL^{-1}, the mass of 1.5 mL solution in significant figures is_____.
a) 4.7 g b) 4680 x 10^{-3} g c) 4.680 g d) 46.80 g

181. Which of the following statements about a compound is incorrect?
a) A molecule of a compound has atoms of different elements
b)
A compound cannot be separated into its constituent elements by physical methods of separation.
c) A compound retains the physical properties of its constituent elements.
d) The ratio of atoms of different elements in a compound is fixed.

182. Mark the rule which is not correctly stated about the determination of significant figures.
a) Zeros preceding to first non-zero digit are not significant.
b) Zeros preceding to first non-zero digit are not significant.
c)
Zeros at the end or right of the number are significant if they are on the right side of decimal point.
d) All non-zero digits are significant.

183. Haemoglobin contains 0.33% of iron by weight. The molecular weight of haemoglobin is approximately 67200 g. The number of iron atoms (at. weight of Fe is 56) present in one molecule of haemoglobin are:
a) 1 b) 6 c) 4 d) 2

184. Which of the following statements illustrates the law of multiple proportions?

a)

An element forms two oxides, XO and XO_2 containing 50% and 60% oxygen respectively. The ratio of masses of oxygen which combines with 1 g of element is 2 : 3.

b)

Hydrogen sulphide contains 5.89% hydrogen, water contains 11.1% hydrogen and sulphur dioxide contains 50% oxygen

c)

3.47 g of $BaCl_2$ reacts with 2.36 g of Na_2S0_4 to give 3.88 g of $BaSO_4$ and 1.95 g of NaCl.

d)

20 mL of ammonia gives 10 volumes of N_2, and 30 volumes of H_2 at constant temperature and pressure.

185. 1 L of 0.1 M NaOH, 1 L of 0.2 M KOH, and 2 L of 0.05 M $Ba(OH)_2$ are mixed together. The final concentration of the solution is

a) 0.01 M b) 0.01 N c) 0.1 N d) 0.001 M

186. A mixture of gases contains of H_2 and O_2 gases in the ratio of 1: 4 (w/w). What is the molar ratio of the two gases in the mixture?

a) 4: 1 b) 16: 1 c) 2: 1 d) 1: 4

187. How much mass of silver nitrate will react with 5.85 g of sodium chloride to produce 14.35 g of silver chloride and 8.5 g of sodium nitrate if law of conservation of mass is followed?

a) 22.85g b) 108g c) 17.0g d) 28.70g

188. How many atoms in total are present in 1 kg of sugar?

a) 7.92×10^{25} atoms b) 7.92×10^{25} atoms c) 6.022×10^{25} g d) 1000 atoms

189. In the reaction, $4NH_3\,(g) + 5O_2\,(g) \longrightarrow 4NO\,(g) + 6H_2O\,(l)$ When 1 mole of ammonia and 1 mole of O_2 are made to react to completion, then:

a) 1.0mole of H_2O is produced b) 1.0mole of NO will be produced

c) all the oxygen will be consumed d) all the ammonia will be consumed

190. Atomic masses of elements are usually fractional because:

a) they are mixtures of isotopes b) they contain impurities of other atoms

c) they are mixtures of isobars

d) atomic masses cannot be weighed accurately

191. A metal oxide has the formula Z_2O_3. It can be reduced by hydrogen to give free metal and water. 0.1596 g of the metal oxide requires 6 mg of hydrogen for complete reduction. The atomic weight of the metal is :
a) 27.9 b) 159.6 c) 79.8 d) 55.8

192. Two elements 'P' and 'Q' combine to form a compound. Atomic mass of 'P' is 12 and 'Q' is 16. Percentage of 'P' in the compound is 27.3. What will be the empirical formula of the compound?
a) P_2Q_2 b) PQ c) P_2Q d) PQ_2

193. A balanced equation for combustion of methane is given below:
$CH_{4(g)} + 2O_{2(g)}\ CO_{2(g)}+2H_2O_{(g)}$
Which of the following statements is not correct on the basis of the above chemical equation?
a)
One mole of CH_4 reacts with 2 moles of oxygen to give one mole of CO_2 and 2 moles of water.
b)
One molecule of CH_4 reacts with 2 molecules of oxygen to give one molecule of CO_2 and 2 molecules of water.
c)
22.4 L of methane reacts with 44.8 L of oxygen to give 44.8 L of CO_2 and 22.4 L of water.
d) 16 g of methane reacts with 64 g of 02 to give 44 g of CO_2 and 36 g of water.

194. Calcium carbonate decomposes on heating to give calcium oxide and carbon dioxide. How much volume of CO_2 will be obtained at STP by thermal decomposition of 50 g of $CaCO_3$?
a) 1 L b) 11.2 L c) 44 L d) 22.4 L

195. The number of significant figures for the three numbers 161 cm, 0.161 cm, 0.0161 cm are:
a) 3, 4 and 5 respectively b) 3, 4 and 4 respectively c) 3, 3 and 4 respectively
d) 3, 3, and 3 respectively

196. An organic compound on analysis gave the following results: C = 54.5%, O = 36.4%, H = 9.1%. The Empirical formula of the compound is
a) CHO_2 b) CH_2O c) C_2H_8O d) C_2H_4O

197. The relative number of atoms of elements, 'X' and 'Y' in a compound is 0.25 and 0.5. The empirical formula of compound is

a) XY b) X_2Y c) XY_2 d) X_2Y_2

198. 1.0 g of magnesium is burnt with 0.56 g O_2 in a closed vessel. Which reactant is left in excess and how much?

(At. wt. Ms = 24; 0 = 16)

a) Mg, 0.16 g b) O_2 0.16g c) Mg, 0.44 g d) O_2 0.28 g

199. Which of the following gases will have least volume if 10 g of each gas is taken at same temperature and pressure?

a) CO_2 b) N_2 c) CH_4 d) HCl

200. What is the total number of electrons present in 1.6 g of methane?

a) 6.023×10^{23} b) 16 c) 12.04×10^{23} d) 6.023×10^{24}

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Time : 1 Mins **CHEMICAL BONDING AND MOLECULAR STRUCTURE 1** **Marks : 982**

1. Which type of overlapping is shown by p (P_x' P_y and p_z)-orbitals?
   a) Two end to end and one sidewise overlap
   b) Two sidewise and one end to end overlap c) Three sidewise overlaps
   d) Three end to end overlaps
2. In which of the following pairs of molecules/ions, the central atoms have Sp^2 hybridisation?
   a) NO_2- and NH_3 b) BF_3 and NO_2^- c) NH_2^- and H_2O d) BF_3 and NH_2^-
3. Dipole moment is highest in:
   a) CI_4 b) CH_4 c) CHF_3 d) CCl_4
4. In BrF_3 molecules, the lone pairs occupy equaterial positions to minimize
   a) lone pair-bond pair repulsion only b) bond pair-bond pair repulsion only
   c) lone pair-lone pair repulsion and lone pair-bond pair repulsion
   d) lone pair-lone pair repulsion only
5. The octet rule is not valid for which of the following molecules?
   a) CO_2 b) NO c) 0_2 d) PCl_3
6. A pair of electrons present between two identical non-metals
   a) is shifted to one of the atoms b) is shared equally between them
   c) undergoes addition reactions d) have same spin.
7. Which of the following bond orders is indication of existence of a molecule?
   a) Zero bond order b) Negative bond order c) Positive bond order d) All of these
8. What is the correct dipole moment of NH_3 and NF_3 respectively?
   a) 4.90×10^{-30} cm and 0.80×10^{-30} cm b) 0.80×10^{-30} cm and 4.90×10^{-30} cm
   c) 4.90×10^{-30} cm and 4.90×10^{-30} cm d) 0.80×10^{-30} cm and 0.80×10^{-30} cm
9. Though covalent in nature, methanol is soluble in water, why?
   a) Methanol is transparent like water.
   b) Due to hydrogen bonding between methanol and water molecules.
   c) Due to van der Waal's forces between methanol and water
   d) Due to covalent attraction forces
10. Which one of the following compounds shows the presence of intramolecular hydrogen bond?
    a) H_2O_2 b) HCN c) Cellulose d) Concentrated acetic acid
11. The pair with more ionic nature and less m.pt. respectively in lithium halides:
    a) LiE, LiI b) LiCI, LiF c) LiBr, LiI d) LiF, LiCl
12. The lattice energy of NaCl is 788 kJ mor^{-1} This means that 788 kJ of energy is required:

a)
to separate one mole of solid NaCl into one mole of $Na_{(g)}$ and one mole of $Cl_{(g)}$ to infinite distance
b)
to separate one mole of solid NaCl into one mole of $Na^{+}_{(g)}$ and one mole of $Cl_{(g)}$ to infinite distance
c) to convert one mole of solid NaCl into one mole of gaseous NaCl
d) to convert one mole of gaseous NaCl into one mole of solid NaCl.

13. Which of the following pairs of d-orbitals will have electron density along the axes?
a) d_{z^2}, d_{xz} b) d_{xz}, d_{yz} c) d_{z^2}, $d_{x^2-y^2}$ d) d_{xy}, $d_{x^2-y^2}$

14. The high density of water compared to ice is due to
a) Hydrogen bonding interactions b) dipole-dipole interactions
c) dipole-induced dipole interactions d) Induced dipole-induced dipole interactions

15. Match the bond enthalpies given in column II with the molecules given in column I and mark the appropriate choice.

Column I		Column II	
(A)	Hydrogen (H_2)	(i)	498.0 kJ mol^{-1}
(B)	Oxygen (O_2)	(ii)	946.0 kJ mol^{-1}
(C)	Nitrogen (N_2)	(iii)	435.8 kJ mol^{-1}

a) (A) → (i), (B) → (ii), (C) → (iii) b) (A) → (iii), (B) → (ii), (C) → (i)
c) (A) → (i), (B) → (iii), (C) → (ii) d) (A) → (iii), (B) → (i), (C) → (ii)

16. Which one shows maximum hydrogen bonding?
a) H_2O b) H_2Se c) H_2S d) HF

17. N_2 and O_2 are converted into mono anions N_2^- and O_2^- respectively. Which of the following statement is wrong?
a) In N_2^-, N-N bond weakens b) In O_2^-, O—O bond order increases
c) In O_2^-, O - Obond order decreases d) N_2^-, becomes diamagnetic

18. H_2O is polar, whereas BeF_2 is not because :
a) The electronegativity of F is greater than that of O
b) H_2O involves hydrogen bonding whereas BeF_2 is a discrete molecule
c) H_2O is linear and BeF_2 is angular d) H_2O is angular and BeF_2 is linear

19. The type of hybridisation of boron in diborane is :
a) sp hybridisation b) sp^2 hybridisation c) sp^3 hybridisation d) sp^3d^2 hybridisation

20. Which of the following statements is true about hybridisation?
a) The hybridised orbitals have different energies for each orbital.
b)
The number of hybrid orbitals is equal to the number of atomic orbitals that are hybridised.
c) Hybrid orbitals form multiple bonds.
d) The orbitals with different energies undergo hybridisation.

21. **Assertion:** Boiling point of p-nitrophenol is greater than that of o-nitrophenol.
Reason: There is intramolecular hydrogen bonding in p-nitrophenol and intermolecular hydrogen bonding in o-nitrophenol.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true and reason is the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

22. In which of the following substances will hydrogen bond be strongest?
a) HCl b) H_2O c) HI d) H_2S

23. The correct order of increasing covalent character of the following is:
a) $SiCl_4 < AlCl_3 < CaCl < KCl$ b) $KCl < CaCl_2 < AlCl_3 < SiCl_4$
c) $AlCl_3 < CaCl_2 < KCl < SiCl_4$ d) none of these

24. If the electronic configuration of an element is $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2 4s^2$, the four electrons involved in chemical bond formation will be _____.
a) $3p^6$ b) $3p^6, 4s^2$ c) $3p^6, 3d^2$ d) $3d^2, 4s^2$

25. Decreasing order of stability of O_2, O_2^-, O_2^+ and O_2^{2-} is :
a) $O_2^+ > O_2 > O_2^- > O_2^{2-}$ b) $O_2^{2-} > O_2^- > O_2 > O_2^+$ c) $O_2 > O_2^+ < O_2^{2-} > O_2^-$
d) $O_2^- > O_2^{2-} > O_2^+ > O_2$

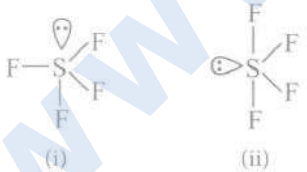
26. Which of the following species has a linear shape?
a) SO_2 b) NO_2^+ c) O_3 d) NO_2^-

27. According to molecular orbital theory, which of the following will not exist?
a) H_2^+ b) Be_2 c) B_2 d) C_2

28. Hydrogen bond between two atoms is formed due to
a)
displacement of electrons towards more electronegative atom resulting in fractional positive charge on hydrogen
b) displacement of electrons towards hydrogen atom resulting in a polar molecule
c) formation of a bond between hydrogen atoms of one molecule and the other
d) existence of an attractive force which binds hydrogen atoms together.

29. Among the following which species has same number of σ and π bonds?
a) C_7H_8 b) C_2CN_4 c) C_2H_4 d) HC == CH

30. Which of the following shapes of SF_4 is more stable and why?



a) Both are equally stable due to 2 lp-bp repulsions
b) Both are unstable since SF_4 has tetrahedral shape
c) (i), due to 3 lp-bp repulsions at 90°. d) (ii), due to 2 lp-bp repulsions.

31. Iodine monochloride molecule is formed by the overalap of
a) s-s orbitals b) s-p orbitals c) p-p orbitals end to end d) p-p orbitals sideways

32. Main axis of a diatomic molecule is z, molecular orbital p_x and p_y overlap to form which of the following orbital?
a) δ-molecular orbital b) No bond will be formed c) π-molecular orbital
d) σ- molecular orbital

33. Hydrogen bonds are formed in many compounds e.g., H_2O, HF, NH_3. The boiling point of such compounds depends to a large extent on the strength of hydrogen bond and the number of hydrogen bonds. The correct decreasing order of the boiling points of above compounds is
    a) $HF > H_2O > NH_3$ b) $H_2O > HF > NH_3$ c) $HF > H_2O > NH_3$
    d) $NH_3 > H_2O > HF$
34. Which of the following representation of wave functions of molecular orbitals and atomic orbitals are not correct?
    a) $\Psi_{MO} = \Psi_A \pm \Psi_B$ b) $\sigma = \Psi_A + \Psi_B$ c) $\Psi_{MO} = \Psi_A \pm \Psi_B$ d) $\Psi_{MO} = \Psi_A \times \Psi_B$
35. Linus Pauling received the Nobel Prize for his work on
    a) atomic structure b) photosynthesis c) chemical bonds d) thermodynamics
36. **Assertion:** The dipole moment in case of BeF2 is zero.
    Reason: The two equal bond dipoles point in opposite directions and cancel the effect of each other.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.
37. Increasing order of sizes of hybrid orbitals is
    a) sp, Sp^2, sp^3 b) Sp^3, Sp^2, sp c) Sp^2, Sp^3, sp d) sp^2,sp,sp^3
38. Which of the following does not apply to metallic bond?
    a) Overlapping valence orbitals b) Mobile valency electrons c) Delocalized electrons
    d) Highly directed bonds
39. CO^{2-}_3-, NO^{-}_3, BO^{3-}_3'- The correct increasing order of extent of p-bonding in above molecules are I II III
    a) I < II < III b) III < II < I c) III < I < II d) II < III < I
40. Identify the correct order of solubility in aqueous medium.
    a) CuS > ZnS > Na_2S b) ZnS > Na_2S > CuS c) Na_2S > CuS > ZnS
    d) Na_2S > ZnS > CuS
41. The dipole moment of NF_3 is very much less compared to that of NH_3 because:
    a) number of lone pairs in NF_3 is much greater than in NH_3
    b) the size of N-atom is much less than that of If-atom.
    c)
    F-atom is more electronegative than N-atom, where as H-atom is less electronegative than N-atom.
    d) unshared electron pair is not present in NF_3
42. Strongest hydrogen bond is shown by :
    a) Water b) Ammonia c) Hydrogen fluoride d) Hydrogen sulphide
43. The correct sequence of bond length in single bond, double bond and triple bond of C is:
    a) (C - C) = (C = C) = (C ≡ C) b) C ≡C < C = C < C - C c) C - C < C = C < C ≡C
    d) C =C < C ≡C < C - C

44. Which is more stable among the following?
    a) Li^+ b) K^+ c) Cs^+ d) Na^+
45. The ground state electronic configuration of S is $3s^2\ 3p^4$. How does it form the compound SF_6?
    a) Due to octahedral shape of S atoms
    b)
    Due to presence of vacant 3d-orbitals which provide 6 unpaired electrons in excited state
    c) Due to Sp^3 hybridisation of S atom which provides 6 electrons to 6 F atoms
    d) Due to presence of 3 sigma and 3 pi bonds between S and F
46. Among liq. $(HF)_3$, liq NH_3, CH_4, CH_3OH and N_2O_4, intermolecular hydrogen bond is expected in
    a) Three molecules b) Two molecules only c) All the molecules d) All except one
47. The molecule which does not exhibit dipole moment is
    a) NH_3 b) $CHCl_3$ c) H_2O d) CCL_4
48. The conditions for the combination of atomic orbitals to form molecular orbitals are stated below. Mark the incorrect condition mentioned here.
    a) The combining atomic orbitals must have nearly same energy.
    b) The combining atomic orbitals must overlap to maximum extent.
    c) Combining atomic orbitals must have same symmetry about the molecular axis.
    d) Pi (π) molecular orbitals are symmetrical around the bond axis.
49. Which of the following statement is not correct for sigma and pi-bonds formed between two carbon atoms?
    a) Free rotation of atoms about a sigma bond is allowed but not in case of a pi-bond
    b)
    Sigma bond determines the direction between carbon atoms but a pi-bond has no primary in this regard.
    c) Sigma bond is stronger than a pi-bond
    d)
    Bond energies of sigma and pi-bonds are of the order of 264 kJ/mol and 347 KJ/mol respectively.
50. Which of the following will be the strongest bond?
    a) F - O b) O - Cl c) N - H d) O - H
51. The ion that is isoelectronic with CO is :
    a) O_2^- b) N_2^+ c) O_2^+ d) CN^-
52. Which of the following statements is not true?
    a)
    Intermolecular hydrogen bonds are formed between two different molecules of compounds.
    b)
    Intramolecular hydrogen bonds are formed between two different molecules of the same compound.

c) Intramolecular hydrogen bonds are formed within the same molecule.

d) Hydrogen bonds have strong influence on the physical properties of a compound.

53. Which of the following reaction involves the liberation of energy?

a) $Na(s) \rightarrow Na^+(g)$ b) $Cl_2(g) \rightarrow 2C1(g)$ c) $Na^+(g) + C1^-(g) \rightarrow NaCl(s)$

d) $NaC!(s) \rightarrow Na^+(g) + Cl^-(g)$

54. Among LiCl, $BeCl_2$, BCl_3, and CCl_4, the covalent bond character follows the order:

a) $LiCl > BeCl_2 > BCl_3 > CCl_4$ b) $LiCl < BeCl_2 < BCl_3 < CCl_4$

c) $LiCl > BeCl_2 > CCl_4 > BCl_3$ d) $LiCl < BeCl_2 < CCl_4 < BCl_3$

55. Which of the following statements is true about hydrogen bonding?

a)

Cl and N have comparable electronegativities yet there is no H-bonding in HCl because size of Cl is large

b) Intermolecular H -bonding results in decrease in m.p. and b.p.

c) Ice has maximum density at O°C due to H-bonding.

d) KHCl2(HCl_2^-) exists but KHF_2(HF_2^-) does not exist due to lack of H-bonding in HCl.

56. **Assertion:** In the formation of water molecule, both hydrogen and oxygen atoms attain octet of electrons.

Reason: Oxygen atom forms two ionic or electrovalent bonds with two hydrogen atoms.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false d) If both assertion and reason are false.

57. **Assertion**

In the formation of a molecule, only the outer shell electrons take part in chemical combination and they are known as valence electrons.

Reason

Atoms achieve the stable octet when they are linked by chemical bonds.

In the formation of a molecule, only the outer shell electrons take part in chemical combination and they are known as valence electrons.

a)

Both Assertion and Reason are correct and Reason is the correct explanation for assertion

b)

Both Assertion and Reason are correct but Reason is not the correct explanation for assertion

c) Assertion is correct but reason is incorrect

d) Both Assertion and Reason are incorrect

58. Which of the following is least ionic?

a) AgCl b) $CaBr_2$ c) $CaC1_2$ d) CaI_2

59. When two atoms of chlorine combine to form one molecule of chlorine gas, the energy of the molecule is

a) greater than that of separate atoms b) equal to that of separate atoms
c) lower than that of separate atoms d) none of these

60. Which of the following angle corresponds to Sp^2 hybridisation?
a) 90^0 b) 120^0 c) 180^0 d) 109^0

61. Bond energy is maximum in:
a) F_2 b) N_2 c) O_2 d) Br_2

62. Which of the following compounds shows maximum hydrogen bonding?
a) HF b) H_2O c) NH_3 d) CH_3OH

63. Which of the following molecules is paramagnetic in nature?
a) H_2 b) Li_2 c) B_2 d) N_2

64. Which of the following is electron deficient?
a) $(SiH_3)_2$ b) $(BH_3)_2$ c) PH_3 d) $(CH_3)_2$

65. The molecules like BrF_5 and $XeOF_4$ are square pyramidal in shape. What is the type of hybridisation shown in these molecules?
a) dsp^3 b) dSp^2 c) sp^3d d) sp^3d^2

66. Fill in the blanks with appropriate choice.
Bond order of N_2^+ is P while that of N_2 is Q.
Bond order of O_2^+ is R while that of O_2 is S.
N - N bond distance T, when N_2 changes to N_2^+ and when O_2 changes to O_2^+ the O - O bond distance U.

a)

P	Q	R	S	T	U
2	2.5	2.5	1	increases	decreases

b)

P	Q	R	S	T	U
2.5	3	2	1.5	decreases	increases

c)

P	Q	R	S	T	U
3	2	1.5	1	increases	decreases

d)

P	Q	R	S	T	U
2.5	3	2.5	2	increases	decreases

67. Mark the incorrect statement in the following :
a) The bond order in the species O_2, O_2^+ and O_2^- decreases as $O_2^+ > O_2 > O_2^-$
b) The bond energy in a diatomic molecule always increases when an electron is lost
c) Electrons in antibonding MO contribute to repulsion between two atoms
d) With increase in bond order, bond length decrease and bond strength increases

68. **Assertion:** Dipole moment of NH_3 is greater than that of NF_3.
Reason: Nitrogen is more electronegative than fluorine.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

69. How many orbitals are singly occupied in O_2 molecule?
a) 2 b) 1 c) 3 d) 4

70. Among the following the pair in which the two species are not isostructural is

a) SiF_4 and SF_4 b) IO_3^- *and* XeO_3 c) BH_4^- *and* NH_4^+ d) PF_6^- *and* SF_6

71. Among the following which has resonating structure?
a) BF_3 b) PCl_5 c) SF_6 d) IF-

72. Some of the properties of the two species, NO_3^- and H_2O^+ are described below. Which one of them is correct?
a) Similar in hybridisation for the central atom with different structures
b) Dissimilar in hybridisation for the central atom with different structures
c) Isostructural with same hybridisation for the central atom.
d) Isostructural with different hybridisation for the central atom.

73. H_2O has a net dipole moment while BeF_2 has zero dipole moment because :
a) H_2O molecule is linear while BeF_2 is bent
b) BeF_2 molecule is linear while H_2O is bent
c) Fluorine has more electronegativity than oxygen
d) Beryllium has more electronegativity than oxygen.

74. When two ice cubes are pressed over each other and unite to form one cube. Which force is responsible for holding them together?
a) Vander waal's forces b) Covalent attraction c) Hydrogen bond formation
d) Dipole-dipole attraction

75. The dipole moment of HBr is 2.6×10^{-30} Cm and the inter atomic spacing is 1.41 Å. The percentage of ionic character in HBr is:
a) 99.5 % b) 11.5% c) 74.3% d) 25%

76. Maximum bond angle at nitrogen is present in which of the following?
a) NO_2^+ b) NO_3^- c) NO_2 d) NO_2^-

77. Which of the following are arranged in the decreasing order of dipole moment?
a) CH_3Cl, CH_3Br, CH_3F b) CH_3Cl, CH_3F, CH_3Br c) CH_3Br, CH_3Cl, CH_3F
d) CH_3Br, CH_3F, CH_3Cl

78. The nodal plane in the π-bond of ethene is located in:
a) The molecular plane b) A plane parallel to the molecular plane
c)
A plane perpendicular to the molecular plane which bisects the carbon carbon sigma bond at right angle
d)
A plane perpendicular to the molecular plane which contains the carbon-carbon J - bond.

79. In which of the following pairs, both the species are not isostructural?
a) $SiCl_4$, PCl_4^+ b) diamond, silicon carbide c) NH_3,PH_3 d) XeF_4, XeO_4

80. The most suitable method of separation of 1:1 mixture of ortho and para-nitrophenols is:
a) steam distillation b) Crystallisation c) Vaporisation d) Colour spectrum

81. In compound of the type ECl_3 where E = B, P, As (or) Bi, the angles Cl - E - Cl for different elements E are in the order:
a) B > P = As = Bi b) B > P > As > Bi c) B < P = As = Bi d) B < P < As < Bi

82. Among the following compounds, the one that is polar and has the central atom with sp^2 hybridization is:
a) H_2CO_3 b) SiF_4 c) BF_3 d) $HClO_2$

83. In NO_3^- ion, the number of bond pair and lone pair of electrons on nitrogen atom is:
a) 2,2 b) 3,1 c) 1,3 d) 4,0

84. Which of the following has homoatomic overlap?
a) H-Cl b) Li-Cl c) C-Cl d) Cl-Cl

85. In allene structure, three carbon atoms are joined by:
a) Three σ- and three π-bond b) two σ- and one π - bond
c) two σ - and two π - bonds d) three π - bonds only

86. Which of the following has the minimum bond length?
a) O_2^+ b) O_2^- c) O_2^{2-} d) O_2

87. Which of the following is paramagnetic?
a) CO b) O_2^- c) CN^- d) NO^+

88. The correct stability order for N_2 and its given ions is:
a) $N_2 > N_2^+ > N_2^- > N_2^{2-}$ b) $N_2^- > N_2^+ > N_2 > N_2$ c) $N_2^+ > N_2^- > N_2 > N_2^{2-}$
d) $N_2 > N_2^+ = N_2^- > N_2^{2-}$

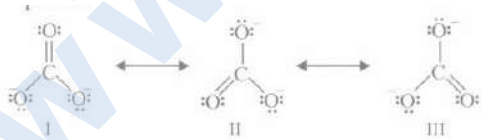
89. The correct order of decreasing bond lengths of CO, CO_2 and CO_3^{2-} is
a) $CO > CO_2 > CO_3^{2-}$ b) $CO_3^{2-} > CO_2 > CO$ c) $CO_2 > CO > CO_3^{2-}$
d) $CO_2 > CO_3^{2-} > CO$

90. Two elements X and Y combine to form a compound XY. Under what conditions the bond formed between them will be ionic?
a) If the difference in electronegativities of X and Y is 1.7.
b) If the difference in electronegativities of X and Y is more than 1.7.
c) If the difference in electronegativities of X and Y is less than 1.7.
d) If both X and Yare highly electronegative.

91. Arrange the following in order of increasing dipole moment: H_2O, H_2S, BF_3.
a) $BF_3 < H_2S < H_2O$ b) $H_2S < BF_3 < H_2O$ c) $H_2O < H_2S < BF_3$ d) $BF_3 < H_2O < H_2S$

92. The hybridizations of atomic orbitals of nitrogen in NO_2^+. NO_3^- and NH_4^+ respectively are :
a) sp, sp^3 and sp^2 b) sp^2, Sp^3 and sp c) sp, sp^2 and sp^3 d) sp^2, sp and sp^3

93. The given structures I, II and III of carbonate ion represent



a) hybrid structures b) isomeric structures c) canonical structures
d) dipole structures.

94. The ice floats on water because
a) solids have lesser density than liquids
b)
it has open-cage like structure in which lesser molecules are packed per mL than water
c) ice is lighter than water
d) when ice is formed water molecules come closer and start floating.

95. The hybridisation involved in complex $[Ni(CN_4)]^{2-}$ is (AL No Ni = 28)
a) dsp^2 b) sp^3 c) d^2sp^2 d) d^2sp^3

96. The correct order of decreasing polarisability of ion is:
a) $Cl^- > Br^- > 1^- > F^-$ b) $F^- > 1^- > Br^- > Cl^-$ c) $I^- > Br^- > Cl^- > F^-$ d) $F^- > Cl^- > Br^- > I^-$

97. **Assertion:** In Lewis structures of NF_3 and CO_3^{2-}, nitrogen and carbon occupy the central position whereas fluorine and oxygen occupy the terminal positions.
Reason: In Lewis representation, the least electronegative atom occupies the central position in the molecule/ion.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

98. In PO_4^{3-} ion, the formal charge on each oxygen atom and P--O bond order respectively are
a) -0.75,0.6 b) -0.75,1.0 c) -075,1.25 d) -3,1.25

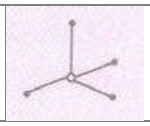
99. The correct order for bond angles is:
a) $NO_2+ > NO_2 > NO_2-$ b) $NO_2+ > NO_2- > NO_2$ c) $NO_2 > NO_2- NO_{2+}$
d) $NO_2 - > NO_2 > NO_2+$

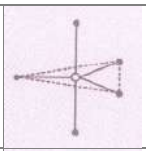
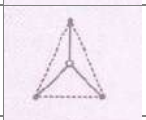
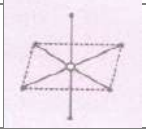
100. The high density of water compared to ice is due to
a) hydrogen bonding interactions b) dipole-dipole interactions
c) dipole-induced dipole interactions d) induced dipole-induced dipole interactions

101. The shape of water molecule which should be tetrahedral has a bent or distorted tetrahedral shape with a bond angle 104.5°. What could be the reason for this?
a) lp-lp repulsion is more than lp-bp repulsion.
b) lp-bp repulsion is more than lp-lp repulsion.
c) lp-lp repulsion is equal to lp-bp repulsion.
d) Presence oflone pair does not affect the bond angle.

102. Which of the following statement is not correct for sigma and pi-bonds formed between two carbon atoms?
a) A sigma bond is stronger than a pi-bond.
b) Bond energies of sigma and pi-bonds are of the same order.
c) Free rotation of atoms about a sigma bond is allowed but not in case of a pi-bond.
d)
Asigma bond determines the direction between carbon atoms, but a pi-bond has no primary effect in this regard.

103. Match the molecules given in column I with their shapes given in column II and mark the appropriate choice.

Column I (Molecule)		Column II(Shape)	
(A)	SF_6	(i)	

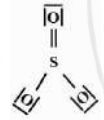
(B)	$SiCl_4$	(ii)	
(C)	AsF_5	(iii)	
(D)	BCl_3	(iv)	

a) (A) ⟶ (iv), (B) ⟶ (ii), (C) ⟶ (iii), (D)⟶ (i)
b) (A) ⟶ (iv), (B) ⟶ (i), (C)⟶ (ii), (D) ⟶ (iii)
c) (A) ⟶(iii), (B) ⟶(i), (C) ⟶ (ii), (D) ⟶ (iv)
d) (A) ⟶ (ii), (B) ⟶(iii), (C) ⟶(i), (D) ⟶ (iv)

104. The species, having bond angles of 120° is:
a) ClF_3 b) $NC1_3$ c) $BC1_3$ d) Ph_3

105. Atomic orbitals of carbon in carbon dioxide are:
a) sp^2-hybridised b) Sp^3d-hybridised c) sp-hybridised d) Sp^3-hybridised

106. A) Tetracyanoethene B) Carbon dioxide C) Benzene D) 1,3-buta-di-ene. Ratio of σ and π bonds is in order
a) A= B < C < D b) A= B < D < C c) A= B = C = D d) C < D

107. Which of the following structure is the most preferred and hence of lowest energy for SO_3?
a) b)  c) d)

108. The correct nond order for CO and CO^+ are respectively :
a) 3, 5/2 b) 3, 2 c) 3, 7/2 d) 4/2, 3

109. Which of the following molecules is formed by Sp^2 hybrid orbitals?
a) CH_4 b) CO_2 c) BF_3 d) BeF_2

110. An element 'X' is strongly electropositive and an element 'Y' is strongly electronegative both are univalent. The compound formed would be:
a) X^+Y^- b) X^-Y^+ c) X-Y d) X⟶Y

111. In a bonded molecule, the order of repulsion between the bonded and non-bonded electrons is
a) lone pair -lone pair>bond pair - bond pair>lone pair - bond pair
b) bond pair - bond pair>lone pair - lone pair>lone pair - bond pair
c) lone pair -lone pair>lone pair - bond pair>bond pair - bond pair
d) bond pair - bond pair>lone pair - bond pair>lone pair - lone pair.

112. Statement 1: Trimethyl amine is more basic than trisilyl amine.
Statement 2: Silicon in trisilyl amine is more electronegative than carbon of trimethyl amine.

a)
Statement 1 is True, statement 2 is True, statement 2 is a correct explanation of statement 1
b)
Statement 1 is True, statement 2 is True, statement 2 is not a correct explanation of statement 1
c) Statement 1 is true, statement 2 is False
d) Statement 1 is False, Statement 2 is True

113. The boiling point of p-nitrophenol is higher than that of o-nitrophenol because
a) NO_2 group at p-position behave in a different way from that at o-position
b) intramolecular hydrogen bonding exists in p-nitrophenol
c) there is intermolecular hydrogen bonding in p-nitrophenol
d) p-nitrophenol has a higher molecular weight than o-nitrophenol

114. In NO_3^- ion number of bond pair and lone pair of electrons on nitrogen atoms respectively are:
a) 2, 2 b) 3, 1 c) 1, 3 d) 4, 0

115. AB is an ionic solid. The ionic radii of A^+ and B^- are respectively Rc and Ra, Lattice energy of AB is proportional to:
a) $\frac{r_c}{r_a}$ b) (r_c+r_a) c) $\frac{r_a}{r_c}$ d) $\frac{1}{Rc+Ra}$

116. Among KO_2, $KAlO_2$, CaO_2 and NO_2+, unpaired electron is present in:
a) $N0_2^+$ and CaO_2 b) $K0_2$ and KA/O_2 c) KO_2 only d) CaO_2 only

117. Which of the following facts regarding bond order is not valid?
a) Bond order is given by the number of bonds between the two atoms in a molecule.
b) With increase in bond order, bond enthalpy of the molecule decreases.
c) Isoelectronic molecules and ions have identical bond orders.
d) With increase in bond order, bond length decreases.

118. The correct order of the lattice energies of the following ionic compounds is:
a) NaCl > $MgBr_2$ > CaO > Al_2P_3 b) $A1_2O_3$ > $MgBr_2$ > CaO > NaCl
c) $MgBr_2$ >AI20} > CaO > NaCl d) Al_2O_3 > CaO > $MgBr_2$ > NaCl

119. On hybridisation of one s and three p-orbitals, we get
a) four orbitals with tetrahedral orientation b) three orbitals with trigonal orientation
c) two orbitals with linear orientation d) two orbitals with perpendicular orientation.

120. Regarding hybridisation the correct statement is
a) Orbitals of different atoms hybridize
b) The angle between any two hybrid orbitals is not the same
c) Hybrid orbitals always form sigma bonds
d) Only electrons undergo hybridisation and noQorbitals

121. Given below is the bond angle in various types of hybridisation. Mark the bond angle which is not correctly matched.
a) dsp^2-90° b) sp^3d^2-90° c) sp^3d-90° d) sp^3-109.5°

122. Which of the following pairs of ions is isoelectronic and isostructural?
a) CO_3^{2-}, NO_3^- b) ClO_3^-, CO_3^{2-} c) SO_3^{2-}, NO_3^- d) ClO_3^-, SO_3^{2-}

123. The molecular orbital electronic configuration is (oil, (0 IY') It corresponds to:

a) He_2 b) $He2^+$ c) H_2^- d) Both 2 & 3

124. Which of the following is a linear molecule?
a) N_2O b) SO_2 c) CO_2 d) H_2S

125. Bond order of N_2^+, N_2^- and N_2 will be
a) 2.5,2.5 and 3 respectively b) 2, 2.5 and 3 respectively c) 3,2.5 and 3 respectively
d) 2.5,2.5 and 2.5 respectively

126. In the case of alkali metals, the covalent character decreases in the order :
a) MCl > MI > MBr > MF b) MF > MCl > MBr > MI c) MF > MCl > MI > MBr
d) MI > MBr > MCl > MF

127. Which of the following is isoelectronic?
a) CO_2, NO_2 b) NO_2^-, CO_2 c) CN^-, CO d) SO_2, CO_2

128. Four distance species are listed below. Identify the correct order in which the bond order is increasing in them:
a) $NO < O_2^- < C_2^{2-} < He_2^+$ b) $O_2^- < NO < C_2^{2-} < He_2^+$
c) $C_2^{2-} < He_2^+ < O_2^- < NO$ d) $He_2^+ < O_2^- < NO < C_2^{2-}$

129. The correct increasing bond angles order is
a) $BF_3 < NF_3 < PF_3 > ClF_3$ b) $ClF_3 < PF_3 < NF_3 < BF_3$ c) $BF_3 \approx NF_3 < PF_3 < ClF_3$
d) $BF_3 < NF_3 < PF_3 < ClF_3$

130. The pair in which the two species are isostructural?
a) SiF_4 and SF_4 b) IO_3^- and XeO_3 c) BH_4^- and NH_4 + d) PF_5 and SF_6

131. The correct sequence of increasing covalent character is represented by :
a) LiCl < NaCl < $BeCl_2$ b) $BeCl_2$ < NaCl < LiCl c) NaCl < LiCl < $BeCl_2$
d) $BeCl_2$ < LiCl < NaCl

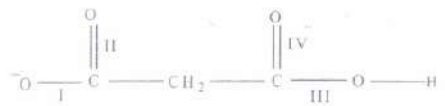
132. Consider the molecules CH_4, NH_3 and H_2O. Which of the given statements is false
a)
The H-C H bond angle in CH_4, the H-N-H bond angle in NH_3, and the H-O-H bond angle in H_2O are all greater than 90°.
b) The H-O-H bond angle in H_2O is larger than the H-C-H bond angle in NH_3.
c) The H-O-H bond angle in H_2O is smaller than the H--N- H bond angle in NH_3.
d) The H-C-H bond angle in CH_4 is larger than the H-N H bond angle in NH_3.

133. In which of the following molecules the central atoms does not have sp^3 hybridisation?
a) NH_4^+ b) CH_4 c) SF_4 d) BF_-^4

134. Which one is not paramagnetic among the following? [Atomic number of Be = 4, Ne = 10, As = 33, Cl = 17]
a) Cl^- b) Be^+ c) Ne^{2+} d) As^+

135. Among the following groups which represents the collection of isoelectronic species?
a) NO, CN^-, N_2, O_2^- b) NO^+,C_2^{2-}, O_2^-, CO c) N_2, C_2^{2-}, CO, NO
d) CO, NO^+, CN^-, C_2^{2-}

136. Which of the following comparison of bond length (C-O) is incorrect for the bonds indicated in the given molecule?



a) I = II b) II < III c) IV < I d) III = IV

137. In which of the following molecules/ions

BF_3, NO_2^-, NH_2^- and H_2O

the central atom is sp^2 hybridised?

a) NH_2^- and H_2O b) NO_2^- and H_2O c) BF_3 and NO_2^- d) NO_2^- and NH_{12}^-

138. In an octahedral structure, the pair of d orbitals involved in d^2sp^3 hybridisation is

a) $d_{x^2-y^2}, d_{z^2}$ b) $d_{xz}, d_{x^2-y^2}$ c) d_{z^2}, d_{xz} d) d_{xy}, d_{yz}

139. Which of the following does not apply to metallic bond?

a) Overlapping valence orbitals b) Mobile valence electrons c) Delocalised electrons

d) Highly directed bonds

140. A covalent bond is likely to be formed between two elements which:

a) Have similar electronegativities b) have low ionization energies

c) have low melting points d) form ions with a small charge

141. Which one of the following pairs is paramagnetic?

a) $Cl_2O_3SO_2$ b) P_2O_5,N_2O_5 c) ClO_2,NO_2 d) SO2,N_2O

142. Which is the weakest among the following types of bond?

a) Ionic bond b) Metallic bond c) Covalent bond d) Hydrogen bond

143. The canonical or resonating structures of a molecule required to describe the structure of a molecule follow which of the following rules?

a) The relative position of all atoms can differ.

b) The same number of unpaired and paired electrons in all structures.

c) The energy of each structure is different.

d) Like charges are present on adjacent atoms.

144. In a covalent bond formation:

a) transfer of electrons takes place

b) Sharing of electrons between two atoms takes place

c) electrons are shared by one atom only

d) electrons are donated by one atom and shared by both atoms

145. Which of the following species has unpaired electrons?

a) N_2 b) F_2 c) O_2^- d) O_2^{2-}

146. Oxygen molecule is paramagnetic because

a) no. of bonding electrons > no. of antibonding electrons

b) no. of bonding electrons < no. of antibonding electrons

c) no. of bonding electrons no. of antibonding electrons

d) presence of unpaired electrons in molecular orbitals

147. In which one of the following species the central atom has the type of hybridization which is not the same as they present in the other three?

a) SF_4 b) I_3^- c) $SbCl_5^{2-}$ d) PCl_5

148. The dielectric constant of H_2O is 80. The electrostatic force of attraction between Na^+ and Cl^- will be

a) reduced to $\frac{1}{40}$ in water than in air b) reduced to $\frac{1}{80}$ in water than in air

c) will be increased to 80 in water than in air d) will remain unchanged

149. Which one of the following is the electron deficient molecule?
a) C_2H_6 b) B_2H_6 c) SiH_4 d) PH_3

150. Which type of hybridisation is shown by carbon atoms from left to right in the given compound: CH_2= CH- C≡ N?
a) sp^2 , sp^2, sp b) Sp^2, sp, sp c) sp, Sp^2, Sp^3 d) Sp^3, Sp^2, sp

151. In HCHO, there are X non-bonding electron pairs, Y σ-bonds and Z 1t -bonds, X, Y and Z are
a) 1, 1, 3 b) 2, 3, 1 c) 1,2, 3 d) 1, 3, 2

152. Which of the following would have a permanent dipole moment?
a) SiF_4 b) SF_4 c) XeF_4 d) BF_3

153. What is the hybrid state of carbon in ethyne, graphite and diamond?
a) sp^2, sp, Sp^3 b) sp,sp^2,Sp^3 c) Sp^3,sp^2, sp d) sp^2,Sp^3, sp

154. Which of the following set of molecules will have zero dipole moment?
a) Boron trifluoride, beryllium difluoride, carbon dioxide, 1, 4-dichlorobenzene
b) Ammonia, beryllium difluoride, water, 1, 4-dichloro- benzene
c) Boron trifluride, hydrogen fluroide, carbon dioxide 1, 3-dichlorobenzene
d) Nitrogen triflouride, beryllium difluride, water, 1, 3- dichlorobenzene

155. Identify a molecule which does not exist
a) O_2 b) He_2 c) Li_2 d) C_2

156. Among the following orbital bonds, the angle is minimum between :
a) sp^3 bonds b) p_x and p_y orbitals c) H-O-H in water d) sp bonds

157. Which of the following molecules\ions does not contain unpaired electrons?
a) N_2^+ b) O_2 c) O_2^{2-} d) B_2

158. Which of the following has strongest bond?
a) HF b) HCI c) HBr d) HI

159. In the formation of SF_6 molecule, the sulphur atom is in
a) first excited state b) second excited state c) third excited state
d) fourth excited state

160. **Assertion**: The experimentally determined carbon to oxygen bond length in carbon dioxide is 115 pm.
Reason: The lengths of a normal carbon to oxygen double bond (C=O) and carbon to oxygen triple bond (C≡O) are 121 pm and 110 pm respectively.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

161. Which of the following molecules contains covalent and coordinate bonds?
a) CCl_4 b) H_2SO_4 c) NaCl d) $Mg(OH)_2$

162. Which one of the following molecules contain no π-bond?
a) CO_2 b) H_2O c) SO_2 d) NO_2

163. If Na^+ion is larger than Mg^{2+} ion and S^{2-} ion is larger than Cl^- ion, Which of the following will be least soluble in water'?
a) NaCl b) Na_2S c) $MgCl_2$ d) MgS

164. Which of the following formulae does not show the correct relationship?
a) B.O.=$\frac{1}{2}$(N_b-N_a) b) B.O.$\propto \frac{1}{Bond\ length}$ c) B.O.$\propto \frac{1}{Bond\ dissociation\ energy}$
d) $N_b > N_a, B.O = +ve$

165. Which of the following is not a correct statement?
a) The canonical structures have no real existence
b) Every AB_5 molecule does in fact have square pyramidal structure
c) Multiple bonds are always shorter than corresponding single bonds
d) The electron deficient molecules can act as Lewis acids

166. Which structure is linear?
a) SO_2 b) CO_2 c) CO_3^{2-} d) SO_4^{2-}

167. In which of the following bond angle is maximum?
a) NH_3 b) NH_4^+ c) PCl_3 d) SCl_2

168. Two elements P and Q combine to form a compound. If P has 2 and Q has 6 electrons in their outermost shell, what will be formula of the compound formed?
a) PQ b) P_2Q c) P_2Q_3 d) PQ_2

169. Which of the two ions from the list given below, have the geometry that is explained by the same hybridisation of orbitals.
NO_2^-, NO_3^-, NH_2^-, NH_4^+, SCN^-?
a) NH_4^+ and NO_3^- b) SCN^- and NH_2^- c) NO_2^- and NH_2^- d) NO_2^- and NO_3^-

170. Which types of bonds are present between two carbon atoms in acetylene molecule?
a) Two sigma bonds and one pi bond b) Three sigma bonds
c) One sigma bond and two pi bonds d) Three pi bonds

171. Oxygen molecule is paramagnetic in nature. What is the paramagnetic content in terms of magnetic moment in O_2^- ?
a) 1.732 b) 3 c) 1.5 d) 2.5

172. The correct order of N—O bond lengths in NO, NO_2^-, NO_3^- and N_2O_4 is :
a) $N_2O_4 > NO_2^- < NO_3^- < NO$ b) $NO > NO_3^- < N_2O_4 > NO_2^-$
c) $NO_3^- < NO_2^- > N_2O_4 > NO$ d) $NO > N_2O_4 > NO_2^- > NO_3^-$

173. The increasing order of energies of various molecular orbitals of N_2, is given below:
$\sigma 1\,s < \sigma^* 1\,s < \sigma 2\,s < \sigma^* 2\,s < \pi 2p_x = \pi 2p_y < \sigma 2p_z < \pi^* 2p_x = \pi^* 2p_y < \sigma^* 2p_z$
The above sequence is not true for the molecule:
a) C_2 b) B_2 c) O_2 d) Be_2

174. The correct order of increasing bond angles in the following triatomic species is:
a) $NO_2^- < NO_2^+ < NO_2$ b) $NO_2^- < NO_2 < NO_2^+$ c) $NO_2^+ < NO_2 < NO_2^-$
d) $NO_2^+ < NO_2^- < NO$

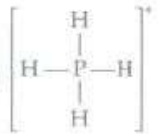
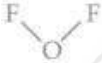
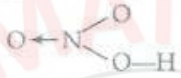
175. Which of the following pairs are isostructural?
a) SO_4^{2-} and BF_4^- b) NH_3 and NH_4^+ c) SO_4^{2-} and CO_2 d) CH_4 and BF_3

176. Which of the following does not show octahedral geometry?
a) SF_6 b) IF_5 c) SiF_6^{2-} d) SF_4

177. The correct order of increasing bond angles is :
a) $PF_3 < PCl_3 < PBr_3 < PI_3$ b) $PF_3 < PBr_3 < pcl_3 < PI_3$ c) $PI_3 < PBr_3 < PCl_3 < PF_3$
d) $PF_3 > PCl_3 < PBr_3 < PI_3$

178. How many number of electrons are involved in the formation of a nitrogen molecule?
a) Three b) Four c) Eight d) Six

179. **Assertion:** Sodium chloride (NaCl) is a stable ionic solid.
Reason: NaCl has high lattice enthalpy.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
if both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

180. Which of the following formula does not correctly represent the bonding capacities of the atoms involved?
a)  b)  c)  d)

181. The correct order of C—O bond length among CO, CO_3^{2-}, CO_2 is :
a) $CO_2 < CO_3^{2-} < CO$ b) $CO < CO_3^{2-} < CO_2$ c) $CO_3^{2-} < CO_2 < CO$
d) $CO < CO_2 < CO_3^{2-}$

182. The correct bond order in the following species is:
a) $O_2^{2+} < O_2^{-} < O_2^{+}$ b) $O_2^{+} < O_2^{-} < O_2^{2+}$ c) $O_2^{-} < O_2^{+} < O_2^{2+}$
d) $O_2^{2+} < O_2^{+} < O_2^{-}$

183. Which of the following is non-polar?
a) SO_2 b) CO_2 c) H_2O d) NH_3

184. As the s-character of a hybrid orbital increases the bond angle
a) Increases b) Decreases c) does not change d) Becomes zero

185. In which of the following species the bond is non directional?
a) NCl_3 b) RbCl c) $BeCl_2$ d) BCl_3

186. Which contains both polar and non-polar covalent bonds?
a) HCN b) CO_2 c) H_2O_2 d) CH_4

187. According to molecular orbital theory which of the following lists rank the nitrogen species in terms of increasing bond order?
a) $N_2^- < N_2 < N_2^{2-}$ b) $N_2^{2-} < N_2^- < N_2$ c) $N_2 < N_2^{2-} < N_2^-$ d) $N_2^- < N_2^{2-} < N_2$

188. Which of the following elements forms predominantly covalent compounds as compared to other elements which form ionic compounds?
a) Be b) Mg c) Ca d) Sr

189. **Assertion:** F_2 and O_2^{2-} have bond order 1 while N_2, CO and NO^+ have bond order 3.
Reason: Higher the bond order, higher is the stability of the molecule.

a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
if both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

190. In X-H---Y, X and Y both are electronegative elements?
a) Electron density on X will increase and on H will decrease
b) In both electron density will decrease c) In both electron density will increase
d) Electron density will decrease on X and will increase on H

191. Which has a giant covalent structure?
a) PbO_2 b) SiO_2 c) NaCl d) AlC_3

192. In which of the following pairs, the two species are isostructural?
a) SF_4 and XeF_4 b) SO_3^{2-} and NO_3^- c) BF_3 and NF_3 d) BrO_3- and XeO_3

193. Which one of the following is the correct order of interactions?
a) Covalent < hydrogen bonding < van der Waals' < dipole-dipole
b) van der Waals < hydrogen bonding < dipole-dipole < covalent
c) van der Waals'< dipole-dipole < hydrogen bonding < covalent
d) Dipole-dipole < van der Waals'< hydrogen bonding < covalent

194. Order of size of sp, Sp^2 and Sp^3 orbitals is:
a) $sp^3 < sp^2 < sp$ b) $sp < sp^2 < sp^3$ c) $sp^2 < sp < sp^3$ d) $sp^2 < sp^3 < sp$

195. Which of the following statements is not correct from the view point of molecular orbital theory?
a) Be_2 is not a stable molecule b) He_2 is not stable but He_2^+ is expected to exist
c)
Bond strength of N_2 is maximum amongst the homonuclear diatomic molecules belonging to the second period.
d)
The order of energies of molecular orbitals in N_2 molecule is
$< \sigma 2s < \sigma^* 2s < \sigma 2p_z < (\pi 2p_x = \pi 2p_y) < (\pi * 2p_x = \pi 2p_y) < \sigma * 2p_z$

196. According to MO theory which of the following lists ranks the nitrogen species in terms of increasing bond order?
a) $N_2^{2-} < N_2^- < N_2$ b) $N_2 < N_2^{2-} < N_2^-$ c) $N_2^- < N_2^{2-} < N_2$
d) $N_2^- < N_2 < N_2^{2-}$

197. The BCl_3 is a planar molecule whereas NCl_3 is pyramidal because :
a) B-Cl bond is more polar than N-Cl bond
b) N-Cl bond is more covalent than B-Cl bond
c) Nitrogen atom is smaller than boron atom
d) BCl_3 has no lone pair but NCl_3 has a lone pair of electrons

198. **Assertion:** Ionic bonds are directional in nature whereas covalent bonds are non-directional.
Reason: According to orbital overlap concept, the formation of a covalent bond between two atoms results by pairing of electrons present in the valence shell having same spins.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

199. Which of the following statements is not true regarding molecular orbital theory?
a) The atomic orbitals of comparable energies combine to form molecular orbitals.
b) An atomic orbital is monocentric while a molecular orbital is polycentric
c) Bonding molecular orbital has higher energy than antibonding molecular orbital
d) Molecular orbitals like atomic orbitals obey Aufbau principle for filling of electrons.

200. The relationship between the dissociation energy of N_2 and N_2^+ is:
a) Dissociation energy of N_2^+ > dissociation energy of N_2.
b) Dissociation energy of N_2 = dissociation energy of N_2^+
c) Dissociation energy of N_2 > dissociation energy of N_2^+
d)
Dissociation energy of N_2 can either be lower or higher than the dissociation energy of N_2^+

201. Which of the following relationships is true?
a) Bond dissociation energy of O_2 and O_2^- are same.
b) Bond dissociation energy of O_2^+ is higher than O_2.
c) Bond dissociation energy of O_2^- and O_2^{2-} are same.
d) Bond dissociation energy of O_2^{2-} is higher than O_2^-.

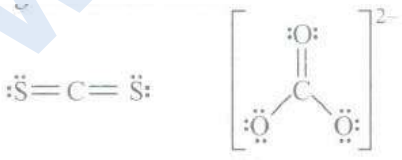
202. Isostructural species are those which have the same shape and hybridisation. Among the given species, identify the isostructural pairs.
a) [NF_3 and BF_3] b) $[BF_4^-$ and $NH_4^+]$ c) [BCl_3 and $BrCl_3$] d) [NH_3 and NO_3^-]

203. The correct order of the O-O bond length in O_2, H_2O_2 and O_3 is
a) O_2>O_3>H_2O_2 b) O_3>H_2O_2>O_2 c) O_2>H_2O_2>O_3 d) H_2O_2>O_3>O_2

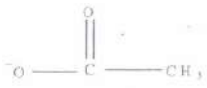
204. O_2^2 is isoelectronic with:
a) H_2 b) N_2 c) F_2 d) S

205. Which bond angle θ would result in the maximum dipole moment for the triatomic molecule Y XY?
a) $\theta = 90^0$ b) $\theta = 120^0$ c) $\theta = 150^0$ d) $\theta = 180^0$

206. What is the formal charge on carbon atom in the following two structures:



a) 0, -2 b) 0, 0 c) +2, -2 d) +1, -1

207. The bond order for c-o bond in Carboxylate ion is 

a) 1 b) 2 c) 1.5 d) 0.5

208. Mark the incorrect statement in the following.

a) The bond order in the species $O_2, O_2^+ and\ O_2^-$ decreases as $O_2^+ > O_2 > O_2^-$
b) The bond energy in a diatomic molecule always increases when an electron is lost
c) Electrons in antibonding MO contribute to repulsion between two atoms
d) With increase in bond order bond length decreases and bond strength increases

209. When the hybridization state of carbon atom changes from sp^3 to sp^2 and finally to sp, the angle between the hybridized orbitals :
a) Decreases gradually b) Decreases considerably c) Is not affected
d) Increases progressively

210. Among the following which compound will show the highest lattice energy
a) KF b) NaF c) CsF d) RbF

211. The higher values of specific heat of water than other liquids has been accounted in terms of:
a) high dielectric constant b) polarity c) H-bonding d) boiling point

212. As sp^3 hybrid orbital contains :
a) $\frac{1}{4}$ s-character b) $\frac{1}{2}$ s-character c) $\frac{1}{3}$ s-character d) $\frac{2}{3}$ s-character

213. The angle between the overlapping of one s-orbital and one p-orbital is
a) 180° b) 120° c) 109°28' d) 120°60'

214. Hybridisation state of Xe in XeF_2, XeF_4 and XeF_6 respectively are:
a) sp^2 , sp^3d, sp^3d^2 b) sp^3d , sp^3d^2, sp^3d^3 c) sp^3d^2 , sp^3d, sp^3d^3 d) sp^2 , sp^3, sp^3d

215. Bond angle in the following conversions decreases except when:
a) NH_4+ into NH_3 b) NH_2^{-1} into N_3^{-1} c) SO_3 into SO_2 d) CO_2 into CO_3^{-2}

216. **Assertion**: In NH_3, N is Sp^3 hybridised but bond angle is 107°.
Reason: Shape of NH_3 molecule is trigonal pyramidal.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

217. The dipole moment of LiH is 1.964×10^{-29} cm and the interatomic distance between Li and H in this molecule is 1.596 $\mathring{A}$. The percentage of ionic character in LiH is
a) 75.0 b) 76.8 c) 79.8 d) 100

218. How many and what types of bonds are present in NH_4^+?
a) Four covalent bonds b) Three covalent bonds and one ionic bond
c) Four ionic bonds d) Three covalent bonds and one coordinate bond

219. Which of the following molecules has the maximum dipole moment?
a) CO_2 b) CH_4 c) NH_3 d) NF_3

220. Equilateral shape has
a) sp hybridisation b) sp^2 hybridisation c) sp^3 hybridisation d) dsp^2 hybridisation

221. The pairs of species of oxygen and their magnetic behaviours are noted below. Which of the following presents the correct description

a) O_2, O_2^{2-} Both diamagnetic b) O^+, O_2^2- Both pararnagnetic c) O_2^+, O_2 - Both pararnagnetic
d) O, O_2^{2-} Both pararnagnetic

222. Dipole moment is shown by:
a) 1, 4-dichlorobenzene b) cis-l, 2-dichlorobutene c) trans-2, 3-dichloro-2-buten
d) trans-2-butene

223. Given below is the table showing shapes of some molecules having lone pairs of electrons. Fill up the blanks left in it.

Molecule type	bp	lp	Shape	Example
AB_2E_2	2	P	Bent	H_2O
AB_3E_2	3	2	Q	ClF_3
AB_5E	5	R	S	BrF_5
AB_4E_2	4	2	T	U

a)

P	Q	R	S	T	U
2	Square pyramidal	2	T-shaped	Square planar	H_2O_2

b)

P	Q	R	S	T	U
4	T-shaped	5	Square planar	Square pyramidal	SO_3

c)

P	Q	R	S	T	U
2	T-shaped	1	Square pyramidal	Square planar	XeF_4

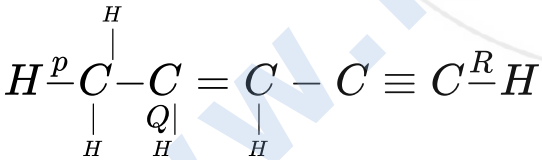
d)

P	Q	R	S	T	U
3	Square planar	2	T-shaped	Square pyramidal	$BrCl_3$

224. Which of the following is soluble in water?
a) $C_2H_5OC_2H_5$ b) C_2H_5OH c) C_2H_5Cl d) C_6H_6

225. Which pair is isostructural and possesses same number of lone pair of electron on central atom?
a) XeF_5 and $XeOF_4$ b) NH_3 and ClO_4^- c) $SnCl_4$ and ClO_4^- d) $AIC1_3$and SO_2

226. Which is the correct order of bond lengths P, Q and R in



a) P > Q > R b) R > Q > P c) Q > P > R d) Q > R > P

227. Among the following, the molecule with highest dipole moment is
a) CH_3Cl b) CH_2Cl_2 c) $CHCl_3$ d) CCl_4

228. Be^{2+} is isoelectronic with which of the following ions?
a) H^+ b) Li^+ c) Na^+ d) Mg^{2+}

229. According to VSEPR theory,
a) the shape of the molecule depends upon the bonded electron pairs
b) pair of electrons attract each other in valence shells
c) the pairs of electrons tend to occupy such positions that minimise repulsions
d)
the pairs of electrons tend to occupy such positions that minimise distances from each other.

230. What is the order of stability of N_2 and its ions?
a) $N_2 > N_2^+ = N_2^- > N_2^{2-}$ b) $N_2^+ > N_2^- > N_2 > N_2^{2-}$ c) $N_2^- > N_2^+ > N_2 > N_2^{2-}$
d) $N_2^{2-} > N_2^- = N_2^+ > N_2$

231. Which of the following shows dSp^2 hybridisation and a square planar geometry?
a) SF_6 b) BrF_5 c) PCl_5 d) $[Ni(CN)_4]^{2-}$

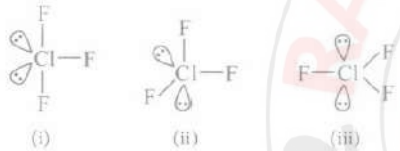
232. Which of the following statements is not correct?
a) Double bond is shorter than a single bond b) Sigma bond is weaker than a p-bond
c) Double bond is stronger than a single bond
d) Covalent bond is stronger than hydrogen bond

233. In water molecule, the two O - H bonds are oriented at an angle of 104.5°. In BF_3 the three B - F bonds are oriented at an angle of 120°. In BeF_2, the two Be - F bonds are oriented at an angle of 180°. Which of the following will have highest dipole moment?
a) BeF_2 b) BF_3 c) H_2O d) All have zero dipole moment.

234. Among LiCl, $BeCl_2$, BCl_3 and CCl_4, the covalent bond character follows the order:
a) LiCl < $BeCl_2$ > BCl_3 > CCl_4 b) LiCl < $BeCl_2$ < BCl_3 > CCl_4
c) LiCl < $BeCl_2$ < BCl_3 < CCl_4 d) LiCl > $BeCl_2$ > BCl_3 > CCl_4

235. In which of the following molecule/ ion all the bonds are not equal?
a) XeF_4 b) BF_4^- c) C_2H_4 d) SiF_4

236. The most stable shape of ClF_3 is shown by



a) (i) only b) (i) and (iii) c) (ii) only d) (iii) only

237. Among the following species, identify the isostructural pairs. NF_3, NO_3^-, BF3, H_3O , HN_3
a) [NF_3, NO_3^-] and [BF_3, H_3O^+] b) [NF3, HN3] and [NO_3^-, BF_3]
c) [NF_3, H_3O^+ and [NO_3^-, BF_3] d) [NF_3, H_3O^+] and [HN_3, BF_3]

238. **Assertion:** Octet rule is based upon the chemical inertness of noble gases.
Reason: Octet rule can explain the shape and relative stability of the molecule.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

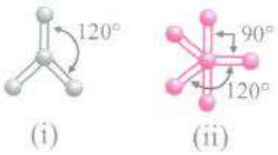
239. Which of the following order of energies of molecular orbitals of N_2 is correct?
a) $(\pi 2p_y) < (\sigma 2p_z) < (\pi^* 2P_x) \approx (\pi^* 2p_y)$ b) $(\pi 2p_y) > (\sigma 2p_z) > (\pi^* 2p_x) \approx (\pi^* 2p_y)$
c) $(\pi 2p_y) < (\sigma 2p_z) > (\pi^* 2p_x) \approx (\pi^* 2p_y)$ d) $(\pi 2p_y) > (\sigma 2p_z) < (\pi^* 2p_x) \approx (\pi^* 2p_y)$

240. CO_2 has the same geometry as
A) $HgC1_2$
B) NO_2
C) $SnCl_4$
D) C_2H_2

a) A and C b) Band D c) A and D d) C and D

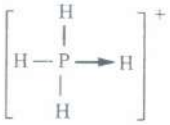
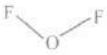
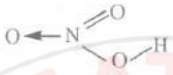
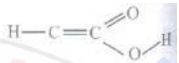
241. Which of the following molecule does not have a linear arrangement of atoms?
a) H_2S b) C_2H_2 c) BeH_2 d) CO_2

242. Which molecule is depicted by the given ball and stick models?



a) (i) $BeCl_2$, (ii) CH_4 b) (i) BF_3, (ii) PCl_5 c) (i) BF_4, (ii) CH_4 d) (i) $BeCl_2$, (ii) PCl_5

243. The types of hybrid orbitals of nitrogen in NO_2^+, NO_3^- and NH_4^+ respectively are expected to be
a) sp,sp^3 and sp^2 b) sp,sp^2 and sp^3 c) sp^2 ,sp and sp^3 d) sp^2,sp^3 and sp

244. Which formulae does not correctly represents the bonding capacity of the atom involved?
a)  b)  c)  d) 

245. The element that exhibits both electrovalency and covalency is
a) Neon b) Sodium c) Barium d) Chlorine

246. The bond order depends on the number of electrons in the bonding and antibonding orbitals. Which of the following statement is/are correct about bond order ?
a) Can have negative value b) Is any number other than zero c) Is any integer
d) It can assume any value-positive or negative, integral or fractional, including zero.

247. Which of the following species has tetrahedral geometry?
a) BH_4^- b) NH_2^- c) CO_3^{2-} d) H_3O^+

248. H-B-H bond angle in BH_4- is
a) 180° b) 120° c) 109° d) 90°

249. Which of the following pairs of compounds is isoelectronic and isostructural?
a) TeI_2, XeF_2 b) IBr_2, XeF_2 c) IF_3, XeF_2 d) $BeCl_2$, XeF_2

250. Among the three isomers of nitrophenols, the one that is least soluble in water is _____.
a) o-nitrophenol b) m-nitrophenol c) p-nitrophenol
d) 0-nitrophenol and p-nitrophenol

251. The number of sigma (σ) and pi (π) bonds in pent-2-en-4- yne is:
a) 8σ bonds and 5 π bonds b) 11σ bonds and 2π bonds
c) 13σ bonds and no π bonds d) 10σ bonds and 3π bonds

252. The correct order of increasing bond angles in the following species is :
a) $Cl_2O < ClO_2 < ClO_2^-$ b) $ClO_2 < Cl_2O < ClO_2^-$ c) $Cl_2O < ClO_2^- < ClO_2$
d) $ClO_2^- < Cl_2O < ClO_2$

253. In PO_4^{3-} ion, the formal charge on each oxygen atom and P—O bond order respectively are:
a) - 0.75, 0.6 b) - 0.75, 1.0 c) - 0.75, 1.25 d) - 3, 1.25

254. In which of the following molecules octet rule is not followed?
a) NH_3 b) CH_4 c) CO_2 d) NO

255. In which of the following pair both the species have sp^3 hybridisation?
a) H_2S, BF_3 b) SiF_4, BeH_2 c) NF_3, H_2O d) NF_3, BF_3

256. The type of hybridisation present on 'S' in SO_2 and SO_3 molecules respectively:
a) sp, Sp^2 b) Sp^2, Sp^2 c) sp, Sp^3 d) Sp^2, Sp^3

257. Which of the following observations can be explained on the basis of hydrogen bonding?
H-F has higher boiling point than other halogen acids.
H_2O has highest boiling point among hydrides of group 16 elements.
NH_3 has lower boiling point than PH_3.
a) (i), (ii) and (iii) b) (i) and (iii) c) (ii) and (iii) d) (i) and (ii)

258. Select the correct relation:
a) $\mu_{NH3} = \mu_{NF3}$ b) $\mu_{NH3} > \mu_{NF3}$ c) $\mu_{NH3} < \mu_{NF3}$ d) can't compared

259. In PO_4^{3-} ion, the formal charge on the oxygen atom of P-O bond is
a) +1 b) -1 c) -0.75 d) +0.75

260. Which of the following pairs of species have the same bond order
a) O_2,NO^+ b) CN^-,CO c) N_2, O_2^- d) CO,NO

261. o- Hydroxybenzaldehyde is a liquid at room temperature while p-hydroxybenzaldehyde is a high melting solid because of
a) H-bonding b) ionisation energy c) electron gain enthalpy d) lattice enthalpy.

262. Which one of the following pairs of species have the same bond order?
a) CO, NO b) O_2, NO^+ c) CN^-, CO d) N_2, O_2^-

263. Which of the following is not isostructural with $SiCl_4$?
a) SCl_4 b) SO_4^{2-} c) PO_4^{3-} d) NH_4^+

264. Linear combination of two hybridized orbitals belonging to the two atoms, each having one electron leads to a :
a) Sigma bond b) Double bond c) Coordinate bond d) Pi-bond

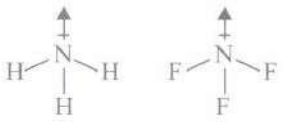
265. **Assertion:** O_2 molecule is diamagnetic while C_2 molecule is paramagnetic in nature.
Reason: Bond order of O_2 molecule is 1.5 and that of C_2 molecule is 2.5.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true and reason is the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

266. The number of anti-bonding electron pairs in O_2^{2-} molecular ion on the basis of molecular orbital theory is:
a) 5 b) 2 c) 4 d) 6

267. Which of the following molecules shows intramolecular hydrogen bonding?
a) o-Nitrophenol b) p-Nitrophenol c) Benzoic acid d) Ethanol

268. Strongest bond is in between
a) CsF b) NaCl c) Both (a) and (b) d) none of above

269. Although F is more electronegative than H, the resultant dipole moment of NH_3 is much more than that of NF_3. It can be explained as



a)
the lone pair of nitrogen opposes the dipole moment of NF_3 while it is added to the dipole moment of NH_3
b) all the dipoles of NF_3 are in same direction
c) all the dipoles of NH_3 are in opposite direction
d)
NH_3 has a regular geometry while NF_3 has irregular geometry which makes dipole moment of NH_3 more than NF_3.

270. Which of the following species contains three bond pairs and one lone pair around the central atom?
a) H_2O b) BF_3 c) NH_2^- d) PCl_3

271. Which one of the following molecules contain both ionic and covalent bonds?
a) CH_2Cl_2 b) K_2SO_4 c) $BeCl_2$ d) SO_2

272. In which of the following molecules all the bonds are not equal?
a) BF_3 b) AlF_3 c) NF_3 d) ClF_3

273. Which of the following molecule can central atom said to adopt sp^2 hybridisation?
a) BeF_2 b) BCl_3 c) C_2H_2 d) NH_3

274. Which of the following species contains equal number of σ and π-bonds
a) XeO_4 b) $(CN)_2$ c) $CH_2(CN)_2$ d) HCO_3^-

275. What will be the bond order of the species with electronic configuration $1s^2\ 2s^2\ 2p^5$?
a) One b) Two c) Three d) Zero

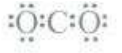
276. Which of the following is least likely to behave as Lewis base?
a) NH_3 b) BF_3 c) OH^- d) H_2O

277. Which ion has a higher polarising power?
a) Mg^{2-} b) $Al3^+$ c) $Ca2^+$ d) Na^+

278. The angular shape of ozone molecule (O_3) consists of:
a) 1 sigma and 2 pi bonds b) 2 sigma and 2 pi bonds c) 1 sigma and 1 pi bonds
d) 2 sigma and 1 pi bonds

279. The strongest ionic bond is present in
a) LiF b) NaF c) RbF d) CsF

280. The outer orbitals of C in ethene molecule can be considered to be hybridized to give three equivalent sp2 orbitals. The total number of sigma (σ) and pi (π) bonds in ethene molecule is
a) 1 sigma (σ) and 2 pi (π) bonds b) 3 sigma (σ) and 2 pi (π) bonds
c) 4 sigma (σ) and 1 pi (π) bonds d) 5 sigma (σ) and 1 pi (π) bonds

281. Which of the following shows the Lewis dot formula for CO_2?
a) b) c) d) 

282. The ONO angle is maximum in:
a) NO_3- b) NO_2^+ c) NO_2- d) NO_2

283. In which of the following molecules the central atom does not retain any lone pair of electrons?
a) NO_2 b) NH_3 c) BF_3 d) H_2O

284. For two ionic solids CaO and KI, identify the wrong statement among the following :
a) Lattice energy of CaO is much large than that of KI b) KI is soluble in benzene
c) CaO has higher melting point d) CaO has higher melting point

285. Which one is not paramagnetic among the following? (at. no. of Be = 4. Ne = 10, As = 13. Cl = 17)
a) Cl^- b) Be c) Ne^{2+} d) As^+

286. What is the dominant intermolecular force or bond that must be overcome in converting liquid CH_3OH to a gas?
a) Dipole-dipole interaction b) Covalent bonds c) London dispersion force
d) Hydrogen bonding

287. Match the column I with column II and mark the appropriate choice.

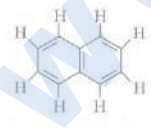
Column I		Column II	
(A)	C_2H_2	(i)	$sp3d^2$ hybridisation
(B)	SF_6	(ii)	sp^3d^3 hybridisation
(C)	SO_2	(iii)	sp hybridisation
(D)	IF_7	(iv)	sp^2 hybridisation

a) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶(iv)
b) (A) ⟶(iii), (B)⟶(i), (C) ⟶(iv), (D) ⟶(ii) c) (A)⟶(ii), (B) ⟶(iii), (C)⟶(i), (D) ⟶(iv)
d) (A) ⟶(iv), (B) ⟶(i), (C) ⟶(iii), (D) ⟶(ii)

288. Polarity in a molecule and hence the dipole moment depends primarily on electronegativity of the constituent atoms and shape of a molecule. Which of the following has the highest dipole moment?
a) CO_2 b) HI c) H_2O d) SO_2

289. Which of the following pairs will form the most stable ionic bond?
a) Na and Cl b) Mg and F c) Li and F d) Na and F

290. Number of π bonds and σ bonds in the following structure is:



a) 6, 19 b) 4, 20 c) 5, 19 d) 5, 20

291. Sodium chloride has a crystalline structure made up of Na^+ and Cl^- ions. Why does NaCl not conduct electricity in solid state?
a) Solids do not conduct electricity.
b)
The ions of NaCl become mobile only in molten state and are not free to move in solid state.

c) The crystalline structure does not have ions.
d) When a bond is formed between ions they lose their charges.

292. Which of the following does not have tetrahedral structure?
a) BH_4^- b) BH_3 c) NH_4^+ d) H_2O

293. Some statements about valence bond theory are given below.
i) The strength of bond depends upon extent of overlapping.
ii) The theory explains the directional nature of covalent bond.
iii) According to this theory oxygen molecule is paramagnetic in nature.
a) all are correct b) only i and ii are correct c) only i and ii are correct
d) all are wrong

294. During the formation of a molecular orbital from atomic orbital, the electron density is:
a) minimum in nodal plane b) maximum in nodal plane c) zero in the nodal plane
d) zero on the surface of lobe

295. $CH_4(g) \rightarrow CH3(g) + H(g)$ $\triangle H1 = Q_3 CH3(g) \rightarrow CH_2(g) + H(g)$ $\triangle H_2 = Q_2$
$C_4(g) \rightarrow CH(g) + H(g)$ $\rightarrow H_3 = Q_3$ $CH(g) \rightarrow C(g) + H(g)$ $\rightarrow H_4 = Q_4$
Then the relationship between Q_1 Q_2 Q_3 and Q_4 are
a) $Q_1 > Q_2 > Q_3 > Q_4$ b) $Q_3 > Q_2 > Q_4 > Q_1$ c) $Q_3 > Q_2 > Q_1 > Q_4$ d) $Q_2 > Q_3 > Q_1 > Q_4$

296. Identify the incorrect statement related to PCl_5 from the following:
a) Three equitorial P - Cl bonds makes an angle of 120° with each other
b) Two axial P - Cl bonds make an angle of 180° with each other
c) Axial P - Cl bonds are longer than equatorial P - Cl bonds
d) PCl_5 molecules is non reactive

297. Which of the following is a polar molecule?
a) BF_3 b) SF_4 c) SiF_4 d) XeF_4

298. Which of the following species is paramagnetic?
a) O_2^{2-} b) NO c) CO d) CN^-

299. Which of the following molecules has trigonal planer geometry?
a) BF_3 b) NH_3 c) PCl_3 d) IF_3

300. Which of the following diatomic molecular species has only π bonds according to Molecular Orbital Theory?
a) N_2 b) C_2 c) Be_2 d) O_2

301. Which of the following statements is correct regarding the structure of PCl_5?
a)
Three P-Cl bonds lie in one plane and two P- Cl bonds lie above and below the equatorial plane.
b) Five P-Cl bonds lie in the same plane. c) The bond angle in all P-Cl bonds is 90°.
d) The bond length of all P-Cl bonds is same.

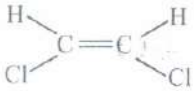
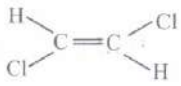
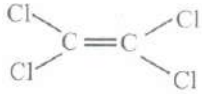
302. Which of the following has $p_\pi - d_\pi$ bonding
a) NO_3^- b) SO_3^{2-} c) BO_3^{3-} d) CO_3^{2-}

303. Molecular shapes of SF_4, CF_4, XeF_4 are:
a) the same with 2, 0 and 1 lone pairs of electrons respectively.
b) the same with 1, 1 and 1 lone pairs of electrons respectively.

c) different with 0, 1 and 2 lone pairs of electrons respectively.

d) different with 1,.0 and 2 lone pairs of electrons respectively.

304. Select the isomers given below, which have non-zero dipole moment ?

a)  b)  c)  d) All of these

305. A molecule which cannot exist theoretically is:

a) SF_4 b) OF_2 c) OF_4 d) O_2F_2

306. Maximum bond angle at nitrogen is present in which of the following?

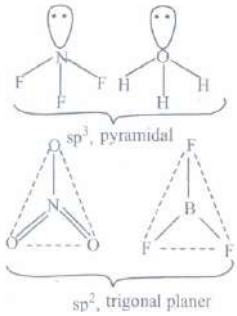
a) NO_2^- b) NO_2^+ c) NO_3^- d) NO_2

307. The pair of species that has the same bond order in the following is:

a) O_2, B_2 b) CO, NO^+ c) NO^-, CN^- d) O_2, N_2

308. (A): 1_3^- ion is linear.

(R)' : It is not in sp hybridized state .



a) Both (A) and (R) are true and (R) is the correct explanation of (A)

b) Both (A) and (R) are true and (R) is not the correct explanation of (A)

c) (A) is true but (R) is false d) (A) is false but (R) is true

309. Which one of the following species does not exist under normal conditions?

a) Be_2^+ b) Be_2 c) B_2 d) Li_2

310. Which of the following options represents the correct bond order?

a) $O_2^- < O_2 < O_2^+$ b) $O_2^- < O_2 < O_2^+$ c) $O_2^- < O_2 < O_2^+$ d) $O_2^- < O_2 < O_2^+$

311. The pair of species with the same bond order is:

a) O_2^-, B_2 b) O_2^+, NO^+ c) NO,CO d) N_2,O_2

312. Which of the following two are isostructural?

a) XeF_2 and IF_2^- b) NH_3 and BF_3 c) CO_3^{2-} and SO_3^{2-} d) PCl_5 and ICl_5

313. CF_4, SF_4 and XeF_4 contain the following electronic structure on their central atoms. Which one is correct option?

a) 1, 2 and 3 lone pairs of electrons respectively

b) 0, 1 and 2 lone pairs of electrons respectively

c) 1, 1 and 1 lone pairs of electrons respectively

d) No lone pairs of electrons on any molecule

314. Which of the following molecules does not possess a permanent electric dipole moment?

a) H_2S b) SO_2 c) SO_3 d) CS_2

315. In which of the following solvents KBr be soluble at 25°C? (D is the Dielectric constant)?

a) C_6H_6[D=O] b) CH_3COCH_3[D=2] c) CCl_4[D=O] d) CH_3OH[D=32]

316. The number of unpaired electrons in a paramagnetic diatomic molecule of an element with atomic nunber 16 is
a) 3 b) 4 c) 11 d) 2

317. Which one of the following molecules will form a linear polymeric structure due to hydrogen bonding?
a) NH_3 b) H_2O c) HCl d) HF

318. Which of the following when dissolved in water forms a solution which is non-conducting?
a) Chile salt petre b) Green vitrol c) Potash alum d) Alcohol

319. Arrange the following in increasing order of covalent character - NaCl, MgCl2, $AlCl_3$.
a) $NaCl < MgCl_2 < AlCl_3$ b) $MgCl_2 < NaCl < AlCl_3$ c) $AlCl_3 < MgCl_2 < NaCl$
d) $NaCl < AlCl_3 < MgCl_2$

320. The electronegativity difference between N and F is greater than that between N and H yet the dipole moment of NH_3(1.5 D) is larger than that of NF_3 (0.2D). This is because
a)
in NH_3 the atomic dipole and bond dipole are in the same direction whereas in NF_3 these are in opposite directions
b) in NH_3 as well as NF_3 the atomic dipole and bond dipole are in opposite directions
c)
in NH_3 the atomic dipole and bond dipole are in the opposite directions whereas in NF_3 these are in the same direction
d) in NH_3 as well as in NF_3 the atomic dipole and bond dipole are in the same direction

321. **Assertion:** PF_5, SF_6 and H_2SO_4 are the examples of expanded octet molecules.
Reason: Octet rule is not applicable to the second period elements of the periodic table.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
if both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

322. Metallic lustre is explained by
a) diffusion of metal ions b) oscillation of loose electrons c) excitation of free protons
d) existence of bee lattice

323. 2s and 2p-atomic orbitals combine to give how many molecular orbitals?
a) 2 b) 4 c) 8 d) 6

324. During a coordinate bond formation:
a) one electron from an atom is transferred to other
b) one electron each is lost from both the atoms
c) a pair of electrons is contributed by one atom and shared by both the atoms
d) a pair of electrons is transferred to the other atom.

325. $NaCl_{(aq)}$ gives a white precipitate with $AgNO_3$ solution but CCl_4 or $CHCl_3$ does not, because:
a) NaCl is a covalent compound and forms AgCl as white ppt
b) NaCl is an ionic compound and forms AgCl as white ppt.

c) CCl_4 and $CHCl_3$ are ionic compound. d) none of these.

326. Considering the state of hybridisation of carbon atoms, find out the molecule among the following which is linear?
a) $CH_3 - CH = CH - CH_3$ b) $CH_3 - C \equiv C - CH_3$ c) $CH_2 = CH - CH_2 - C \equiv CH$
d) $CH_3 - CH_2 - CH_2 - CH_3$

327. Which of the following pairs will have same bond order?
a) F_2 and O_2^{2-} b) N_2 and CO_2 c) O_2 and O_2^- d) N_2 and N_2^+

328. In formation of ethene, the bond formation between s and p-orbitals takes place in the following manner.
a)
Sp^2 hybridised orbitals form sigma bond while the unhybridised (Px or Py) overlaps sidewise to form π-bond
b)
Sp^2 hybridised orbitals form π-bond while the unhybridised (p_z) overlaps to form σ-bond.
c)
Sp^2 hybridised orbitals overlap with s-orbitals of H atoms while unhybridised orbitals form C-C bond.
d)
sp^2 hybridised orbitals form sigma bonds with H atoms while unhybridised orbitals form π-bonds between C atoms.

329. What is common between the following molecules: SO_3, CO_3^{2-}, NO^-_3?
a) All have linear shape. b) All have trigonal planar shape.
c) All have tetrahedral shape. d) All have trigonal pyramidal shape.

330. In a regular octahedral molecule, MX6 the number of X-M-X bonds at 180° is:
a) three b) two c) six d) four

331. Which of the following compounds has a zero dipole moment ?
a) 1.1-Dichloroethene b) Cis-1,2-dichloroethanc c) Trans-1,2 dichloroethylene
d) Trans-1,2 dichloroethene

332. An sp^3 hybrid orbital contains
a) $\frac{1}{4}s - character$ b) $\frac{1}{2}s - character$ c) $\frac{1}{3}s - character$ d) $\frac{2}{3}s - character$

333. Paramagnetism is shown by the molecules which have
a) paired electrons b) unpaired electrons c) lone pair of electrons
d) bond order more than one

334. Bond order of 1.5 is shown by
a) O_2^+ b) O_2^- c) O_2^{2-} d) O_2

335. The ground state electronic configuration of valence shell electrons in nitrogen molecule (N_2) is written as KK, $\sigma 2s^2$, $\sigma^* 2s^2$, $\pi 2p^2_x = \pi 2p^2_y$ $\sigma 2p^2_z$ Bond order in nitrogen molecule is :
a) 0 b) 1 c) 2 d) 3

336. Which of the following molecules does not show any resonating structures?
a) NH_3 b) CO_3^{2-} c) O_3 d) SO_3

337. Lattice energy of ionic compound depends upon:
a) packing of ions only b) charge and size of ions c) charge on ion only
d) size of ions only

338. Which of the following orbitals will not form sigma bond after overlapping?
a) s-orbital and s-orbital b) s-orbital and p_z-orbital c) p_z-orbital and p_z-orbital
d) p_x-orbital and p_x-orbital

339. The electronic configuration of four atoms are given in brackets:
L $\left(1s^2 2s^2 2p^1\right)$; M $\left(1s^2 2s^2 2p^5\right)$;
Q $\left(1s^2 2s^2 2p^6 3s^1\right)$; R $\left(1s^2 2s^2 2p^2\right)$;
The element that would most readily form a diatomic molecule is
a) Q b) M c) R d) L

340. Which one of the following is planar?
a) XeF_4 b) XeO_4 c) XeO_3F d) XeO_3F_2

341. Which one of the following is not paramagnetic?
a) NO b) N_2^+ c) CO d) O_2^-

342. Which one of the following has the highest dipole moment?
a) AsH_3 b) SbH_3 c) PH_3 d) NH_3

343. In which of the following ionisation processes the bond energy increases and the magnetic behaviour changes from paramagnetic to diamagnetic
a) $N_2 \rightarrow N_2^+$ b) $O_2 \rightarrow O_2^+$ c) $C_2 \rightarrow C_2^+$ d) $NO \rightarrow NO^+$

344. A square planar complex is formed by hybridisation of which of the following atomic orbitals?
a) s, P_x, P_y, d_{yz} b) S, P_x, p_y, $d_{x^2-y^2}$ c) S, P_x, p_y, d_{z2} d) s, p_y, p_z, d_{xy}

345. In which of the following species the hybrid state of the central atom is same?
a) SO_2, SO_3 b) SO_3, SO_4^{2-} c) SO_2, SO_3^{2-} d) CH_4, HCOOH

346. Oxygen molecule is formed by
a) one axial s-s overlap and one p-p axial overlap b) two p-p axial overlaps
c) two p-p sidewise overlaps d) one p-p axial and one p-p sidewise overlap.

347. In which of the following molecules/ions BF_3, NO_2^-, NH_2^- and H_2O, the central atom is Sp_2 hybridized?
a) NO_2^- and NH_2^- b) NH_2^- and H_2O c) NO_2^- and H_2O d) BF_3 and NO_2^-

348. In which of the following, the hydrogen bonding is strongest in the liquid phase?
a) HF b) CH_4 c) HI d) PH_3

349. Hypervalent compound is
a) IF_7 b) NH_3 c) BeF_2 d) CH_4

350. AsF_2 molecule is trigonal bipyramidal. The hybrid orbitals used by As-atoms for bonding are
a) $d_{x^2-y^2}, d_{z^2}, s, p_x, p_y$ b) d_{xy}, s, p_x, p_y, p_z c) s, px, py, pz, d_{z^2} d) $d_{x^2-y^2}, s, p_x, p_y, p_z$

351. Which of the following does not contain coordinate covalent bond?
a) NH_4+ b) H_3O+ c) CH_3- d) $[Ag(CN)_2]$+

352. In the formation of N_2^+ the electron is lost form:
a) a σ-orbital b) aπ-rbital c) a σ^* -orbital d) a π^* -orbital

353. Which of the following molecules/ions has all its bonds of unequal length?
a) XeF_4 b) BF_4^- c) SF_4 d) SiF_4

354. The manganate and permanganate ions are tetrahedral, due to
a) There is no π-bonding
b) The π-bonding involves overlap of p-orbitals of oxygen with p-orbitals of manganese
c) The π-bonding involves overlap of d-orbitals of oxygen with d-orbitals of manganese
d) The π-bonding involves overlap of p-orbitals of oxygen with d-orbitals of manganese

355. Which of the following is the most stable state when two atoms come closer to each other to form a molecule?

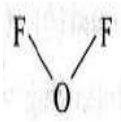
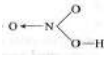
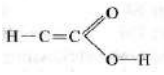
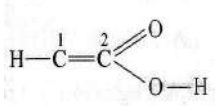
a) (i), when the bond is formed, the energy is minimum.
b) (ii), when the atoms touch each other, the energy is zero
c) (iii), when the atoms are isolated, the energy is minimum.
d) (ii), when the attractive forces are more than repulsive forces.

356. Few examples of the compounds formed by chemical bonding are given below. Mark the incorrect example.
a) A molecule with central atom devoid of octet - BF_3
b) A molecule with linear shape - CO_2
c) A non-polar covalent compound between two different atoms - CH_4
d) A molecule which is V-shaped with a bond angle 104.5^o - NH_3

357. **Assertion:** Among alkaline earth metals, Be predominantly forms covalent bond.
Reason: Be is smaller in size and hence has greater polarising power.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

358. The electronic configuration of carbon is $1s^2\ 2s^2 2p^2$. There are 12 electrons in C_2. The correct electronic configuration of C_2 molecule is
a) $(\sigma 1s^2)(\sigma^* 1s^2)(\sigma 2s^2)(\sigma^* 2s^2)(\sigma 2p_z^2)(\pi 2p_z^2)$ b) $(\sigma 1s^2)(\sigma^* 1s^2)(\sigma 2s^2)(\sigma^* 2s^2)(\pi 2p_x^2 = \pi 2p_y^2)$
c) $(\sigma 1s^2)(\sigma^* 1s^2)(\sigma 2s^2)(\sigma^* 2s^2)(\sigma 2p_z^2)(\pi 2p_x^1 = \pi 2p_y^1)$
d) $(\sigma 1s^2)(\sigma^* 1s^2)(\sigma 2s^2)(\sigma^* 2s^2)(\pi 2p_x^2 = \pi 2p_y^2)$

359. Which one of the following formulae does not correctly represent the bonding capacities of the atoms involved?

a)  b)  c)  d) 

360. In which of the following the hydration energy is higher than the lattice energy?
a) $MgSO_4$ b) $RaSO_4$ c) $SrSO_4$ d) $BaSO_4$

361. What are the exceptions of the octet rule?

a) The incomplete octet of central atom
b) An odd number of electrons on central atom c) Expanded octet of the central atom
d) All of these

362. XeF_2 is isostructural with
a) TeF_2 b) ICl_2^- c) $SbCl_3$ d) $BaCl_2$

363. Four diatomic species are listed below in different sequences. Which of these presents the correct order of their increasing bond order?
a) $O_2^- < NO < C_2^{2+} < He_2^+$ b) $NO < C_2^{2-} < O_2^- < He_2^+$ c) $C_2^{2-} < He_2^+ < NO < O_2^-$
d) $He_2^+ < O_2^- < NO < C_2^{2-}$

364. Propyne molecule contains:
a) 6 sigma and 2 pi bonds b) S sigma bonds c) S pi bonds and I sigma bond
d) 2 sigma and 3 pi bonds.

365. In a diatomic molecule the bond distance is 1×10^{-8} cm. Its dipole moment is 1.2 D. What is the fractional electronic charge on each atom?
a) 0.50 b) 1.2×10^{-10} c) 0.25 d) 1.2

366. For which element would XH3 be a stable species?
a) C b) Cl c) P d) S

367. Which one of the following species has plane triangular shape?
a) N_3^- b) NO_3^- c) NO_2^- d) CO_2

368. During change of O_2 to O_2^- ion, the electron adds on which one of the following orbitals
a) π^* orbital b) π orbital c) σ^* orbital d) σ orbital

369. Predict the correct order among the following
a) lone pair - lone pair > lone pair - bond pair > bond pair - bond pair
b) lone pair - lone pair > bond pair - pond pair > lone pair - bond pair
c) bond pair - bond pair > lone pair - bond pair > lone pair - lone pair
d) lone pair - bond pair > bond pair - bond pair > lone pair - lone pair

370. How many sigma and pi bonds are present in toluene?
a) l0σ and 3π bonds b) 12σ and 3π bonds c) l5σ and 3π bonds
d) 6σ and 3π bonds

Ravi Maths Tuition Centre

Time : 1 Mins **CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES 1** **Marks : 961**

1. In which element shielding effect is not possible?
   a) B b) N c) H d) Be
2. Similarity in the radius of Zr and Hf is explained on the basis of
   a) Lanthanide contraction b) Inert pair effect c) Same outershell configuration
   d) Anomalous configuration
3. Which of the following properties increases across a period:
   a) Reducing property b) Size of atom c) Acidic nature of oxides d) Metallic property
4. Which one of the following pairs of atomic numbers represents elements belonging to the same group?
   a) 11,20 b) 12,30 c) 13,31 d) 14,33
5. Some statements are given. Among them the correct statements are
   i) IP_2 of sodium is greater than that of Magnesium
   ii) IP_2 of lithium is greater than IP_1 of Helium
   iii) IP_2 of sodium is greater than IP_1 of Neon
   iv) IP_1 of oxygen is greater than that of Nitrogen
   a) All are correct b) Only i, ii and iii are correct c) Only i, ii are correct
   d) Only i, iv are correct
6. Correct order of ionic radius is
   a) $Ti^{4+} < Mn^{7+}$ b) $Cl^- < Cl$ c) $K^+ > Cl^-$ d) $P^{3+} > P^{5+}$
7. K^+, Cl^-, Ca^{2+}, S^{2-} ions are isoelectronic, The decreasing order of their size is :
   a) $S^{2-} > Cl^- > K^+ > Ca^{2+}$ b) $Ca^{2+} > K^+ > Cl^- > S^{2-}$ c) $K^+ > Cl^- > Ca^{2+} > S^{2-}$
   d) $Cl^- > S^{2-} > Ca^{2+} > K^+$
8. Which of the following statements is not correct about the electron gain enthalpy?
   a)
   In general, the electron gain enthalpy becomes less negative in going from top to bottom in a group.
   b) The electron gain enthalpy becomes less negative in a period from left to right.
   c)
   The elements having stable configuration like noble gases have large positive electron gain enthalpies.
   d) Noble gases have large positive electron gain enthalpies

9. Fill in the blanks with appropriate option.
The ability of an atom to attract shared electrons to itself is called (i). It is generally measured on the (ii)scale. An arbitrary value of (iii) is assigned to fluorine (have greatest ability to attract electrons). It generally (iv) across a period and (v) down a group

a)

i	ii	iii	iv	v
polarity	Pauling	2.0	decreases	increases

b)

i	ii	iii	iv	v
electronegativity	Pauling	4.0	decreases	increases

c)

i	ii	iii	iv	v
valency	Mulliken	1.0	decreases	increases

d)

i	ii	iii	iv	v
electron affinity	Mulliken	2.0	increases	increases

10. Few values of enthalpies are given below:
0=- 141 kJ mol^{-1} F = - 328 kl mol^{-1}
S = - 200 kJ mol^{-1} Cl = - 349 kJ mol^{-1}
What do these values show?
a) Ionisation enthalpy b) Bond enthalpy c) Electron gain enthalpy d) Hydration enthalpy

11. The first periodic law stated by Mendeleev was:
a) there is no correlation in the properties and atomic weights of the elements
b) the properties of the elements are a periodic function of their atomic numbers
c) the properties of the elements are a periodic function of their atomic weights
d) the properties of the elements are a periodic function of their empirical formula.

12. The statement that is false for the long form of the periodic table is
a) It reflects the sequence of filling the electrons in the order of sub energy levels s,p,d and f
b) It helps to predict the stable valency states of the element
c) It reflects trends in physical and chemical properties of the elements
d) It helps to predict the relative ionicity of the bond between any two elements

13. Which one of the following sets of ions represents the collection of isoelectronic species?
a) Na^+, Mg^{2+}, Al^{3+}, F^- b) K^+, Ca^{2+}, Sc^{3+}, Cl^- c) K^+, Cl^-, Mg^{2+}, Sc^{3+} d) Na^+, Mg^{2+}, Al^{3+},Cl^-

14. Which one of the following oxides is not neutral?
a) CO b) OF_2 c) NO_2 d) both (b) and (c)

15. Largest ion among the following is
a) Na^+ b) O^{2-} c) S^{-2} d) Cl^-

16. Which of the following is not a merit of Mendeleev's periodic table?
a) It helped in correcting the atomic masses of some of the elements.
b) He predicted the properties of some undiscovered elements and left gaps for them.
c) He framed the periodic table with vertical and horizontal columns and gave shape to it.
d) He gave separate places to isotopes in his periodic table.

17. The magnitude of first ionisation energy for Na (according to formula given) is equal to :
a) energy of its 3s electron b) energy of its 1s electron c) energy of its 2s electron
d) energy of its 2p electron

18. Z* for a ls electron in Fe atom is :
a) 2.85 b) 25.7 c) 25.65 d) 3.75

19. Generally the ionisation potential in it period increases, but there are some exceptions. The one which is not an exception is
    a) Be & B b) N & O c) Mg & Al d) Na & Mg

20. The periodic table of today owes its development to two chemists namely
    a) Rutherford and Moseley b) Alexander Newlands and Dobereiner
    c) Dmitri Mendeleev and Lothar Meyer d) de Broglie and Neil Bohr

21. Identify the wrong statement in the following :
    a)
    Amongst isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius.
    b)
    Amongst isoelectronic species, greater the negative charge on the anion, larger is the ionic radius.
    c)
    Atomic radius of the elements increases as one moves down the first group of the periodic table.
    d)
    Atomic radius of the elements decreases as one moves across from left to right in the 2nd period of the periodic table.

22. Which one of the following arrangements represents the correct order of least negative to most negative electron gain enthalpy for C, Ca, Al, F and O?
    a) Ca b) Al c) Al d) C

23. Considering the elements F, Cl, O and N, the correct order of their electron affinity values is :
    a) F > Cl > O > S b) F > O > Cl > S c) Cl > F > S > O d) O > F > S > Cl

24. In which of the following sets, elements have nearly same atomic radii?
    a) Li, Be, B b) Mg, Ca, Sr c) Fe, Co, Ni, Cu d) O, S, Se

25. Few elements are matched with their successive ionisation energies. Identify the elements.

Element	IE_1 (kJ/mol)	IE_2 (kJ/mol)
X	2372	5251
Y	520	7297
Z	900	1758

a)

X	Y	Z
A noble gas	Alkali metal	Alkaline earth metal

b)

X	Y	Z
Alkali metal	A noble gas	Alkaline earth metal

c)

X	Y	Z
Alkaline earth metal	Alkali metal	A noble gas

d)

X	Y	Z
Alkali metal	Alkaline earth metal	A noble gas

26. The first ($\Delta_i H_1$) and second ($\Delta_i H_2$) ionisation enthalpies (in kJ mol^{-1}) and the electron gain enthalpy (Δ_{eg} H (in kJ mol^{-1}) of the elements I, II, III, IV and V are given below:

Element	$\Delta_i H_1$	$\Delta_i H_2$	Δ_{eg} H
I	520	7300	-60
II	419	3051	-48

III	1681	3374	-328
IV	1008	1846	-295
V	2372	5251	+48

The most reactive metal and the least reactive nonmetal of these are respectively

a) I and V b) V and II c) II and V d) IV and V

27. The ground state electronic configurations of some elements, A, B, C, D and E (these symbols represent the some of the known elements given in the periodic table) are as follows.

P) $1s^2 2s^2 2p^6 3s^2 3p^2$ Q) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$ R) $1s^2 2s^2 2p^6 3s^2 3p^1$

S) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$ T) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6$

Match the electronic configurations of the elements with the properties given below and select the correct sequence by choosing the correct codes given.

i) Element forms a cation which is isoelectronic with p^{3-}

ii) Element which in its compounds can show a maximum oxidation state of +6 and that is coloured too.

iii) Element has largest atomic radius and highest first ionisation energy in the respective period.

iv) Element which has intermediate value of electronegativity and its oxide forms salts with strong acids and bases.

a) QRTP b) QSTR c) QRST d) PQRS

28. In the periodic table, the maximum chemical reactivity is at the extreme left (alkali metals) and extreme right (halogens). Which properties of these two groups are responsible for this?

a)

Least ionisation enthalpy on the left and highest negative electron gain enthalpy on the right.

b) Non-metallic character on the left and metallic character on the right.

c) High atomic radii on the left and small atomic radii on the right.

d) Highest electronegativity on the left and least electronegativity on the right

29. A, B and C are hydroxy-compounds of the elements X, Y and Z respectively. X, Y and Z are the same period of the periodic table. A gives an aqueous solution of pH less than seven, B reacts with both strong acids and strong alkalis. C gives an aqueous solution which is strongly alkaline.

Which of the following statements is/are true?

I: The three elements are metals.

II: The electronegativities decrease form X to Y to Z

III: The atomic radius decreases in the order X, Y and Z.

IV: X, Y and Z could be phosphorus, aluminium and sodium respectively.

a) 1, II, III only correct b) I, III only correct c) II, IV only correct d) II, III, IV only correct

30. The elements with atomic numbers 90 to 103 are known as :

a) d-block elements b) lanthanides c) actinides d) transition elements

31. Electron affinity of Fluorine is less than that of Chlorine because

a) Electronegativity of Fluorine is more b) 2p sub shell of F is smaller

c) Chlorine is a stronger oxidant d) Bond dissociation energy of F_2 is less

32. An element X has atomic number 19. What will be the formula of its oxide?

a) X_2O b) XO c) XO_2 d) X_2O_3

33. Choose the incorrect statement

a)

Chemical reactivity tends to be high in group 1 metals, lower in elements in middle and increases to maximum in the group 17.

b) Halogens have very high negative electron gain enthalpy.

c) Noble gases have large positive electron gain enthalpy

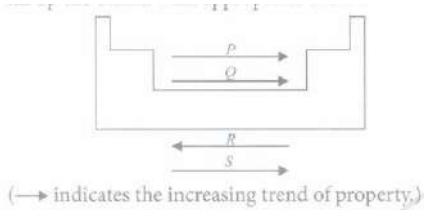
d)

Decrease in electronegativities across a period is accompanied by an increase in non-metallic properties.

34. In the periodic table, inversion of atomic weights took place in this pair

a) Argon - Potassium b) Boron - Scandium c) Hydrogen - Helium d) Beryllium-Boron

35. Study the given diagram of the periodic table and fill up the blanks with appropriate choice.



a)

P	Q	R	S
Ionisation enthalpy	Electron gain enthalpy	Atomic radius	Electro-negativity

b)

P	Q	R	S
Atomic radius	Ionisation enthalpy	Electro-negativity	Electron gain enthalpy

c)

P	Q	R	S
Ionisation enthalpy	Atomic radius	Electro-negativity	Electron gain enthalpy

d)

P	Q	R	S
Electro-negativity	Electron gain enthalpy	Ionisation enthalpy	Atomic radius

36. Electronegativity of an element is the average of its ionisation energy and electron affinity according to

a) Pauling b) Rutherford c) Bohr d) Mulliken

37. An element has the electronic configuration

$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^8\ 4s^2$

What will be its position in the periodic table?

a) Period 4, Group 10 b) Period 2, Group 2 c) Period 4, Group 2 d) Period 2, Group 8

38. Which of the following pairs has elements containing same number of electrons in the outermost orbit?

a) N, O b) Na, Ca c) As, Bi d) Pb, Sb

39. If metal $X_{(s)}$ forms X^+ ion and $Y_{2(g)}$ forms Y^{2-} ion then, which of the following is the correct to calculate enthalpy of following reactions?

(if ΔH_f^0 of X_2Y is exothermic) $2X^+_{(g)}+Y^{2-}_{(g)} \sim X_2\ Y_{(s)}; \Delta H$ = -q(kJ/mole)

a) -q=ΔH_f^0 (X_2Y)-SE-IP_1-$\frac{BE}{2}$ +EGE_1-EGE_2

b) -q=ΔH_f^0 (X_2Y)-2SE-IP_1-$\frac{BE}{2}$ +EGE_1-EGE_2

c) -q=ΔH_f^0 (X_2Y)-2SE-IP_1-IP_2-$\frac{BE}{2}$ +EGE_1-EGE_2

d) -q=ΔH_f^0 (X_2Y)-2SE-2IP_1-$\frac{BE}{2}$ +EGE_1-EGE_2

40. Given below are the names of few elements based on their position in the periodic table. Identify the element which is not correctly placed.
a) An element which tends to lose three electrons - Aluminium
b) An element which tends to gain two electrons - Iodine
c) An element with valency four - Silicon d) A transuranium element - Plutonium

41. Which one of the above elements is least reactive?
a) R b) S c) T d) U

42. The correct sequence which shows decreasing order of the ionic radii of the elements is:
a) $Na^+ > Mg^{2+} > Al^{3+} > O^{2-} > F^-$ b) $Na^+ > F^- > Mg^{2+} > O^{2-} > Al^{3+}$
c) $O^{2-} > F^- > Na^+ > Mg^{2+} > Al^{3+}$ d) $Al^{3+} > Mg^{2+} > Na^+ > F^- > O^{2-}$

43. Amphoteric behaviour is shown by the oxides of:
a) Al and Ca b) Pb and Ba c) Cr and Mg d) Sn and Zn

44. The electronic configuration of an element is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$. What is the atomic number(X) of the element which is just below the above given element in the periodic table. Enter the value of X.
a) 33 b) 34 c) 31 d) 49

45. Ionisation energy values of an atom are 495, 767, 1250 and 4540 kJ $mole^{-1}$ the formula of its sulphate is
a) MSO_4 b) M_2SO_4 c) $M_2(SO_4)_3$ d) $M(SO_4)_2$

46. Which one of the following oxides is expected to exhibit paramagnetic behaviour:
a) CO_2 b) SiO_2 c) SO_2 d) ClO_2

47. If Aufbau rule is not followed, K -19 will be placed in ..... block.
a) s-Block b) p-Block c) d-Block d) f-Block

48. What is the position of the element in the periodic table satisfying the electronic configuration $(n - 1)\ d^1\ ns^2$ for n = 4?
a) 3rd period and 3rd group b) 4th period and 3rd group c) 3rd period and 2nd group
d) 4th period and 2nd group

49. Which of the following can most easily form unipositive gaseous ion?
a) $1s^2\ 2s^2\ 2p^6\ 3s^2$ b) $1s^2\ 2s^2\ 2p^6\ 3s^1$ c) $1s^2\ 2s^2\ 2p^6\ 3s^23p^1$ d) $1s^2\ 2s^2\ 2p^6\ 3s^23p^3$

50. What were the main demerits of Mendeleev's periodic table?
(i) Hydrogen has been placed in group I though it resembles to group VII as well.
(ii) Position of some elements was not justified.

(iii) Isotopes were not given separate places.

(iv) Lanthanides and actinides were not included in the table.

a) (i), (ii) and (iii) b) (i), (ii), (iii) and (iv) c) (ii) and (iv) d) (i), (iii) and (iv)

51. Which is the most electropositive element?

a) Na b) Cu c) Cs d) Ca

52. An element X occurs in short period having configuration ns^2np^1. The formula and nature of its oxide is

a) X_2O_3 amphoteric b) XO_3, basic c) XO_3, acidic d) X_2O_3, basic

53. Which is correct increasing order of their tendency of the given elements to form M^{3-} ion?

a) Bi > Sb > As > P > N b) Bi < Sb < As < P < N c) N < P < Sb < Bi < As

d) Bi> Sb ~ N ~ P > As

54. Which has the highest second ionization potential?

a) Nitrogen b) Carbon c) Oxygen d) Fluorine

55. S-1 : Formation of Mg^{2+} and Al^{3+}, both require the absorption of energy.

S-2 : The following set of elements represent the correct order of electron affinity values S > Se > Te > O

S-3 : The size of the isoelectronic species is affected by electron-electron interaction in the outer orbitals.

S-4 : Chemistry of the elements depend on the valence shell electron configurations as well as nuclear masses.

a) TTFF b) TFTF c) TTFT d) TTTT

56. The order of first electron affinity of O, S and Se is :

a) O > S > Se b) S > Se > O c) Se > O > S d) S > O > Se

57. Atomic number of Ag is 47. In the same group the atomic number of elements placed above and below Ag in Long form of periodic table will be:

a) 37, 67 b) 29, 79 c) 39, 69 d) 18, 28

58. Which one of the following arrangements does not truly represent the property indicated against it?

a) $Br_2 < Cl_2 < F_2$ Oxidising power b) $Br_2 < Cl_2 < F_2$ Electronegativity

c) $Br_2 < F_2 < Cl_2$ Electron affinity d) $Br_2 < Cl_2 < F_2$ Bond energy

59. Which of the following oxides is neutral in nature?

a) SrO b) Al_2O_3 c) CO_2 d) CO

60. In which of the following pairs of species, the size of the first species is not more than the second species?

a) Na^+,F^- b) Fe^{2+},Fe^{3+} c) Li, F d) S, O

61. Elements belonging to the same group of periodic table have

a) same number of energy levels b) same number of valence electrons

c) same number of electrons d) same ionisation enthalpy.

62. Which of the following does not represent the correct order of the properties indicated?

a) $Ni^{2+} > Cr^{2+} > Fe^{2+} > Mn^{2+}$ (size) b) Sc > Ti > Cr > Mn (size)

c) $Mn^{2+} > Ni^{2+} < CO^{2+} < Fe^{2+}$(unpaired electron)

d) $Fe^{2+} > CO^{2+} > Ni^{2+} > Cu^{2+}$ (unpaired electron)

63. Match the columns I, II and III and mark the appropriate choice.

	Colum I		Colum II		Colum III
(A)	Bromine	(i)	Noble metal	(p)	Amalgam
(B)	Gold	(ii)	Crystalline non-metal	(q)	$4s^2\ 4p^5$
(C)	Mercury	(iii)	Liquid non-metal	(r)	Transition metal
(D)	Iodine	(iv)	Liquid metal	(s)	Violet

a) (A)→(iii, q); (B)→(i, r), (C)→(iv, p); (D)→(ii, s)
b) (A)→(ii, p); (B)→(i, s), (C)→(iii, q); (D)→(iv, r)
c) (A)→(i, s), (B)→(ii, p); (C)→(iv, r), (D)→(iii, q)
d) (A)→(iv, r), (B)→(iii, q): (C)→(ii, s): (D)→(i, p)

64. In crystals of which of the following ionic compounds would you expect maximum distance between centres of cations and anions?
a) LiF b) CsF c) CsI d) LiI

65. Of the metals Be, Mg, Ca and Sr of group 2 in the periodic table, the least ionic chloride will be formed by
a) Be b) Ca c) Mg d) Sr

66. Anomalous pair among the following is
a) Boron - Silicon b) Beryllium - Indium c) Aluminium - Gallium d) Cobalt - Nickel

67. Element in periodic table with electronic configuration as $[Ar]^{l8}3d^5 4s^1$ is placed in
a) IA, s-block b) VIA, s-block c) VIB, s-block d) VIB, d-block

68. Atomic radii of fluorine and neon in angstrom unit arc respectively given by:-
a) 0.75, 1.60 b) 0.72, 0.72 c) 1.2, 1.2 d) 1.62, 0.72

69. An element 'P' has atomic number 56. What will be the formula of its halide?
a) PX b) PX_2 c) PX_3 d) P_2X_3

70. The species Ar, K^+ and Ca^{2+} contain the same number of electrons. In which order do their radii increase?
a) $Ca^{2+} < K^+ < Ar$ b) $K^+ < Ar < Ca^{2+}$ c) $Ar < K^+ < Ca^{2+}$ d) $Ca^{2+} < Ar < K^+$

71. Amongst the elements with following electronic configurations, which one may have the highest ionization energy?
a) [Ne] $3s^2\ 3p^3$ b) [Ne] $3s^2\ 3p^2$ c) [Ar] $3d^{10}, 4s^2, 4p^3$ d) [Ne] $3s^2, 3p^1$

72. Correct order of 1st IP among following elements Be, B, C, N, O is
a) B < Be < C < O < N b) B < Be < C < N < O c) Be < B < C < N < O
d) Be < B < C < O < N

73. Which of the following ions contains minimum number of unpaired electrons?
a) Fe^{2+} b) Fe^{3+} c) CO^{2+} d) CO^{3+}

74. Element with atomic number 15 and mass number 31 is present in
a) group 5 and period 4 b) group 5 and period 3 c) group 15 and period 3
d) group 15 and period 4

75. Pauling's electronegativity values for elements are useful in predicting
a) polarity of the molecules b) position in the emf series c) coordination numbers
d) dipole moments

76. Element with highest electronegativity is:
a) Chlorine b) Fluorine c) Oxygen d) Nitrogen

77. In a given energy level, the order of penetration effect of different orbitals is:
a) f < d < p < s b) s = p = d = f c) s < p < d < f d) P > s > d> f

78. Set of elements with the following atomic numbers belong to the same group
a) 9, 16, 35, 3 b) 12, 20, 4, 38 c) 11, 19, 27, 5 d) 24, 47, 42, 55

79. In which of the following cases lattice energy of resulting product will be highest?
a) X and Y both are monovalent b) X and Y both are divalent
c) X is monovalent and Y is divalent d) X is divalent and Y is monovalent

80. In the isoelectronic species the ionic radii of N^{3-}, O^{2-} and F^{-} are respectively given by
a) 1.36, 1.71, 1.40 b) 1.36, 1.40, 1.71 c) 1.71, 1.36, 1.40 d) 1.71, 1.40, 1.36

81. Meitnerium is IUPAC official name of an element with atomic number
a) 113 b) 118 c) 104 d) 109

82. The general electronic configuration $(n-1)d^3ns^2$ indicates that the particular element belong to:
a) V B group b) V A group c) IV B group d) II B group

83. Which of the following is the atomic number of a metal?
a) 35 b) 34 c) 36 d) 38

84. Elements A, B, C, D and E have the following electronic configuration:
A) $1s^2,2s^22p^1$
B) $1s^2,2s^22p^6,3s^23p^1$
C) $1s^2,2s^22p^6,3s^23p^3$
D) $1s^2, 2s^2\ 2p^6, 3s^2\ 3p^5$
E) $1s^2, 2s^2\ 2p^6, 3s^2\ 3p^6$
Which among these will belong to same group in the periodic table?
a) A and C b) A and D c) A and B d) A and E

85. The most abundant noble gas in atmosphere is:
a) neon b) argon c) xenon d) krypton

86. Identify the correctly matched set among the following
a) Scandium-d-block-representative element b) Lanthanum-d-block-innertransition element
c) Cerium-f-block-transition element d) Actinium-d-block-transition element

87. Which electronic configuration of an element has abnormally high difference between second and third ionisation energy.
a) $1s^2, 2s^2\ 2p^6, 3s^1$ b) $1s^2, 2s^2\ 2p^6, 3s^2\ 3p^1$ c) $1s^2, 2s^2\ 2p^6, 3s^2\ 3p^2$ d) $1s^2, 2s^2, 2p^6, 3s^2$

88. The first ionisation enthalpy of the elements C, N, P, Si are in the order of
a) C<N<Si<P b) N<Si<C<P c) Si < P < C < N d) P < Si < N < C

89. Predict the formulae of the binary compounds formed by combination of the following pairs of elements:
(i) Magnesium and nitrogen
(ii) Silicon and oxygen
a) MgN_2, SiO_2 b) Mg_3N_2, SiO_2 c) Mg_2N_3, Si_2O_3 d) MgN, SiO_2

90. The property of an element that is not determined directly but is obtained indirectly using Bom Haber cycle:

a) Ionisation potential b) Electron affinity c) Electronegativity d) Metallic character

91. Ionic radii are :
a) inversely proportional to effective nuclear charge
b) inversely proportional to square of effective nuclear charge.
c) directly proportional to effective nuclear charge.
d) directly proportional to square of effective nuclear charge.

92. Which of the following best describes the relationship of electronegativity, bond energy and bond moment in a diatomic molecule?
a) As electronegativity increases, both bond energy and bond moment increases
b) As electronegativity increases, bond energy decreases but bond moment increases
c) As elecctronegativity increases, bond energy increases but bond moment decreases
d) As electronegativity increases, both bond energy and bond moment decreases

93. Select the incorrect statement(s).
a) IE(I) of nitrogen atom is more than IE(1) of oxygen atom
b) Electron gain enthalpy of oxygen is less negative than selenium
c) Electronegativity on Pauling scale is 2.8 times the electronegativity on Mulliken scale.
d) cr_6^+ is smaller than Cr^{3+}

94. Which of the following is not a periodic property for the elements?
a) Electronegativity b) Atomic size c) Occurrence in nature d) Ionization energy

95. The electronic states X and Y of an atom are depicted below:
X : $1s^2\ 2s^2\ 2p^6\ 3s^1$
Y :$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6 4s^1$
Which of the following statements is not correct?
a) X represents an alkali metal. b) Energy is required to change X into Y.
c) Y represents ground state of the element
d) Less energy is required to remove an electron from X than from Y.

96. Assertion: Atomic number of the element ununtrium is 113.
Reason: According to IUPAC system of nomenclature, the numerical roots for 1, 1 and 3 are un, un and tri respectively
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

97. Anything that influences the valence electrons will affect the chemistry of the element. Which one of the following factors does not affect the valence shell?
a) Valence principal quantum number (n) b) Nuclear charge (Z) c) Nuclear mass
d) Number of core electrons

98. The number of protons, neutrons and electrons in $^{175}_{71}\mathrm{Lu}$ respectively, are:
a) 175, 104 and 71 b) 71, 104 and 71 c) 104, 71 and 71 d) 71, 71 and 104

99. Van der waal's radius is used for
a) Molecular substances in gaseous state only b) Molecular substances in solid state only
c) Molecular substances in liquid state only d) Molecular substances in any state

100. Na^+, Mg^{2+}, $A1^{3+}$ and Si^{4+} are isoelectronic. The order of their ionic size is :
a) $Na^+ > Mg^{2+} < Al^{3+} < Si^{4+}$ b) $Na^+ < Mg^{2+} > Al^{3+} > Si^{4+}$ c) $Na^+ > Mg^{2+} > Al^{3+} > Si^{4+}$
d) $Na^+ < Mg^{2+} > Al^{3+} < Si^{4+}$

101. Which of the following order of radii is correct?
a) Li < Be < Mg b) $H^+ < Li^+ < H^-$ c) O < P < Ne d) $Na^+ > F^- > O^{-2}$

102. Which of the following is not an actinoid?
a) Curium (Z = 96) b) Californium (Z = 98) c) Uranium (Z = 92) d) Terbium (Z = 65)

103. Among, the elements Ca, Mg, P and Cl, the order of increasing atomic radii is
a) Ca b) Mg c) Cl d) P

104. The metal which can form a stable binary halide of the formula MX2 (X = halogen) :
a) P b) Q c) U d) S

105. Which group of elements shows lowest ionisation enthalpy?
a) Alkali metals b) Alkaline earth metals c) Halogens d) Noble gases

106. First and second ionization energies of magnesium are 7.646 and 15.035 eV respectively. The amount of energy in kJ needed to convert all the atoms of magnesium into Mg^{+2} ions present in 12 mg of magnesium vapours is [Given 1 eV=96.5kJ mol^{-1}]
a) 1.1 b) 1.5 c) 2.0 d) 0.5

107. Increasing order of acidic character is
a) $SO_3 > N_2O_5 > CO_2 > SiO_2$ b) $SO_3 < N_2O_5 < CO_2 < SiO_2$ c) $SO_3 < N_2O_5 > CO_2 < SiO_2$
d) $SO_3 > N2O_5 < CO_2 < SiO_2$

108. Beryllium shows diagonal relationship with aluminium. Which of the following similarity is incorrect?
a) Be_2C like Al_4C_3 yields methane on hydrolysis b) Be, like Al is rendered passive by HNO_3
c) Be $(OH)_2$ like $Al(OH)_3$ is basic d) Be forms beryllates and Al forms aluminate

109. The ionization of hydrogen atom would give rise to:
a) hydride ion b) hydronium ion c) proton d) hydroxyl ion

110. Which one of the following arrangements is the incorrect representation of the property indicated with it?
a) Br < Cl < F : Electro negativity b) F < Br < Cl : Electron - affinity
c) $F_2 < Br_2 < Cl_2$: Bond energy d) $Br_2 < Cl_2 < F_2$: Oxidising strength

111. Use (IE) and (EA) listed below to determine whether the following process is endothermic exothermic. $Mg_{(g)} + 2F_{(g)} \rightarrow Mg^{2+}{}_{(g)} + 2F^-{}_{(g)}$
$(IE)_1$ of $Mg_{(g)}$ = 737.7 kJ mol^{-1} ; $(IE)_2$ of $Mg_{(g)}$ = 1451 kJ mol^{-1} ; (EA) of $F_{(g)}$ = - 328 kJ mol^{-1}
a) Exothermic b) Endothermic c) Both d) can't be predicted

112. The correct order of the decreasing ionic radii among the following isoelectronic species are
a) $Ca^{2+} > K^+ > S^{2-} > Cl^-$ b) $Cl^- > S^{2-} > Ca^{2+} > K^+$ c) $S^{2-} > Cl^- > K^+ > Ca^{2+}$
d) $K^+ > Ca^{2+} Cl^- > S^{2-}$

113. The Ionisation energy of nitrogen is more than that of oxygen because:
a) of the extra stability of half-filled p orbitals in nitrogen b) more number of energy levels
c) less number of valence electrons d) smaller size

114. The main reason for showing anomalous properties of the first member of a group in s or p-block is

a) maximum chemical reactivity b) maximum electronegativity and different configurations
c) small size, large charge/radius ratio d) tendency to form multiple bonds

115. Which one of the following orders is not in accordance with the property stated against it?
a) $F_2 > Cl_2 > Br_2 > I_2$ (Oxidising power) b) HI > HBr > HBr > HF (Acidic property in water)
c) $F_2 > Cl_2 > Br_2 > I_2$ (Electronegativity) d) F2 > $Cl_2 > Br_2 > I_2$ (Bond dissociation energy)

116. Assertion: In the present form of periodic table, the period number corresponds to the highest principal quantum number of the elements in the period.
Reason: Elements having similar outer electronic configurations in their atoms belong to same period.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

117. Assertion: Metallic character is highest at the extremely left side of the periodic table.
Reason: Ionization enthalpy increases across a period.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

118. Which of the following statements regarding the variation of atomic radii in the periodic table is not true?
a) In a group, there is continuous increase in size with increase in atomic number.
b) In 4f-series, there is a continuous decrease in size with increase in atomic number
c) The size of inert gases is larger than halogens.
d) In 3rd period, the size of atoms increases with increase in atomic number.

119. Which one of the above elements is most reactive metal?
a) P b) Q c) U d) S

120. Which of the following electronic configuration of an atom has the lowest ionization enthalpy?
a) $1s^2, 2s^2, 2p^5$ b) $1s^2, 2s^2\ 2p^3$ c) $1s^2, 2s^2\ 2p^6, 3s^1$ d) $1s^2, 2s^2\ 2p^6$

121. Among the following, the one which is most basic is
a) ZnO b) MgO c) Al_2O_3 d) N_2O_5

122. The transition elements (d-block elements) show variable oxidation states because
a) of the presence of ns, np and nd electrons
b)
the energy difference between (n-l)d and ns electrons is very less, thus (n-l)d electrons also behave like valence electrons
c) of the presence of ns and nd orbitals
d) of the presence of electrons in np and nd orbitals

123. The electro negativity of carbon from the following data is : E_{H-H} = 104.2 kcal mol^{-1}, E_{c-c} = 83.1 kcal mol^{-1}, E_{C-H}= 98.8 kcal mol^{-1}. X_H = 2.1
a) 3.0 b) 2.1 c) 2.5 d) 3.1

124. Pair of elements with equal values of electronegativity
a) Be, Al b) Mg, Al c) Mg, Ca d) F, Ne

125. What is the correct electronic configuration of the central atom in $K_4[Fe(CN)_6]$ based on crystal field theory?
a) $t_{2g}^6 e_g^0$ b) $e^3 t_2^3$ c) $e^4 t_2^2$ d) $t_{2g}^4 e_g^2$

126. Which electron is configuration of an element has abnormally high difference between second and third ionization energy?
a) $1s^2, 2s^2, 2p^2, 3s^1$ b) $1s^2, 2s^2\ 2p^6, 3s^2\ 3p^1$ c) $1s^2, 2s^2\ 2p^6, 3s^2\ 3p^2$
d) $1s^2, 2s^2\ 2p^6, 3s^2$

127. What would be the atomic number of the next halogen if discovered in future?
a) 115 b) 119 c) 117 d) 121

128. The starting element of fifth period is:
a) K b) Rb c) Kr d) Xe

129. The longest and shortest periods are
a) 1 & 6 b) 2 & 6 c) 6 & 1 d) 1 & 7

130. The element Z = 114 has been discovered recently. It will belong to which of the following family/group and electronic configuration?
a) Halogen family, [Rn] $5f^{14}\ 6d^{10}\ 7s^2\ 7p^5$ b) Carbon family, [Rn] $5f^{14}\ 6d^{10}\ 7s^2\ 7p^2$
c) Oxygen family, [Rn] $5f^{14}\ 6d^{10}\ 7s^2\ 7p^4$ d) Nitrogen family, [Rn] $5f^{14}\ 6d^{10}\ 7s^2 7p^6$

131. An increase in both atomic and ionic radii with atomic number occurs in any group of the periodic table and in accordance with this the ionic radii of Tiny) and Zr(IV) ions are 0.68A° and 0.74A° respectively; but for Hf(IV) ion, the ionic radius is O. 75A°, which is almost the same as that for Zr(IV) ion. This is due to
a) Greater degree of covalency in compounds of Hf^{4+} b) Lanthanide contraction
c) Actinide contraction
d) Difference in co-ordination number of Zn^{4+} and Hf^{4+} in their compounds

132. Based upon the electronegativity difference of bonded atoms, which of the following is correct about the chemical bond?
a) Ionic if ΔEN < I.2; Polar covalent if ΔEN > 1.2
b) Ionic if ΔEN > 1.2 Polar covalent if ΔEN < 1.12
c) Ionic if ΔEN < 2.0 ; Polar covalent if ΔEN > 2.0
d) Ionic if ΔEN > 2.0 ; Polar covalent if ΔEN < 2.0

133. Screening effect is not observed in:
a) He^+ b) Li^{2+} c) Be^{3+} d) In all the above cases

134. Which of the following sets of elements have the same number of electrons in outermost shell?
a) Elements with atomic numbers 30, 48, 80 b) Elements with atomic numbers 14, 15, 16
c) Elements with atomic numbers 20, 30, 50 d) Elements with atomic numbers 10, 18, 26

135. Which of tire following sets has strongest tendency to form anions
a) Ga, In, Tl b) Na, Mg, Al c) N,O, F d) V,Cr,Mn

136. Which pair of elements of atomic numbers given below will have similar chemical properties?
a) 13 & 22 b) 3 & 11 c) 4 & 24 d) 2 & 1

137. One would expect proton to have very large
a) charge b) ionisation potential c) hydration energy d) radius

138. Which of the following elements will have highest ionisation energy?
a) $1s^2\ 2s^2\ 2p^6\ 3s^1$ b) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$ c) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4$ d) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^1$

139. The electronegativity of the following elements increase in the order
a) C, N, Si, P b) N, Si, C, P c) Si, P, C, N d) P, Si, N, C

140. Assertion: Among isoelectronic species, the cation with the greater positive charge will have a smaller radius.
Reason: Greater the attraction of the electrons to the nucleus, smaller is the size of atom/ion.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

141. The order of ionic mobility in aqueous solution of the following ions will be (If R, S belong to same group):
a) $R^{2+}_{(aq)} > S^{2+}_{(aq)}$ b) $S^{2+}_{(aq)} > R^{2+}_{(aq)}$ c) $S^{2+}_{(aq)} = R^{2+}_{(aq)}$ d) can not be co-related

142. The reference element in Pauling scale of electronegativity is:
a) H b) C c) Cl d) He

143. $N_0/2$ atoms of X(g) are converted into $X^+(g)$ by energy E_1.$N_0/2$ atoms of X(g) are converted into $X^-(g)$ by the energy E_2. Hence ionisation potential and electron affinity of X(g) are:
a) $\frac{2E_1}{N_0}, \frac{2(E_1 - E_2)}{N_0}$ b) $\frac{E_1}{N_0}, \frac{2E_2}{N_0}$ c) $\frac{2(E_1 - E_2)}{N_0}, \frac{2E_2}{N_0}$ d) $\frac{2E_1}{N_0}, \frac{2E_2}{N_0}$

144. Fill in the blanks by picking the correct option.
There are _____ groups and _____ periods in the extended form of periodic table. The group, all members of which are in gaseous state under ordinary conditions is_____ group. Most electropositive elements belong to _____ group.
a) 16, 8, 17, 2 b) 18, 7, 18, 1 c) 8, 7, 0, 2 d) 16, 8, 18, 1

145. The element with the atomic number 118, will be :
a) alkali b) noble gas c) lanthanide d) transition element

146. Which of the following element has maximum electron affinity?
a) Cl b) Br c) I d) F

147. Some statements are given regarding nature of oxides
i) In second period, nitrogen form strongest acidic oxide
ii) In third period, sodium froms strongest basic oxide
iii) Oxides of metalloids are generally amphoteric in nature
a) i and iii are correct b) ii and iii are correct c) i and ii are correct
d) i, ii and iii are correct

148. Match the atomic numbers of the elements given in column I with the periods given in column II and mark the appropriate choice

Column I (Atomic number)		Column II (Period)	
(A)	31	(i)	5
(B)	50	(ii)	3
(C)	56	(iii)	4

(D)	14	(iv)	6

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv) b) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (iii)
c) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii) d) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (ii)

149. Beryllium has higher ionisation enthalpy than boron. This can be explained as,
a) ionisation energy increases in a period.
b) beryllium has higher size than boron hence its ionisation enthalpy is higher
c) penetration of 2p-electrons to the nucleus is more than the 2s-electrons
d)
it is easier to remove electron from 2porbital as compared to 2s-orbital due to more penetration of s-electrons

150. If each orbital can hold a maximum of 3 electrons. The number of elements in 2nd period of the periodic table (long form) will be:
a) 12 b) 6 c) 8 d) 24

151. Electronic configurations of few elements are given below. Mark the incorrect match.
a) $1s^2\ 2s^2\ 2p^5$ - Most electronegative element
b) $1s^2\ 2s^2\ 2p^3$ -An element belonging to 3rd period and 5th group
c) $1s^2\ 2s^2\ 2p^6 3s^2\ 3p^6\ 3d^8\ 4s^2$ -A d-block element
d) $1s^2\ 2s^2\ 2p^6 3s^2\ 3p^6$ -An element from 18th group

152. Few general names are given along with their valence shell configurations. Mark the incorrect name:
a) $ns^2\ np^6$ - Noble gases b) $ns^2\ np^5$- Halogens c) ns^1 - Alkali metals
d) $ns^2\ np^2$ -Chalcogens

153. The element with the atomic number 118, will be
a) alkali b) noble gas c) lanthanide d) transition element

154. Which are correct match?
i) Eka silicon-Ge ii) Eka aluminium-Ga iii) Eka manganese-Ar iv) Eka scandium-B
a) ii, iii b) i, ii, iii c) i, iv d) i,ii

155. Which of the following process refers to ionisation potential?
a) $X_{(s)} \longrightarrow X^+_{(g)} + e^-$ b) $X_{(g)} \longrightarrow X^+_{(g)} + e^-$ c) $X_{(g)} + aq \longrightarrow X^+_{(ag)} + e^-$ d) $X_{(g)} + e^- \longrightarrow X^-_{(g)}$

156. In the periodic table, with the increase in atomic number, the metallic character of an element
a) decrease in a period and increases in a group
b) increases in a period and decreases in a group
c) increases in a period as well as in the group
d) decreases in a period and also in the group

157. The stability of +1 oxidation state among Al, Ga, In and Tl increases in the sequence:
a) Tl < In < Ga < Al b) In < Tl < Ga < Al c) Ga < In < Al < Tl d) Al < Ga < In < Tl

158. Identify the incorrect order of acidic strengths of CO_2, CuO, CaO, H_2O.
a) CaO < CuO < CO_2 < H_2O b) H_2O < CuO < CaO < CO_2 c) CaO < H_2O < CuO < CO_2
d) all of these

159. The first element of the groups 1 and 2 are different from other members of the respective groups. Their behaviour is more similar to the second element of the following groups. What is this relationship known as?

a) Anomalous relationship b) Periodic relationship c) Diagonal relationship
d) Chemical relationship

160. The covalent and van der Waals radii of chlorine respectively are
a) 1.80$\mathring{A}$ & 0.99$\mathring{A}$ b) 0.99$\mathring{A}$ & 1.80$\mathring{A}$ c) 1.80$\mathring{A}$ & 1.80$\mathring{A}$ d) 0.99$\mathring{A}$ &0.99$\mathring{A}$

161. The order of which of the following oxides is arranged according to decreasing basic nature?
a) Na_2O, MgO, Al_2O_3, CuO b) CuO, Al_2O_3, MgO, Na_2O c) Na_2O_3, CuO, MgO, Na_2O
d) CuO, MgO, Na_2O, Na_2O_3

162. Law of octaves stated :
a) every eighth element had properties similar to the first element
b) every third element had properties similar to the first element
c) the properties of the middle element were in between the other two members
d) the properties of the elements were repeated after regular intervals of 3, 4 or 8 elements

163. Which of the following orders is not correct for the size?
a) $Al^{3+} < Mg^{2+} < Na^{+} < F^{-}$ b) $Te^{2-} > I^{-} > Cs^{+} > Ba^{2+}$ c) $Fe^{3+} < Fe^{2+} < Fe^{4+}$
d) Mg > Al> Si > P

164. When we go from left to right in a period:
a) the basic nature of the oxides increases b) the basic nature of the oxides decreases
c) there is no regular trend in the nature of oxides
d) oxides of only first two groups are basic in nature.

165. Assertion: Shielding effect increases as we go down the group.
Reason: More is the number of electrons in the penultimate shell, more is the shielding.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

166. Assertion: Electronegativity is not a measurable quantity.
Reason: The electronegativity of any given element is not constant, it varies depending on the element to which it bound.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

167. Which of the following statement is incorrect?
a) Oxide of aluminium (Al_2O_3) , and arsenic (AS_2O_3) are amphoteric.
b) Oxide of chlorine (Cl_2O_7) is less acidic than oxide of nitrogen (N_2O_5).
c) Oxide of carbon (CO_2) is more acidic than oxide of silica (SiO_2).
d)
The correct increasing order of basic character of various oxides is H_2O < CuO < MgO < CaO.

168. The electronic configuration of an element is $1s^2$,$2s^2$ $2p^6$, $3s^2$ $3p^3$. What is the atomic number of the element, which is present just below the above element in the periodic table?
a) 33 b) 34 c) 36 d) 49

169. The oxidation state of an element in a particular compound can be defined as
a)
the charge acquired by its atom on the basis of electronegative consideration from other atoms in the molecule
b)
the residual charge acquired by its atom after removing all electronegative atoms from the molecule
c) the valency of the most electronegative atom present in the molecule
d) total number of electrons accepted by an atom to form a molecule.

170. The first ionisation potential (in eV) of Be and B, respectively are
a) 8.29,9.32 b) 9.32,9.32 c) 8.29,8.29 d) 9.32,8.29

171. The correct order of decreasing second ionization enthalpy of Ti (22), V (23), Cr (24) and Mn (25) is :
a) Cr > Mn > V > Ti b) V > Mn > Cr > Ti c) Mn > Cr > Ti > V d) Ti > V > Cr > Mn

172. In the long form of periodic table, elements are arranged in the increasing order of
a) atomic mass b) atomic number c) mass number d) metallic character

173. Which of the following is the correct order of size of the given species?
a) $I > I^- > I^+$ b) $1^+ > I^- > I$ c) $I > I^+ > I^-$ d) $I^- > I > I^+$

174. In which of the following options order of arrangement does not match with the variation of property indicated against it?
a) $A1^{3+} < Mg^{2+} < Na^+ < F^-$ (increasing ionic size)
b) B < C < N < O (increasing first ionisation enthalpy)
c) I < Br < F < Cl (increasing electron gain enthalpy)
d) Li < Na < K < Rb (increasing metallic radius)

175. In lanthanides, the differentiating electron enters into:
a) d - subshell b) f - subshell c) P - subshell d) s - subshell

176. A sudden large jump between the values of second and third ionization energies of an element would be associated with which of the following electronic configuration?
a) $1s^2\ 2s^2\ 2p^6\ 3s^1\ 3p^2$ b) $1s^2\ 2s^2\ 2p^6\ 3s^1\ 3p^1$ c) $1s^2\ 2s^2\ 2p^6\ 3s^1$ d) $1s^2\ 2s^2\ 2p^6\ 3s^2$

177. One of the characteristic properties of non-metals is that they
a) are reducing agents b) form basic oxides c) form cations by electron gain
d) are electronegative

178. In which of the following, the order is not in accordance with the property mentioned?
a) Li < Na < K < Rb - Atomic radius b) F > N > O > C - Ionisation enthalpy
c) Si < P < S < Cl- Electronegativity d) F < Cl < Br < I - Electronegativity

179. Which of the element can make MX type compound (X is the halogen)?
a) P b) Q c) R d) S

180. What is the common property of the oxides CO, NO and N_2O?
a) All are basic oxides. b) All are neutral oxides c) All are amphoteric oxides
d) All are acidic oxides

181. An element belongs to group 17 with atomic number is 17. What is the atomic number of the element belonging to same group and present in fifth period:

a) 25 b) 33 c) 35 d) 53

182. Indicate the wrong statement on the basis of the periodic table.
a) The most electronegative element in the periodic table is fluorine
b) Scandium is the first transition element and belongs to fourth period.
c) There are four transition series in the periodic table each containing 10 elements.
d) Along a period halogens have maximum negative electron gain enthalpy.

183. Which of the following represents the correct order of increasing electron gain enthalpy with negative sign for the elements O, S, F and Cl?
a) Cl < F < O < S b) O < S < F < Cl c) F < S < O < Cl d) S < O < Cl < F

184. The first ionization potential (in eV) of Be and B, respectively are :
a) 8.29, 9.32 b) 9.32, 9.32 c) 8.29, 8.29 d) 9.32, 8.29

185. The correct decreasing order of electropositive character among the following elements is: Fe, Sc, Rb, Br, Te, F, Ca
a) Fe > Sc > Rb > Br > Te > F> Ca b) Ca > Rb > Sc > Fe > Te > F > Br
c) Rb > Ca > Sc > Fe > Br > Te > F d) Rb > Ca > Sc > Fe > Te > Br > F

186. The correct order of negative electron gain enthalpy is:
a) Cl < F b) F < Br c) S < O d) O < F

187. The order of basic character of given oxides is
a) $Na_2O > MgO > CuO > SiO_2$ b) $MgO > SiO_2 > CuO > Na_2O$
c) $SiO_2 > MgO > CuO > Na_2O$ d) $CuO > Na_2O > MgO > SiO_2$

188. The correct order of radii is :
a) N < Be < B b) $Mg^{2+} < Li^{+} < N^{3-}$ c) Na < Li < K d) $Fe^{+3} < Fe^{2+} < Fe^{4+}$

189. Match the atomic numbers given in column I with the block in which the element is placed in column II and mark the appropriate choice.

Column I (Atomic number)		Column II (Block)	
(A)	62	(i)	d - block
(B)	47	(ii)	p - block
(C)	56	(iii)	f - block
(D)	53	(iv)	s - block

a) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (ii) b) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv)
c) (A) ⟶ (ii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (iii) d) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii)

190. An element of 5f-series but has no electrons filled in 5f-sub shell:
a) Ac b) Ce c) Th d) U

191. The first (IE_1) and second (IE_2) ionization energies (kJ/mol) of a few elements designated by Roman numerals are given below. Which of these would be an alkali metal?

a)

	IE_1	IE_2
I	2372	5251

b)

	IE_1	IE_2
II	520	7300

c)

	IE_1	IE_2
III	900	1760

d)

	IE_1	IE_2
IV	1680	3380

192. Which of the following will have lowest electron affinity?
a) Nitrogen b) Oxygen c) Argon d) Boron

193. Identify the correct order of the size of the following :
a) $Ca^{2+} < K^{+} < Ar < S^{2-} < cl^{-}$ b) $Ca^{2+} < K^{+} < Ar < cl^{-} < S^{2-}$ c) $Ar < Ca^{2+} < K^{+} < Cl^{-} < S^{2-}$
d) $Ca^{2+} < Ar < K^{+} < Cl^{-} < S^{2-}$

194. The atomic weights of Be were corrected by Mendeleef using the formula:
a) $\sqrt{v}$ =a(Z-b) b) $mvr = \frac{nh}{2\pi}$ c) Atomic weight = Equivalent weight x valency
d) Equivalent weight = Atomic weight x valency

195. Of the following four elements which represents an inert gas?
a) P b) Q c) R d) S

196. Among halogens, the correct order of amount of energy released in electron gain (electron gain enthalpy) is
a) F > Cl > Br > I b) F < Cl < Br < I c) F < Cl > Br > I d) F < Cl < Br > I

197. By taking chemical properties into consideration, the atomic weights of the following elements were corrected
a) Te & I b) Ar & K c) Co & Ni d) Be & In

198. Elements X, Y and Z have atomic numbers 19,37 and 55 respectively. Which of the following statements is true about them?
a) Their ionization potential would increase with increasing atomic number.
b) Y would have an ionization potential between those of X and Z.
c) Z would have the highest ionization potential.
d) Y would have the highest ionization potential.

199. The correct order of atomic radii in group 13 elements is :
a) B < Al < In < Ga < Tl b) B < Al < Ga < In < Tl c) B < Ga < Al < Tl < In
d) B < Ga < Al < In < Tl

200. Which is not a transition metal?
a) Ag b) Pb c) Cr d) Pt

201. Match the column I with column II and mark the appropriate choice.

Column I (Atomic number)		Column II (Period, Group)	
(A)	14	(i)	3, 14
(B)	53	(ii)	5, 2
(C)	38	(iii)	6, 10
(D)	78	(iv)	5, 17

a) (A) ⟶ (ii), (B) ⟶ (iv), (C) ⟶ (iii), (D) ⟶ (i) b) (A) ⟶ (i), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (iii)
c) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iv) d) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (iv)

202. 4d, 5p, 5f and 6p orbitals are arranged in the order of decreasing energy. The correct option is:
a) 6p>5f>5p>4d b) 6p>5f>4d>5p c) 5f>6p>4d>5p d) 5f>6p>5p>4d

203. Amongst K, Ca, Fe and Zn the element which can form more than one binary compound with chlorine is
a) Fe b) Zn c) K d) Ca

204. The amount of energy when million atoms of iodine are completely converted into I^- ions in the vapour state according to the equation, $I_{(g)} + e^- \rightarrow I^-_{(g)}$ is 4.9×10^{-13} J. What would be the electron gain enthalpy of iodine in terms of kJ mol^{-1} and eV per atom?
a) 295, 3.06 b) -295, -3.06 c) 439,5.09 d) -356, -7.08

205. Which of the following pairs of ions have the same electronic configuration:
a) Cr^{+3}, Fe^{+3} b) Sc^{+3}, Cr^{+3} c) Fe^{3+}, Co^{+3} d) Fe^{3+}, Mn^{2+}

206. The element which belong to 3rd period and IVA group of periodic table is
a) Silicon b) Carbon c) Germanium d) Tin

207. The lanthanides contraction refers to
a) radius of the series b) valence electrons of the series c) the density of the series
d) electronegativity of the series

208. An ion M^{3+} has electronic configuration $[Ar]3d^{10}4s^2$, Element M belongs to:
a) s-block b) p-block c) d-block d) f-block

209. Fluorine is more electronegative than nitrogen, The best explanation is that
a) The valence electrons in F are on the average, a little farther to the nucleus than in N.
b) The charge on a F nucleus is +9, while that on N nucleus is +7
c)
The nitrogen has half filled valence shell electron configuration, ns-np ' where as fluorine has partially filled electron configuration ns^2np^5
d)
The electronegativity decreases from top to bottom in each of the group as the effective nuclear charge remains constant.

210. The first ionization enthalpies of Na, Mg, Al and Si are in the order
a) NaAl b) Na>Mg>Al>Si c) Na < Mg < Al < Si d) Na > Mg > Al < Si

211. Which one of the following ions will be smallest in size?
a) Na^+ b) Mg^{2+} c) F^- d) O_2^-

212. (A), (B) and (C) are elements in the third short period. Oxide of (A) is ionic, that of (B) is amphoteric and of (C) a giant molecule. (A), (B) and (C) have atomic number in the order:
a) (A) < (B) < (C) b) (C) < (B) < (A) c) (A) < (C) < (B) d) (B) < (A) < (C)

213. Atomic radius depends upon
i) Number of bonds formed by the atom
ii) Nature of the bonding
iii) Oxidation state of the atom
a) i and ii b) ii and iii c) i and iii d) i, ii, iii

214. Which of the following sequence regarding ionisation potential of coinage metal is correct?
a) Cu > Ag > Au b) Cu < Ag < Au c) Cu > Ag < Au d) Ag > Cu

215. The order of screening effect of electrons of s, p, d and f orbitals of a given shell of an atom on its outer shell electrons is:
a) s > p > d >f b) f > d > p > s c) p < d < s < f d) f > p > s > d

216. Electronic configurations of four elements A, B, C and D are given below
(A) $1s^2\ 2s^2\ 2p^6$
(B) $1s^2\ 2s^2\ 2p^4$

(C) $1s^2\ 2s^2\ 2p^6\ 3s^1$
(D) $1s^2\ 2s^2\ 2p^5$
Which of the following is the correct order of increasing tendency to gain electron?
a) A < C < B < D b) A < B < C < D c) D < B < C < A d) D < A < B < C

217. Which of the properties of isotopes of an element is different?
a) First ionisation enthalpy b) Effective nuclear charge c) Electron affinity
d) Melting point and boiling point

218. Which of the following statements regarding an anion is not true?
a) The gain of an electron leads to the formation of an anion.
b) The radius of the anion is larger than the atomic radius of its parent atom.
c) The effective nuclear charge increases when an anion is formed.
d) Electron cloud expands due to increased repulsion among the electrons

219. Atomic numbers of few elements are given below. Which of the pairs belongs to s-block?
a) 7, 14 b) 3, 20 c) 8, 15 d) 9, 17

220. Incorrect statement is
a) Fluorine has the highest electron affinity
b) Greater the nuclear charge, greater is the electron affinity
c) The electron affinity of Nitrogen is positive (energy is absorbed)
d) Chlorine has highest electron affinity

221. Few values are given in the table in the direction from left to right and top to bottom. Predict the property which could be depicted in the table.

152						
186	160	143	117	110	104	99
231						
244						
262						

a) Atomic number b) Ionisation enthalpy c) Atomic radius d) Electron gain enthalpy

222. Four successive members of the first row transition elements are listed below with their atomic numbers. Which one of them is expected to have the highest third ionization enthalpy?
a) Vanadium (Z = 23) b) Chromium (Z = 24) c) Iron (Z = 26) d) Manganese (Z = 25)

223. Ionic radii are
a) inversely proportional to effective nuclear charge
b) inversely proportional to square of effective nuclear charge
c) directly proportional to effective nuclear charge
d) directly proportional to square of effective nuclear charge

224. Two elements X and Y contain only one electron in the outer level. Element X is reactive and loses electron easily while element Y is relatively unreactive and non-corrosive. The elements X and Y respectively ar
a) Cs and Li b) Rb and Na c) Li and Cu d) Ag and Au

225. For the second period elements the correct increasing order of first ionisation enthalpy is:
a) Li < B < Be < C < N < O < F < Ne b) Li < Be < B < C < O < N < F < Ne
c) Li < Be < B < C < N < O < F < Ne d) Li < B < Be < C < O < N < F < Ne

226. What is the name and symbol of the element with atomic number 112?

a) Ununbium, Uub b) Unnilbium, Unb c) Ununnillum, Uun d) Ununtrium, Uut

227. Which of the following oxide is amphoteric?
a) SnO_2 b) Cr_2O_3 c) CrO_3 d) CrO_5

228. Which block of the periodic table contains elements with the general electronic configuration $(n - 2)f^{1-14}$ $(n -1)$ d^{0-1} ns^2?
a) s-block b) p-block c) d-block d) f-block

229. Which of the following statement is/are incorrect about the modern form of periodic table?
a) Third group of periodic table accommodates maximum number of elements
b)
Due to presence of half filled and fully subshells in electronic configuration electronegativity of atom increases
c) The element of 13th group and 7th period will have atomic number 113
d)
Diagonal relationship in 2nd and 3rd period element is found due to similar polarising power.

230. An element with atomic number 117 is known as
a) nihonium b) flerovium c) tennessine d) roentgenium

231. The C-C single bond length is 1.54A° and that of Cl-Cl is 1.98A°. If the elcctroncgativity of Cl and C are 3.0 and 2.5 respectively, the C-Cl bond-length will be equal to
a) 3.12A° b) 1.67A° c) 1.71A° d) 2.12A°

232. Which of the following statement is wrong for the transition elements?
a) Last electron enters in (n-1)d subshell
b) Transition elements are placed from 3rd to 6th period c) Exhibits variable valency
d) General electronic configuration is $(n-1)d^{1-10}ns^{1-2}$

233. Consider the isoelectronic species, Na^+, Mg^{2+}, F^- and O^{2-}. The correct order of increasing length of their radii is
a) $F^- < O^{2-} < Mg^{2+} < Na^+$ b) $Mg^{2+} < Na^+ < F^- < O^{2-}$ c) $O^{2-} < F^- < Na^+ < Mg^{2+}$
d) $O^{2-} < F^- < Mg^{2+} < Na^+$

234. Which of the following statements is correct?
a) Elements of 3d and 4d-series are kept separately in periodic table.
b) Elements of 4f and Sf-series are kept separately in periodic table
c) Elements of 5p and 6p-series are kept separately in periodic table
d) All statements are correct.

235. The atomic radii of transition elements from Cr to Cu are almost equal because
a)
Increased effective nuclear charge is balanced by decreased screening effect of (n-l)d orbitals
b)
Increased effective nuclear charge is balanced by increased screening effect of (n-l)d orbitals

c)
Decreased effective nuclear charge is balanced by increased screening effect of (n-l)d orbitals
d)
Decreased effective nuclear charge is balanced by decreased screening effect of (n-l)d orbitals

236. The statement that is not correct for periodic classification of elements is
a) the properties of elements are periodic function of their atomic numbers
b) non-metallic elements are less in number than metallic elements
c)
for transition elements, the 3d orbitals are filled with electrons after 4p orbitals and before 4s orbitals
d)
the first ionization enthalpies of elements generally increase with increase in atomic number as we go along a period

237. Which one of the elements with the following outer orbital configurations may exhibit largest number of oxidation states?
a) $3d^3, 4s^2$ b) $3d^5, 4s^1$ c) $3d^5, 4s^2$ d) $3d^2, 4s^2$

238. Assertion : Na_2O is basic oxide whereas Cl_2O_7 is acidic oxide.
Reason: Elements on extreme left form basic oxides whereas elements on extreme right form acidic oxides.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

239. Which of the following is not correct statement for periodic classification of elements?
a) The properties of elements are the periodic functions of their atomic number.
b) Non-metallic elements are less in number than metallic elements.
c) For transition elements, the last electron enters into (n - 2) d-subshell. d) None of these

240. The period in which s-block, p-block and d-block elements are present
a) 1 b) 6 c) 7 d) 3

241. As per the modern periodic law, the physical and chemical properties of elements are in periodic functions of their
a) atomic number b) electronic configuration c) atomic weight d) atomic size

242. Which of the following sets of oxides is amphoteric in nature?
a) Al_2O_3, As_2O_3, ZnO b) CO, NO, N_2O c) SO_3, SO_2, Cl_2O_7 d) Na_2O, MgO, BaO

243. Which of the following elements shown as pairs with their atomic numbers belong to the same period?
a) Z = 19 and Z = 38 b) Z = 12 and Z = 17 c) Z = 11 and Z = 21 d) Z = 16 and Z = 35

244. Which of the following order is correct for the size of Fe^{3+}, Fe and Fe^{2+} ?
a) $Fe < Fe^{2+} < Fe^{3+}$ b) $Fe^{2+} < Fe^{3+} < Fe$ c) $Fe < Fe^{3+} < Fe^{2+}$ d) $Fe^{3+} < Fe^{2+} < Fe$

245. Ionization enthalpies of transition metals are

a) intermediate between those of s- and p-block elements b) more than p-block elements
c) highest in all the elements d) lower than s-block elements.

246. The period number in the long form of the periodic table is equal to:
a) magnetic quantum number of any element of the period
b) atomic number of any element of the period
c) maximum principal quantum number of any element of the period
d) maximum azimuthal quantum number of any element of the period.

247. With an increase in the extent of penetration of valence electrons, ionisation energy
a) Decreases b) Increases c) Remains constant d) Both are not related

248. Assertion: Atomic number is a more fundamental property of an element than its atomic mass.
Reason : Atomic number is equal to number of protons in an atom.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

249. The five successive ionisation energies of the element are 800, 2427, 3658, 25024 and 32824 $kJmol^{-1}$ respectively. The number of valence electrons is
a) 3 b) 5 c) 4 d) 2

250. Which of the following groups contains metals, non-metals and metalloids?
a) Group 17 b) Group 14 c) Group 13 d) Group 12

251. Identify the incorrect match

a)

Name	IUPAC official Name
Unnilunium	Mendelevium

b)

Name	IUPAC official Name
Unniltriurn	Lawrencium

c)

Name	IUPAC official Name
Unnilhexium	Seaborgiurn

d)

Name	IUPAC official Name
Unununnium	Darmstadtium

252. Which one of the following arrangements represents the correct order of electron gain enthalpy (with negative sign) of given atomic species?
a) F < Cl < O < S b) S < O < Cl < F c) O < S < F < Cl d) Cl < F < S < O

253. According to the law of triads:
a) the properties of the middle element were in between those of the other two members
b) three elements arranged according to increasing weights have similar properties
c) the elements can be grouped in the groups of six elements
d) every third element resembles the first element in periodic table.

254. Amongst the elements with following electronic configurations which one of them may have the highest ionization energy
a) $[Ne]3s^2 3p^1$ b) $[Ne]3s^2 3p^3$ c) $[Ne]3s^2 3p^2$ d) $[Ar]3d^{10} 4s^2 4p^3$

255. Assertion: According to Mendeleev, the properties of elements are a periodic function of their atomic weights.
Reason : Mendeleev left the gap under aluminium and a gap under silicon, and called these elements Eka-Aluminium and Eka-Silicon.

a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

256. $M_{(g)} \rightarrow M^{+}_{(g)} + e^{-}$, $\Delta H = 100eV$; $M_{(g)} \rightarrow M^{2+}_{(g)} + 2e^{-}$, $\Delta H = 250eV$
Which is incorrect statement?
a) I_1 of $M_{(g)}$ is 100 eV b) I_1 of $M^{+}_{(g)}$ is 150 eV c) I_2 of $M_{(g)}$ is 250 eV
d) I_2 of $M_{(g)}$ is 150 eV

257. Predict the formula of stable compound formed by an element with atomic number 114 and fluorine.
a) AF_3 b) AF_2 c) AF d) AF_4

258. The size of the following species increases in the order:
a) $Mg^{2+} < Na^{+} < F^{-} < Al$ b) $Al^{3+} < Mg^{2+} < Na^{+} < F^{-}$ c) $Na^{+} < F^{-} < Al^{3+} < Mg^{2+}$
d) $Na^{+} < Al^{3+} < Mg^{2+} < F^{-}$

259. Which of the following element has the greatest tendency to lose electrons?
a) F b) S c) Fe d) Be

260. An atom has electronic configuration $1s^2 2s^2\ 2p^6 3s^2 3p^6 4s^2$, you will place it in which group?
a) Fifth b) Fifteenth c) Second d) Third

261. Atomic numbers of actinides are
a) 57 to 71 b) 80 to 103 c) 58 to 71 d) 90 to 103

262. The electronic configurations of four elements are given below. Which element does not belong to the same family as others?
a) [Xe] $4f^{14}, 5d^{10}, 6s^2$ b) [Kr] $4d^{10}, 5s^2$ c) [Ne] $3s^2 3p^5$ d) [Ar] $3d^{10}, 4s^2$

263. What is the value of electron gain enthalpy of Na^{+} if IEI of Na = 5.1 eV.
a) -5.1 eV b) -10.2 eV c) +2.55 eV d) +10.2 eV

264. The elements in which electrons are progressively filled in 4f orbital are called
a) actinoids b) transition elements c) lanthanoids d) halogens

265. The ionisation of hydrogen atom would give rise to
a) hydride ion b) hydronium ion c) proton d) hydroxyl ion

266. Which of the following statements is true about the variation of density of elements in the periodic table?
a)
In a period from left to right density first increases upto the middle and then starts decreasing
b) In a group on moving down the density decreases from top to bottom.
c) A less closely packed solid has higher density
d) Density of elements is not a periodic property

267. There are two rows of inner transition elements in the periodic table each containing 14 elements. The reason for this may be
a) f-orbital has seven values for magnetic quantum number, hence total electrons are 14
b) in the periodic table there is space to accommodate 14 electrons only
c) only 28 inner transition elements have been discovered till date
d) 28 is the maximum number of elements that any block can accommodate.

268. An element has 18 electrons in the outer most shell. The element is
a) Transition metal b) Rare earth metal c) Alkaline earth metal d) Alkali metal

269. Which one of the following groups represents a collection of isoelectronic species? (At. nos.: Cs-55, Br-35)
a) Na^+, Ca^{2+}, Mg^{2+} b) $N3^-$, F^-, Na^+ c) Be, $Al3^+$, Cl^- d) Ca^{2+}, Cs^+Br

270. The general electronic configuration of f-block elements is
a) $(n - 2)f^{1-14}(n - 1)d^{0-1}ns^2$ b) ns^2 $(n-l)d^{0-1}$ $(n-2)f^{l-14}$ c) ns^2 nd^{0-1} nf^{l-14}
d) ns^2 $(n-l)d^{0-1}$ $(n-l)f^{1-14}$

271. What is the correct order of successive ionisation enthalpies?
a) $IE_{III} > IE_{II} > IE_I$ b) $IE_I > IE_{II} > IE_{III}$ c) $IE_{II} > IE_I > IE_{III}$ d) $IE_{III} > IE_I > IE_{II}$

272. The formation of the oxide ion $O^{2-}(g)$, from oxygen atom requires first an exothermic and then an endothermic step as shown below?
$$O(g) + e^- \rightarrow O^-(g); \Delta_f H^\Theta = -141 \text{ kJ mol}^{-1}$$
$$O^-(g) + e^- \rightarrow O^{2-}(g); \Delta_f H^\Theta = +780 \text{ kJ mol}^{-1}$$
Thus process of formation of O2 in gas phase is unfavorable even though O^{2-} is isoelectronic with neon. It is due to the fact that
a) Electron repulsion outweighs the stability gained by achieving noble gas configuration
b) O- ion has comparatively smaller size than oxygen atom
c) Oxygen is more electronegative
d) Addition of electron in oxygen results in larger size of the ion.

273. If electro negativity of x be 3.2 and that of y be 2.2, the percentage ionic character of xy is
a) 19.5 b) 18.5 c) 9.5 d) 29.5

274. Electronegativity values for elements are useful in predicting:
a) bond energy of a molecule b) polarity of a molecule c) nature of an oxide d) All

275. As we move from left to right, the electronegativity increases. An atom which is highly electronegative has
a) large size b) low electron affinity c) high ionisation enthalpy
d) low chemical reactivity.

276. The 4f-subshell is successively filled for
a) Rare earths b) Rare gases c) Transition metals d) Alkaline earth metals

277. Among the following which electron of Fe atom experience minimum attraction from nucleus? (Atomic number of Fe = 26).
a) 3d b) 4s c) 2s d) 2p

278. Why is the electron gain enthalpy of O or F less than that of S or Cl?
a) O and F are more electronegative than Sand Cl.
b)
When an electron is added to O or F, it goes to a smaller (n = 2) level and suffers more repulsion than the electron in S or Cl in larger level (n = 3).
c) Adding an electron to 3p-orbital leads to more repulsion than 2p-orbital.
d) Electron gain enthalpy depends upon the electron affinity of the atom.

279. Which of the following statement is correct ?

a) Metallic radius refer to metals only and is greater than covalent radius

b) Metallic radius refer to metals only and is smaller than covalent radius

c)

Generally covalent radius refer to non-metals as well as metals in bonded state (covalent bond).

d)

Atomic radii of noble gases are expressed as van der Waal's radii which are smaller than metallic radii.

280. Which of the following is not isoelectronic series?

a) Cl^-, P^{3-}, Ar b) N^{3-}, Ne, Mg^{2+} c) B^{3+}, He, Li^+ d) N^{3-}, S^{2-}, Cl^-

281. The species Ar, K^+ and Ca^{2+} contain the same number of electrons. In which order do their radii increase?

a) Ca^{2+} + b) $Ca^{2+} < K^+ < Ar$ c) K^+2+ d) Ar+2+

282. What is the formula of ionic compound if electronic configurations of outermost shell of X = ns^2 and Y = ns^2np^3?

a) X_3Y_2 b) X_3Y c) XY_2 d) XY

283. Aqueous solutions of two compounds M-O-H and M' -O-H have been prepared in two different beakers. If the electronegativity of M = 3.5, M' = 1.72, O = 3.0 and H = 2.1, then the solutions respectively are

a) acidic, acidic b) acidic, basic c) basic, basic d) basic, acidic.

284. The electronic configuration of few elements is given below. Mark the statement which is not correct about these elements.

(i) $1s^2\ 2s^2\ 2p^6\ 3s^1$

(ii) $1s^2\ 2s^2\ 2p^5$

(iii) $1s^2\ 2s^2\ 2p^6$

(iv)$1s^2\ 2s^2\ 2p^3$

a) (i) is an alkali metal. b) (iii) is a noble metal c) (i) and (ii) form ionic compounds

d) (iv) has high ionisation enthalpy

285. What is common between given cations and anions, O^{2-}, F^-, Na^+, Mg^{2+}, Al^{3+}?

a) All have same ionic radii. b) All are isoelectronic species having 10 electrons.

c) All of them belong to the third period. d) The nature of oxides of all the ions is basic

286. Correct order of I^{st} ionization potential (IP) among following elements Be, B, C, N, O is :

a) B < Be < C < O < N b) B < Be < C < N < O c) Be < B < C < N < O

d) Be < B < C < O < N

287. Electronic configuration of four elements is given below. Which of the following does not belong to the same group?

a) $[Kr]4d^{10}\ 5s^2$ b) [Ar] $3d^{10}\ 4S^2$ c) $[Xe]4f^{14}\ 5d^{10}\ 6s^2$ d) $[Xe]\ 5p^6\ 6s^2$

288. Select correct statement :

a)

Across a transition series (from Cr to Cu), there is only a small decrease in atomic radius from one element to another due to very small increase in effective nuclear charge

b)

The rate of decrease in the size across the lanthanide series is less than the across the first transition series

c) Both are correct statements d) None of the statement is correct

289. Which of the following transitions will involve maximum amount of energy?

a) $M \rightarrow M^{+}+e^{-}$ b) $M^{-} \rightarrow M^{+}+2e^{-}$ c) $M^{2+} \rightarrow M^{3+}+e^{-}$ d) $M^{+} \rightarrow M^{2+}+e^{-}$

290. Assertion: The chemistry of the early actinoids is more complicated than the corresponding lanthanoids.

Reason: Outer electronic configuration of actinoids is $(n - 2)f^{1-14}\ (n - 1)d^{0-1}\ ns^{2}$.

a) If both assertion and reason are false.

b) If both assertion and reason are true and reason is the correct explanation of assertion.

c) If both assertion and reason are true but reason is not the correct explanation of assertion.

d) If assertion is true but reason is false.

291. The period to which an element belongs to in the long form of periodic table represents

a) atomic mass b) atomic number c) principal quantum number

d) azimuthal quantum number

292. The ions O^{2-}, F^{-}, Na^{+}, Mg^{2+} and Al^{3+} are isoelectronic. Their ionic radii show :

a) an increase from O^{2-} to F^{-} and then decrease from Na^{+} to Al^{3+}.

b) a decrease from O^{2-} to F^{-} and then increase from Na^{+} to Al^{3+}

c) a significant increase from O^{2-} to Al^{3+} d) a Significant decrease from O^{2-} to Al^{3+}

293. Which of the following statements related to the modem periodic table is incorrect?

a) The p-block has 6 vertical columns, i.e., groups b) The d-block has 8 vertical columns

c)

Each block contains a number of columns equal to the number of electrons that can occupy that subshell

d)

The block indicates value of azimuthal quantum number (l) for the last subshell that received electrons in building up the electronic configuration

294. Predict the formula of a compound formed by aluminium and sulphur.

a) Al_2S_2 b) Al_3S_2 c) Al_2S3 d) AlS

295. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	3d-transition series	(i)	Z = 58 to Z = 71
(B)	Lanthanoid series	(ii)	Z = 39 to Z = 48
(C)	Actinoid series	(iii)	Z = 21 to Z = 30
(D)	4d-transition series	(iv)	Z = 90 to Z = 103

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv) b) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i)

c) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (ii) d) (A) ⟶ (iv), (B) ⟶ (iii), ⟶ (C) (i), (D) ⟶ (ii)

296. The correct order of acidic character of oxides in third period of periodic table is

a) $SiO_2 < P_4O_{10} < SO_3 < Cl_2O_7$ b) $Cl_2O_7 < SO_3 < P_4O_{10} < SiO_2$
c) $SO_3 < Cl_2O_7 < P_4O_{10} < SiO_2$ d) $SiO_2 < Cl_2O_7 < P_4O_{10} < SiO_2$

297. Among the elements A, B, C and D having atomic numbers 9, 10, 11 and 12 respectively the correct order of ionisation energies is
a) A > B > C > D b) B > A> D > C c) B > A> C > D d) D > C > B > A

298. Which of the following is the wrong statement?
a) All the actinide element are radioactive
b) Alkali and alkaline earth metals are s-block elements
c) Chalcogens and halogens are p-block elements
d) The first member of the lanthanide series is lanthanum

299. Which is the most non-metallic element among the following
a) $1s^2\ 2s^2\ 2p^6\ 3s^1$ b) $1s^2\ 2s^2\ 2p^5$ c) $1s^2\ 2s^2\ 2p^6\ 3s^2$ d) $1s^2\ 2s^2\ 2p^3$

300. Which of the following elements will have highest second ionisation enthalpy?
a) $1s^2\ 2s^2\ 2p^6\ 3s^2$ b) $1s^2\ 2s^2\ 2p^6\ 3s^1$ c) $1s^2\ 2s^2\ 2p^6\ 3s^2 3p^2$ d) $1s^2\ 2s^2\ 2p^6\ 3s^2 3p^3$

301. Why do noble gases have positive electron gain enthalpy?
a) It is difficult to add an electron due to small size
b) It is difficult to add an electron due to high electronegativity
c) It is difficult to add an electron due to stable configuration
d) It is difficult to add an electron due to high electron affinity

302. The number of elements present in 2nd, 3rd, 4th and 5th periods of modem periodic table respectively are:
a) 2, 8, 8 & 18 b) 8, 8, 18 & 32 c) 8, 8, 18 & 18 d) 8, 18, 18 & 32

303. Mercury is the only metal which is liquid at 0°c. This is due to its:
a) high ionisation energy and weak metallic bond
b) Low ionisation potential and high electrogativity c) High atomic mass and small size
d) High electronegativity and low ionisation potential

304. If the atomic number of an element is 33, it will be placed in the periodic table in the:
a) first group b) third group c) fifth group d) seventh group

305. In a period of representative elements, the decrease in ionic radius when compared with the corresponding decrease in atomic radius
a) is equal b) is less c) is more d) Cannot be predicted

306. Thallium shows different oxidation states due to:
a) of its high reactivity b) of inert pair of electrons c) of its amphoteric nature
d) its is a transition metal

307. Two elements A and B have the following electronic configurations. The formula of the compound formed between them can be A = $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^1$: B = $1s^2\ 2s^2\ 2p^4$
a) AB b) AB_2 c) A_2B_3 d) A_3B_2

308. The period that includes all blocks of elements is
a) 1 b) 2 c) 6 d) 7

309. Correct statement among the following is:
a) Covalent radius is 40% more than Van der waals radius
b) Van der waals radius is less than covalent radius

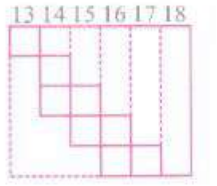
c) Van der waal's radius is 40% more than covalent radius d) Radii cannot be compared

310. Which of the following series of elements have nearly the same atomic radii?
a) F, Cl, Br, I b) Na, K, Rb, Cs c) Li, Be, B, C d) Fe, Co, Ni, Cu

311. If an element 'X' is assumed to have the types of radii, then their order is
a) Crystal radius> Van der waals radius> Covalent radius
b) van der waals radius > Crystal radius > Covalent radius
c) Covalent radius > Crystal radius > van der waals radius
d) Van der waals radius > Covalent radius > Crystal radius

312. Examples of elements belonging to s,p,d or f-block are given below. Identify the wrong example.
a) s-block element - Caesium b) p-block element - Barium
c) d-block element - Chromium d) f-block element - Thorium

313. Part of the periodic table showing p-block is depicted below. What are the elements shown in the zig-zag boxes called? What is the nature of the elements outside this boundary on the right side of the table?



a) Transition elements, metalloids b) Metalloids, non-metals c) Metals, non-metals
d) Non-metals, noble gases

314. Element with atomic number 52 belongs to
a) s-block b) p-block c) d-block d) f-block

315. The electronic configuration of gadolinium (atomic number 64) is
a) [Xe] $4f^3\ 5d^5\ 6s^2$ b) [Xe] $4f^7\ 5d^2\ 6s^1$ c) [Xe] $4f^7\ 5d^1\ 6s^2$ d) [Xe] $4f^8\ 5d^6\ 6s^2$

316. Which of the following statements is true?
a) Silicon exhibits 4 coordinates number in its compounds
b) Bond energy of F_2 is less than Cl_2
c) Mn (III) oxidation state is more stable than Mn (II) in aqueous state
d) Elements of 15th group shows only +1 and +5 oxidation states

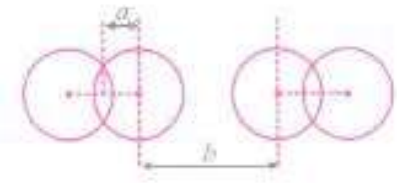
317. Which of the following order is wrong?
a) $NH_3 < PH_3 < AsH_3$ - Acidic b) Li < Be < B < C - First IP
c) $Al_2O_3 < MgO < Na_2O < K_2O$ - Basic d) $Li^+ < Na^+ < K^+ < Cs^+$ - Ionic radius

318. Assertion: Oxidation state of oxygen in OF_2 and Na_2O is +2 and -2 respectively.
Reason: Oxygen is an electronegative element
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

319. An element 'X' belongs to fourth period and fifteenth group of the periodic table. Which one of the following is true regarding the outer electronic configuration of 'X'?

a) It has partially filled d-orbitals and completely filled s-orbitals.
b) It has completely filled s-orbitals and completely filled p-orbitals.
c) It has completely filled s-orbitals and halffilled p-orbitals.
d) It has half-filled d-orbitals and completely filled s-orbitals.

320. What are the two radii shown as 'a' and 'b' in the figure known as



a) a = Atomic radius, b = Molecular radius
b) a = Covalent radius, b = van der Waals' radius c) a = Ionic radius, b = Covalent radius
d) a = Covalent radius, b = Atomic radius

321. Which of the following order(s) is/are incorrect?
a) $O^{2-} < F^{-} < Na^{+} < Mg^{2+}$ Increasing $Z_{effective}$ b) $Mg^{2+} < Na^{+} < O^{2-} < F^{-}$ Increasing size
c) $O^{2-} < F^{-} < Na^{+} < Mg^{2+}$ Increasing ionisation energy
d) $O^{2-} < F^{-} < Na^{+} < Mg^{2+}$ Increasing electron affinity

322. Gd (64) has_____ unpaired electrons with sum of spin_____
a) 7. 3.5 b) 8, 3 c) 6, 3 d) 8, 4

323. Which of the following orders of ionic radii is correctly represented?
a) $H^{-} > H^{+} > H$ b) $Na^{+} > F^{-} > O^{2-}$ c) $F^{-} > O^{2-} > Na^{+}$ d) all are wrong

324. In the long form of periodic table, the non-metals are placed in
a) s-block b) p-block c) d-block d) f-block

325. The electronic configuration of four elements are given below. Which element does not belong to the same family as others
a) [xe] $4f^{14},5d^{10},6s^{2}$ b) [Kr] $4d^{10},5s^{2}$ c) [Ne] $3s^{2},3p^{5}$ d) [Ar] $3d^{10},4s^{2}$

326. Which of the following is arranged in order of increasing metallic character?
a) P < Si < Na < Be < Mg b) Be < Mg < P < Na < Si c) Si < Be > Mg < Na < P
d) P < Si < Be < Mg < Na

327. Atomic radius is measured by
a) Mulliken oil drop method b) Rutherford's a-ray scattering experiment
c) X-ray diffraction technique d) Electric discharge tube experiment

328. Assertion: For the element O or F, the electron gain enthalpy is less negative than that of the succeeding element.
Reason: Electron gain enthalpy becomes less negative as we go down a group.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

329. Which element exhibit inert pair effect
a) Pb b) Al c) Tl d) both a and c

330. Configuration that does not denote a transition element
a) $3d^{1}\ 4s^{2}$ b) $3d^{10}\ 4s^{1}$ c) $3d^{10}\ 4s^{2}\ 4p^{2}$ d) $3d^{8}\ 4s^{2}$

331. Inert gas element which has a different valence shell configuration
a) Xe b) Ne c) Kr d) He

332. Which one of the following arrangements represents the correct order of electron gain enthalpy (with negative sign) of the given atomic species?
a) Cl < F < S < O b) O < S < F < Cl c) S < O < Cl < F d) F < Cl < O < S

333. Which of the following is true about the element $_{33}As$?
a) It is the 5th period element b) It is p-block element c) It belongs to 16th group
d) It is the member of VIA group

334. Which of the following order of atomic/ionic radius is not correct?
a) $I^- > I > I^+$ b) $Mg^{+2} > Na^+ > F^-$ c) $p^{5+} < p^{3+}$ d) Li > Be > B

335. IP_1 and IP_2 of Mg are 178 and 348 kcal $mole^{-1}$. The energy required for the reaction. $Mg \rightarrow Mg^{2+} + 2e^-$ is :
a) + 170 kcal/mol b) +526 kcal/mol c) -170 kcal/mol d) -526 kcal/mol

336. There are many elements in the periodic table which exhibit variable valency. This is a particular characteristic of:
a) representative elements b) transition elements c) noble gases d) non-metals.

337. K^+ and Cl^- ions are isoelectronic. Which of the statements is not correct?
a) Both K^+ and Cl^- ions contain 18 electrons.
b) Both K^+ and cl^- ions have same configuration.
c) K^+ ion is bigger than Cl^- ion in ionic size. d) Cl^- ion is bigger than K^+ ion in ionic size.

338. In which of the following orders the ionic radii is correctly represented?
a) $H^- > H^+ > H$ b) $Na^+ > F^- > O^{2-}$ c) $F^- > O^{2-} > Na^+$ d) None of these

339. The correct order of electron affinity of the elements of oxygen family in the periodic table is
a) O > S > Se b) S > O > Se c) S > Se > O d) Se > O > S

340. Arrange the isotopes of hydrogen in correct order of ionisation potential:
a) D = T = P b) D>T>P c) D < T < P d) D < T > P

341. Assertion: The atomic size generally increases across a period and decreases down the group.
Reason: Atomic size depends upon valence shell electronic configuration.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

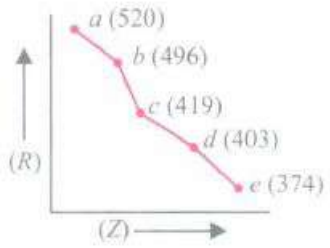
342. In which of the following options the order of arrangement does not agree with the variation of properties indicated against it?
a) B < C < N < 0 (increasing first ionisation enthalpy)
b) I < Br < Cl < F (increasing electron gain enthalpy)
c) Li < Na < K < Rb (increasing metallic radius)
d) $Al^{3+} < Mg^2 + < Na^+ < F^-$ (increasing ionic size)

343. Among the elements with atomic numbers 9, 12, 16 and 36 which is highly electropositive?
a) Element with atomic number 9 b) Element with atomic number 12
c) Element with atomic number 16 d) Element with atomic number 36

344. Which of the following represents correct order of electron affinity?
a) Cl > F > S > O b) F > O > S > Cl c) F > Cl > S > O d) Cl > S > O > F

345. Among chalcogens electron affinity is highest for
a) O b) S c) Se d) Te

346. In the given graph, a periodic property (R) is plotted against atomic numbers (Z) of the elements. Which property is shown in the graph andhow it is correlated with reactivity of the elements?



a) Ionisation enthalpy in a group, reactivity decreases from a -7 e.
b) Ionisation enthalpy in a group, reactivity increases from a -7 e.
c) Atomic radius in a group, reactivity decreases from a -7 e.
d) Metallic character in a group, reactivity increases from a -7 e.

347. First and second ionization enthalpies (in kJ/mol) of few elements are given below:

Element	IE_1	IE_2
(i)	520	980
(ii)	900	1760
(iii)	1680	3380
(iv)	2080	3963

Which of the above elements will form halides with formula MX_2?
a) (i) and (ii) b) (i) and (iii) c) (ii) and (iii) d) (i) and (iv)

348. The plot of $\sqrt{v}$ vs Z is
a) Straight line b) Exponential curve c) Hyperbolic d) Curve with -ve slope

349. Second ionisation potential of oxygen is:
a) Equal to that of fluorine b) Less than that of fluorine c) Greater than that of fluorine
d) Half of that of fluorine

350. The electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^4$ represents
a) Oxygen b) Magnesium c) Calcium d) Sulphur

351. In the periodic table, the elements are arranged in the periods following the
a) Hund's rule of maximum multiplicity b) Pauli's exclusion principle c) Aufbau principle
d) Both (1) and (2)

352. In general, the configuration of lanthanides is $(n - 2)f^{1-14}(n - 1)s^2p^6d^{0-1}ns^2$. It has been observed that, with increase in atomic number of lanthanides, there is a gradual decrease in ionic radii from La($1.22A^0$) to Lu($0.99A^0$). The reason for decrease in ionic radii is an increase in
a) Electronegative character b) Valency electrons and number of shells
c) Atomic and ionic volumes
d) Nuclear attraction for valence electrons leading to inward shrinking of shell

353. The amount of energy released when 10^6 atoms of iodine in vapour state are converted to I^- ions is 4.9×10^{-13} J. What is the electron affinity of iodine in eV per atom?
a) 2.0 b) 2.5 c) 2.75 d) 3.0

354. Astatine is a radioactive halogen. It is a solid at room temperature because
a) of greater van der Waal's force of attraction between large atoms of astatine
b) of less van der Waal's force of attraction between large atoms of astatine
c) of less van der Waal's force of attraction between small atoms of astatine
d) it shows non-metallic characters

355. Assertion: Boron can only form $[BF_4]^-$ whereas aluminium forms $[AlF_6]^{3-}$.
Reason:The first member of a group of elements in the s- and p- blocks shows anomalous behaviour.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

356. Ionic radius in a group while moving down?
a) remains same from top to bottom b) decreases from top to bottom
c) increases from top to bottom d) first increases and then decreases

357. In which of the following element +3 oxidation state is more stable than +5?
a) Pb b) Al c) Tl d) Bi

358. An element has atomic number 79. Predict the group and period in which the element is placed.
a) 2nd group, 7th period b) 11th group, 6th period c) 13th group, 6th period
d) 12th group, 6th period

359. Select correct statement(s) about radius of an atom
a)
values of van der Waal's radii are larger than those of covalent radii because the van der waal's forces are much weaker than the forces operating between atoms in covalently bonded molecule
b)
the metallic radii are smaller than the van der waal's radii, since the bonding forces in the metallic crystal lattice are much stronger than the vander waal's forces.
c) both are correct d) none is correct

360. The more basic oxide is
a) CaO b) MgO c) K_2O d) Na_2O

361. Metallic radius of Ca is 200 pm. Covalent radius of Ca is:
a) 200 pm b) 230 pm c) 280 pm d) 174 pm

362. Which one of the following ionic species has the greatest proton affinity to form stable compound?
a) NH_2^- b) F^- c) I^- d) HS^-

363. The characteristic properties of transition elements are due to
a) Unpaired electrons in d-sub shell b) d-orbitals have five fold degeneracy
c) Presence of 2 nodal planes for d-orbital d) Because they belong to d-block

364. To which group, an element with atomic number 88 will belong?
a) Group 12 b) Group 17 c) Group 10 d) Group 2

365. The ionization enthalpies of Li and Na are 520 kJ mol^{-1} and 495 kJ mol^{-l} respectively. The energy required to convert all the atoms present in 7 mg of Li vapours and 23 mg of sodium vapours of their respective gaseous cations respectively are
a) 52 J, 49.5 J b) 520 J, 495 J c) 49.5 J, 52 J d) 495 J, 520 J

366. Which of the following is true regarding inert pair effect
a) due to poor shielding of p orbital b) due to poor shielding of d & f orbital
c) due to poor shielding of s orbital d) due to poor shielding of s & p orbital

367. In the periodic table from left to right in a period, the atomic volume :
a) decreases b) increases c) remains same d) first decreases then increases

368. Assertion: On moving down the group, ionization enthalpy decreases.
Reason: With decrease in size of the atom, the force of attraction between the nucleus and valence electrons decreases.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

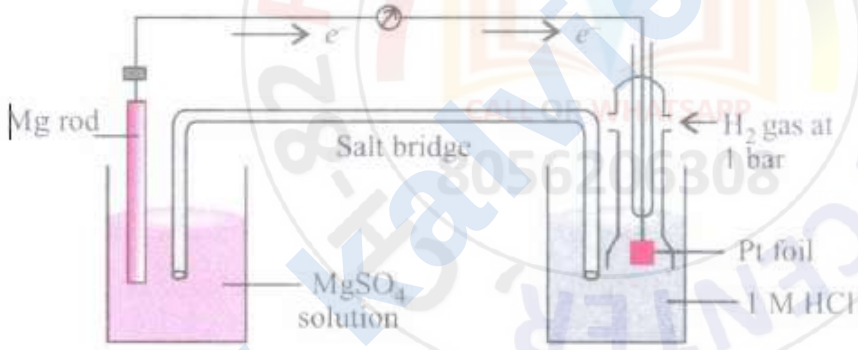
369. In which of the following arrangements, the order is correct according to the property indicated against it :
a) increasing IE_1 : Na< Al < Mg < Si b) increasing $I.E_1$: B < C < N < O
c) increasing size : Cu^{2+} < Cu < Cu^{+} d) increasing IE_1 : Li < Na < K < Rb

370. Arange Ce^{3+}, La^{3+}, Pm^{3+} and Yb^{3+} in increasing order of their size
a) Yb^{3+} < Pm^{3+} < Ce^{3+} < La^{3+} b) Ce^{3+}<Yb^{3+} < Pm^{3+}< La^{3+} c) Yb^{3+} < Pm^{3+} < La^{3+} < Ce^{3+}
d) Pm^{3+} < La^{3+} < ce^{3+} < Yb^{3+}

RAVI MATHS TUITION CENTRE , WHATSAPP - 8056206308

Time : 1 Mins **ELECTROCHEMISTRY 1** **Marks : 868**

1. The molar conductivity of a 0.5 mol/dm^3 solution of $AgNO_3$ with electrolytic conductivity of 5.76 X 10^{-3} S cm^{-1} at 298 K is :
   a) 2.88 S cm^2/mol b) 11.52 S cm^2/mol c) 0.086 S cm^2/mol d) 28.8 S cm^2/mol
2. A 5 current is passed through a solution of zinc sulphate for 40 min. The amount of zinc deposited at the cathode is :
   a) 40.65 g b) 0.4065 g c) 4.065 g d) 65.04 g
3. Units of the properties measured are given below. Which of the properties has not been matched correctly?
   a) Molar conductance = S m^2 mol^{-1} b) Cell Constant = ,m^{-1}
   c) Specific conductance = S m^2 d) Equivalent conductance = S m^2 (g eq)$^{-1}$
4. A cell is set up as shown in the figure. It is observed that EMF of the cell comes out to be 2.36 V. Which of the given statements is not correct about the cell?

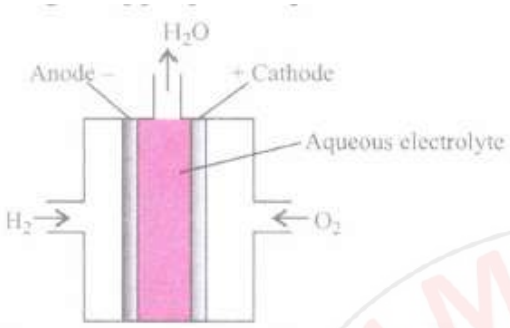


   a) Reduction takes place at magnesium electrode and oxidation at SHE.
   b) Oxidation takes place at magnesium electrode and reduction at SHE.
   c) Standard electrode potential for Mg^{2+} / Mg will be -2.36 V.
   d) Electrons flow from magnesium electrode to hydrogen electrode.
5. Given below are few reactions with some expressions. Mark the expression which is not correctly matched.
   For concentration cell, $Ag|Ag^+(C_1)||Ag^+(C_2)|Ag$;
   a) $E_{cell} = \frac{0.0591}{1} log \frac{C_1}{C_2}$
   For the cell, $2Ag^+ + H_2$ (l atm) $\rightarrow$ $2Ag + 2H^+$ (1 M) ;
   b) $E_{cell} = \frac{0.0591}{1} log \frac{[Ag^+]^2}{[H^+]^2}$
   For an electrochemical reaction, at equilibrium
   $aA + bB \overset{ne^-}{\rightleftharpoons} cC + dD$;
   c) $E_{cell} = \frac{0.0591}{1} log \frac{[C]^c[D]^d}{[A]^a[B]^b}$
   For the cell, $M^{n+}_{(aq)} + ne^- \rightarrow M_{(s)}$;
   d) $E = E^0 - \frac{0.0591}{1} log \frac{1}{[M^{n+}]}$

6. For the galvanic cell, $Cu|Cu^{2+}||Ag^{+}|Ag$. Which of the following observations is not correct?
   a) Cu acts as anode and Ag acts as cathode.
   b) Ag electrode loses mass and Cu electrode gains mass.
   c) Reaction at anode, $Cu \rightarrow Cu^{2+} + 2e^{-}$ d) Copper is more reactive than silver.

7. Following reactions are taking place in a Galvanic cell,
   $Zn \rightarrow Zn^{2+} + 2e^{-}$; $Ag^{+} + e^{-} \rightarrow Ag$
   Which of the given representations is the correct method of depicting the cell?
   a) $Zn_{(s)}|Zn^{2+}_{(aq)}||Ag^{+}_{(aq)}|Ag_{(s)}$ b) Zn^{2+} I Zn II Ag I Ag^{+} c) $Zn_{(aq)}$ I $Zn^{2+}_{(s)}$II $Ag^{+}_{(s)}$ I $Ag_{(aq)}$
   d) $Zn_{(s)}$ I $Ag^{+}_{(aq)}$ II $Zn^{2+}_{(aq)}$ I $Ag_{(s)}$

8. Study the given cell carefully and fill in the blanks by choosing an appropriate option.



In the given cell, hydrogen and oxygen are bubbled through porous _____$^{(i)}$_____ electrodes into concentrated aqueous _____$^{(ii)}$_____ solution. Catalysts like finely divided _____$^{(iii)}$_____ or _____$^{(iv)}$_____ metal are incorporated into the electrodes for increasing the rate of electrode reactions.

a)

(i)	(ii)	(iii)	(iv)
hydrogen	potassium hydroxide	palladium	platinum

b)

(i)	(ii)	(iii)	(iv)
oxygen	hydrogen chloride	manganese	iron

c)

(i)	(ii)	(iii)	(iv)
carbon	sodium hydroxide	platinum	palladium

d)

(i)	(ii)	(iii)	(iv)
graphite	sodium chloride	nickel	platinum

9. Use the data of and find out the most stable oxidised species.
   a) Cr^{3+} b) MnO_4^- c) $Cr_2O_7^{2-}$ d) Mn^{2+}

10. If $E^\circ Fe^{2+}/Fe = -0.441\ V$ and $E^\circ Fe^{3+}/Fe^{2+} = 0.771\ V$ the standard EMF of the reaction $Fe + 2Fe^{3+} \rightarrow 3Fe^{3+}$ will be
    a) 1.653V b) 1.212V c) 0.111V d) 0.330V

11. How much metal will be deposited when a current of 12 ampere with 75% efficiency is passed through the cell for 3 h? (Given: Z = 4 x 10^{-4})
    a) 32.4 g b) 38.8 g c) 36.0 g d) 22.4 g

12. **Assertion :** In electrolysis of aqueous NaCl the product obtained is H_2 gas.
    Reason: Gases are liberated faster than the metals.

a) If assertion is true but reason is false. b) If both assertion and reason are false.
c) If both assertion and reason are true and reason is the correct explanation of assertion.
d)
If both assertion and reason are true but reason is not the correct explanation of assertion.

13. **Assertion:** The conductivity of electrolytic solutions increases with increase of temperature.
Reason : Electronic conductance decreases with increase of temperature.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

14. E^o for the cell, $Zn\left|Zn^{2+}(ag)\right|\left|Cu^{2+}(ag)\right|Cu$ is 1.10 V at 25°C. The equilibrium constant for the reaction,
$Zn(s) + Cu^{2+}(aq) \rightleftharpoons Cu(s) + Zn^{2+}(aq)$ is of the order
a) 10^{-37} b) 10^{-28} c) 10^{18} d) 10^{17}

15. E^0 values for the half cell reactions are given below :
$Cu^{2+} + e^- \rightarrow Cu^+$; $E^0 = 0.15$ V
$Cu^{2+} + 2e^- \rightarrow Cu$; $E^0 = 0.34$ V
What will be the E^0 of the half -cell : $Cu^+ + e^- \rightarrow Cu$?
a) +0.49 V b) +0.19 V c) +0.53 V d) +0.30 V

16. During the electrolysis of molten sodium chloride, the time required to produce 0.10 mol of chlorine gas using a current of 3 amperes is :
a) 55 minutes b) 110 minutes c) 220 minutes d) 330 minutes

17. The e.m.f. of a Daniell cell at 298K is E1

$$Zn\left|\begin{matrix} ZnSO_4 & CuSO_4 \\ (0.01M) & (1.0M) \end{matrix}\right|Cu$$

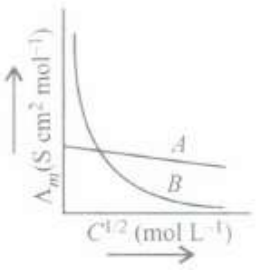
When the concentration of $ZnSO_4$ is 1.0M and that of $CuSO_4$ is 0.01 M, the e.m.f. changed to E_2. What is the relationship between E_1 and E_2?
a) $E_2 = 0 \neq E_1$ b) $E_1 > E_2$ c) $E_1 < E_2$ d) $E_1 = E_2$

18. The correct Nernst equation for the given cell $Pt_{(s)}$ I $Br_{2(l)}$ I Br^- (M) II H^+ (M) I $H_{2(g)}$ (1 bar) I $Pt_{(s)}$

a) $E_{cell} = E^0_{cell} - \frac{0.0591}{2} log \frac{[Br_{2(l)}][H_2]}{[H^+]^2[Br^-]^2}$ b) $E_{cell} = E^0_{cell} - \frac{0.0591}{2} log \frac{[H^+]^2[Br^-]^2}{[Br_{2(l)}][H_2]}$

c) $E_{cell} = E^0_{cell} - \frac{0.0591}{2} log \frac{[H^+]^2[H_2]}{[Br_{2(l)}][Br^-]^2}$ d) $E_{cell} = E^0_{cell} - \frac{0.0591}{2} log \frac{[Br_{2(l)}][Br^-]^2}{[H^+]^2[H_2]}$

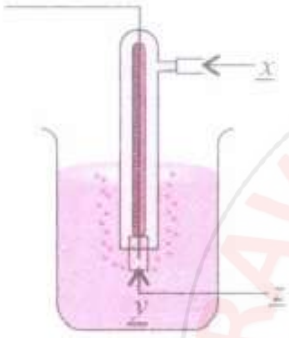
19. Mark the correct choice of electrolytes represented in the graph



a) A → NH_4OH, B → NaCl b) A → NH_4OH, B → NH_4Cl
c) A → CH_3COOH, B → CH_3COONa d) A → KCl, B → NH_4OH

20. The equivalent conductance of M/32 solution of a weak monobasic acid is 8.0 mho cm^2 and at infinite dilution is 400 mho cm^2. The dissociation constant of this acid is:
a) 1.25×10^{-6} b) 6.25×10^{-4} c) 1.25×10^{-4} d) 1.25×10^{-5}

21. Observe the given diagram and fill in the blanks by choosing the correct option.



a)

x	y	z
$H_{2(g)}$ at 1 atm	$10^{-2}MH^+$	Finely divided Pt

b)

x	y	z
$H_{2(g)}$ at 1 bar	$1.00MH^+$	Finely divided Pt

c)

x	y	z
1.00M H^+	$H_{2(g)}$ at 1 bar	Finely divided Ni

d)

x	y	z
$H_{2(g)}$ at 1 bar	1.00M H^+	Pt granules

22. $Cu^+_{(aq)}$ is unstable in solution and undergoes simultaneous oxidation and reduction according to the reaction :
$2Cu^+_{(aq)} \rightleftharpoons Cu^{2+}_{(aq)} + Cu_{(s)}$
Choose the correct E^0 for above reaction if E^0cu^{2+}/cu = 0.34 V and E^0cu^{2+}/cu^+= 0.15 V
a) - 0.38 V b) - 0.49 V c) 0.38 V d) - 0.19 V

23. A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wire at one atm pressure. The oxidation potential of electrode would be?
a) 0.59 V b) 0.118 V c) 1.18 V d) 0.059 V

24. Molar conductivity of 0.15 M solution of KCl at 298 K, if its conductivity is 0.0152 S cm^{-1} will be
a) 124 Ω^{-1} cm^2 mol^{-1} b) 204 Ω^{-1} cm^2 mol^{-1} c) 101 Ω^{-1} cm^2 mol^{-1} d) 300 Ω^{-1} cm^2 mol^{-1}

25. Reduction potential for the following half-cell reactions are :
$Zn \longrightarrow Zn^{2+} + 2e^-$, ($E^0$ = - 0.76 V)
$Fe \longrightarrow Fe^{2+} + 2e^-$, ($E^0_{Fe2+/Fe}$ = -0,44 V) The EMF for the cell reaction :
a) + 0.32 V b) - 0.32 V c) + 1.20 V d) -1.20 V

26. Limiting molar conductivity of NH_4OH (i.e., Åm (NH_4OH) is equal to :

a) $\AA_{m(NH_4Cl)} + \AA_{m(NaCl)} - \AA_{m(NaOH)}$ b) $\AA_{m(NaOH)} + \AA_{m(NaCl)} - \AA_{m(NH_4Cl)}$

c) $\AA_{m(NH_4OH)} + \AA_{m(NH_4Cl)} - \AA_{m(HCl)}$ d) $\AA_{m(NH_4Cl)} + \AA_{m(NaOH)} - \AA_{m(NaCl)}$

27. Galvanic cell has electrical potential of 1.1 V. If an opposing potential of 1.1 V is applied to this cell, what will happen to the cell reaction and current flowing through the cell?
a) The reaction stops and no current flows through the cell
b) The reaction continuous but current flows in opposite direction.
c) The concentration of reactants becomes unity and current flows from cathode to anode.
d) The cell does not function as a galvanic cell and zinc is deposited on zinc plate

28. **Assertion:** Lithium has the lowest electrode potential.
Reason : Lithium ion is the strongest oxidising agent.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

29. The position of some metals in the electrochemical series in decreasing electropositive character is given as Mg > Al > Zn > Cu > Ag. What will happen if a copper spoon is used to stir a solution of aluminium nitrate?
a) The spoon will get coated with aluminium.
b) An alloy of copper and aluminium is formed. c) The solution becomes blue.
d) There is no reaction.

30. If the E^0_{cell} for a given reaction has a negative value, which of the following gives the correct relationships for the values of ΔG^0 and K_{eq}?
a) $\Delta G^0 > 0, K_{eq} < 1$ b) $\Delta G^0 > 0, K_{eq} > 1$ c) $\Delta G^0 < 0, K_{eq} > 1$ d) $\Delta G^0 < 0, K_{eq} < 1$

31. Two solutions of X and Y electrolytes are taken in two beakers and diluted by adding 500 mL of water. A_m of X increases by 1.5 times while that of Y increases by 20 times, what could be the electrolytes X and Y?
a) X → NaCl, Y → KCl b) X → NaCl, Y → CH3COOH c) X → KOH, Y → NaOH
d) X → CH3COOH, Y → NaCl

32. In the cell, $Zn|Zn^{2+}||Cu^{2+}|$ Cu, the negative terminal is
a) Cu b) Cu^{2+} c) Zn d) Zn^{2+}

33. The number of faradays (F) required to produced 20g of calcium from molten $CaCl_2$ (Atomic Mass of Ca = 40g mol^{-1}) is
a) 4 b) 1 c) 2 d) 3

34. Limiting molar conductivity of NaBr is:
a) $\Lambda^0_m NaBr = \Lambda^0_m NaCl + \Lambda^0_m KBr$ b) $\Lambda^0_m NaBr = \Lambda^0_m NaCl + \Lambda^0_m KBr - \Lambda^0_m KCl$
c) $\Lambda^0_m NaBr = \Lambda^0_m NaOH + \Lambda^0_m NaBr\ \Lambda^0_m NaCl$ d) $\Lambda^0_m NaBr = \Lambda^0_m NaCl - \Lambda^0_m NaBr$

35. A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wire at 1 atm pressure. The oxidation potential of electrode would be :
a) 0.118 V b) 1.18 V c) 0.059 V d) 0.59 V

36. Which of the following expressions correctly represents the equivalent conductance at infinite dilution of $Al_2(SO_4)_3$. Given that $\overset{\circ}{\Lambda}Al^{3+}$ and $\Lambda_{SO_4^{2-}}$ are the equivalent conductances at infinite dilution of the respective ions?

a) $\frac{1}{3}\Lambda Al^{3+} + \frac{1}{3}\Lambda SO_4^{2}$ b) $2\Lambda Al^{3+} + 3\Lambda SO_4^{2-}$ c) $\overset{0}{\Lambda}Al^{3+} + \Lambda SO_4^{2-}$

d) $\left(\overset{o}{\Lambda}Al^{3+} + \Lambda SO_4^{2-} \right) > 6$

37. The weight of silver (atomic weight = 108), displaced by a quantity of electricity which displaces 5600 mL of O_2 at STP will be :
a) 5.4 g b) 10.8 g c) 54.0 g d) 108.0 g

38. Choose the option with correct words to fill in the blanks.
According to preferential discharge theory, out of number of ions the one which requires _____ energy will be liberated _____at a given electrode.
a) least, first b) least, last c) highest, first d) highest, last

39. In a Daniell cell,
a) the chemical energy liberated during the redox reaction is converted to electrical energy
b) the electrical energy of the cell is converted to chemical energy
c) the energy of the cell is utilised in conduction of the redox reaction
d) the potential energy of the cell is converted into electrical energy.

40. If a current of 1.5 ampere flows through a metallic wire for 3 hours, then how many electrons would flow through the wire?
a) 2.25 x 10^{22} electrons b) 1.13 x 10^{23} electrons c) 1.01 x 10^{23} electrons
d) 4.5 x 10^{23} electrons

41. Equivalent conductance of NaCl, HCl and C_2H_5COONa at infinite dilution are 126.45, 426.16 and 91 Ω^{-1} cm^2, respectively. The equivalent conductance of C_2H_5COOH is :
a) 201.28 Ω^{-1} cm^2 b) 390.71 Ω^{-1} cm^2 c) 698.28 Ω^{-1} cm^2 d) 540.48 Ω^{-1} cm^2

42. How much electricity in terms of Faraday is required to produce 100 g of Ca from molten $CaCl_2$?
a) 1 F b) 2 F c) 3 F d) 5 F

43. Which of the following statements is correct?
a) E_{cell} and D_rG of cell reaction both are extensive properties.
b) E_{cell} and D_rG of cell reaction both are intensive properties.
c) E_{cell} is an intensive property while D_rG of cell reaction is an extensive property.
d) E_{cell} is an extensive property while D_rG of cell reaction is an intensive property.

44. The standard reduction potential for Cu^{2+}/Cu is +0.34 V What will be the reduction potential at pH = 14? [Given: K_{sp} of $Cu(OH)_2$ is 1.0 x 10^{-19}]
a) 2.2 V b) 3.4 V c) -0.22 V d) -2.2 V

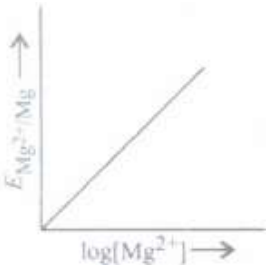
45. Limiting molar conductivity for some ions is given below (in S cm2 mol ") :
Na^+ - 50.1, Cl^- 76.3, H^+ - 349.6, CH_3COO^- - 40.9, Ca^{2+} - 119.0.
What will be the limiting molar conductivities of $CaCl_2$, CH_3COONa and NaCl respectively?

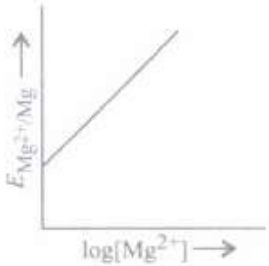
a) 97.65, 111.0 and 242.8 S cm^2 mol^{-1} b) 195.3,182.0 and 26.2 S cm^2 mol^{-1}
c) 271.6,91.0 and 126.4 S cm^2 mol^{-1} d) 119.0, 1024.5 and 9.2 S cm^2 mol^{-1}

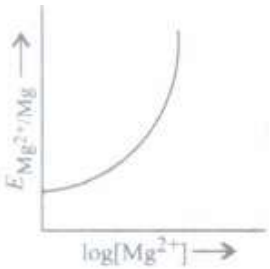
46. Electrode potential for Mg electrode varies according to the equation

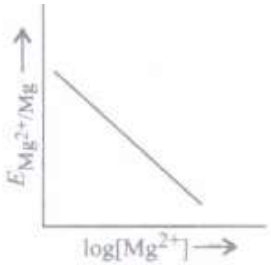
$$E_{Mg^{2+}|Mg} = E^{o}_{Mg^{2+}|Mg} - \frac{0.059}{2}\log\frac{1}{[Mg^{2+}]}$$

The graph of $E_{Mg^{2+}|Mg} vs \log[Mg^{2+}] is$

a) 

b) 

c) 

d) 

47. Without losing its concentration $ZnCl_2$ solution cannot be kept in contact with
a) Au b) Al c) pb d) Ag

48. The EMF of a cell corresponding to the reaction;
$Zn_{(s)} + 2H^+_{(aq)} \rightarrow Zn^{2+}$ (0.1M) $+H_{2(g)}$(1atm) is 0.28 volt at 15^0C
The pH of the solution at the hydrogen electrode is
(Given $E^0_{Zn^{2+}/Zn} = -0.76$ volt; $E^0_{H^+/H_2}$ = 0 volt)
a) 7.05 b) 8.62 c) 8.75 d) 9.57

49. Which of the following statements is not correct about an inert electrode in a cell?
a) It does not participate in the cell reaction.
b) It provides surface either for oxidation or for reduction reaction.
c) It provides surface for conduction of electrons. d) It provides surface for redox reaction.

50. NaCl, $MgCl_2$ and $CaSO_4$ are known as
The variation in A_m with concentration for a strong electrolyte can be represented by the equation,

$$A_m = A^0_m - AC^{1/2}$$

The value of constant A for a given solvent and temperature depends upon the type of electrolyte i.e., cations and anions produced on dissociation of electrolyte in the solution.
a) 1 - 1, 2 - 1, and 2 - 2 type electrolytes respectively
b) strong, weak and strong electrolytes respectively c) electrolytes with different value of A
d) electrolytes with same molar conductivity.

51. **Assertion :** In electrolysis, the quantity of electricity needed for depositing 1 mole of silver is different from that required for 1 mole of copper.
Reason: The molecular weights of silver and copper are different.

a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

52. For the reaction, $Cu^{2+} + 2e^- \rightarrow Cu$; log[$Cu^{2+}$] vs E graph is of type as shown in figure where OA = 0.34 V, the electrode potential of the half-cell of
Cu|Cu^{2+}(0.1 M) will be
a) $-0.34 + \frac{0.0591}{2} V$ b) 0.34 + 0.0591 V c) 0.34 V d) none of these

53. Use the data given in and find out which of the following is the strongest oxidising agent.
$E^0_{Cr_2^{2-}/Cr^{3+}} = 1.33V; E^0_{Cl2/Cl^-} = 1.36V$
$E^0_{MnO_4^-/Mn^{2+}} = 1.51V; E^0_{Cr^{3+}/cr} = -0.74V$
a) Cl^- b) Mn^{2+} c) MnO_4^- d) Cr^{3+}

54. **Assertion:** The electrical resistance of any object decreases with increase in its length.
Reason: Electrical resistance of any object increases with increase in its area of cross-section.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

55. While charging the lead storage battery_____.
a) $PbSO_4$ anode is reduced to Pb b) $PbSO_4$ cathode is reduced to Pb
c) $PbSO_4$ cathode is oxidised to Pb d) $PbSO_4$ anode is oxidised to PbO_2

56. Assertion: EMF of the cell is the potential difference between the electrode potentials of the cathode and anode when no current is drawn through the cell.
Reason : Anode is kept on the right side and cathode on the left side while representing the galvanic cell.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

57. Match the column I with column II and mark the appropriate choice.

	Column - I		**Column - II**
(A)	Electrochemical equivalent	(i)	Potential difference x Quantity of charge
(B)	Faraday	(ii)	Mass of substance deposited by one coulomb of charge
(C)	Ampere	(iii)	Charge carried by one mole of electrons
(D)	Electrical energy	(iv)	One coulomb of electric charge passed through one second

a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)
b) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)
c) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)
d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

58. In a cell reaction, $Cu_{(s)} + Ag^{+}_{(aq)} \rightarrow Cu^{2+}_{(aq)} + 2Ag_{(s)}$ E^{0}_{cell} = +0.46 V. If the concentration of Cu^{2+} ions is doubled then E^{0}_{cell} will be:
a) doubled b) halved c) increased by four times d) unchanged

59. The specific conductance of a saturated solution of AgCl at 25°C is 1.821 x 10^{-5} mho cm^{-1} . What is the solubility of AgCl in water (in g L^{-1}), if limiting molar conductivity of AgCl is 130.26 mho cm^2 mol^{-1}?
a) 1.89 x 10^{-3} g L^{-1} b) 2.78 x 10^{-2} g L^{-1} c) 2.004 x 10^{-2} g L^{-1} d) 1.43 x 10^{-3} g L^{-1}

60. In electrolysis of NaCl when Pt electrode is taken then H_2 is liberated at cathode while with Hg cathode it forms sodium amalgam. This is because:
a) Hg is more inert than Pt b) More voltage is required to reduce H^+ at Hg than at Pt
c) Na is dissolved in Hg while it does not dissolved in Pt
d) Conc. of H^+ ions is larger when Pt electrode is taken

61. The quantity of charge required to obtain one mole of aluminium from Al_2O_3 is_____
a) 1 F b) 6 F c) 3 F d) 2 F

62. The efficiency of a fuel cell is given by :
a) ΔG/ΔS b) ΔG/ΔH c) ΔS/ΔG d) ΔH/ΔG

63. Molar conductivities $\left(\Lambda^{\circ}_{m}\right)$ at infinite dilution of NaCl, HCl and CH_3COONa are 126.4, 425.9 and 91.0 S cm^2 mol^{-1} respectively. Λ°_{m} for CH_3COOH will be:
a) 425.5 S cm^2 mol^{-1} b) 180.5 S cm^2 mol^{-1} c) 290.8 S cm^2 mol^{-1} d) 390.5 S cm^2 mol^{-1}

64. Reduction potential for the following half-cell reactions are
$Zn \rightarrow Zn^{2+} + 2e^{-}$
$\left(E^{\circ}_{Zn^{2+}/Zn} = -0.76\ V\right)$
$Fe \rightarrow Fe^{2+} + 2e^{-}, \left(E^{\circ}Fe^{2+}/Fe = -0.44\ V\right)$
The EMF for the cell reaction,
$Fe^{2+} + Zn \rightarrow Zn^{2+} + Fe$ will be
a) +0.32 V b) -0.32 V c) +1.20 V d) -1.20 V

65. The difference between the electrode potentials of two electrodes when no current is drawn through the cell is called _____.
a) cell potential b) cell emf c) potential difference d) cell voltage

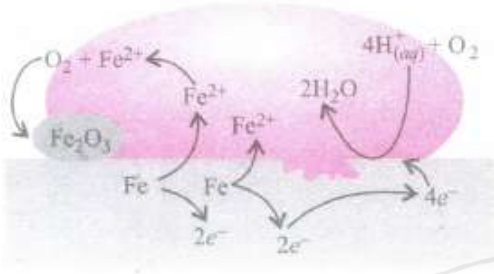
66. An electrochemical cell is shown below Pt, H_2 (1 atm) HCl (0.1)ml CH_3COH (0.1 m)1 H_2(1 atm), ft. The EMF of the cell will not be zero, because:
a) EMF depends on molanties of acids used
b) pH of 0.1 m HCl and 0.1 m CH_3COOH is not same c) the temperature is constant
d) acids used in two compartments are diflerent

67. The equivalent conductance of Ba^{2+} and Cl^- are 127 and 76 Ω^{-1} cm^{-1} eq^{-1} respectively at infinite dilution. The equivalent conductance of $BaCl_2$ at infinite dilution will be:
a) 139.52 b) 203 c) 279 d) 101.5

68. On the basis of the following E^0 values, the strongest oxidising agent is :
$[Fe(CN)_6]^{4-} \longrightarrow [Fe(CN)_6]^{3-} + e^-$, $E^0 = -0.35$ V
$Fe^{2+} \longrightarrow Fe^{3+} + e^-$, $E^0 = -0.77$ V
a) $[Fe(CN)_6]^{4+}$ b) Fe^{2+} c) Fe^{3+} d) $[Fe(CN)_6]^{3-}$

69. An increase in equivalent conductance of a strong electrolyte with dilution is mainly due to :
a) increase in ionic mobility of ions b) 100% ionisation of electrolye at normal dilution
c) increase in both i.e. number of ions and ionic mobility of ions
d) increase in number of ions

70. The given figure shows the corrosion of iron in atmosphere



Fill in the blanks by choosing an appropriate option.

At a particular spot of an object made of iron, $\underset{(i)}{\_\_\_\_\_}$ of iron to ferrous ion takes place and that spot behaves as $\underset{(ii)}{\_\_\_\_\_}$. Electrons released at anodic spot move through the metal and go to another spot on the metal and reduce oxygen in presence of H+. This spot behaves as $\underset{(iii)}{\_\_\_\_\_}$. The ferrous ions are further oxidised by atmospheric oxygen to ferric ions which come out as rust, $\underset{(iv)}{\_\_\_\_\_}$ and with further production of $\underset{(v)}{\_\_\_\_\_}$ ions.

a)

(i)	(ii)	(iii)	(iv)	(v)
oxidation	anode	cathode	$Fe_2O_3.xH_2O$	hydrogen

b)

(i)	(ii)	(iii)	(iv)	(v)
reduction	cathode	anode	Fe_3O_4	hydroxide

c)

(i)	(ii)	(iii)	(iv)	(v)
oxidation	cathode	anode	$Fe_2O_3.xH_2O$	hydrogen

d)

(i)	(ii)	(iii)	(iv)	(v)
oxidation	anode	cathode	$Fe_2O_3.H_2O$	ferrous

71. For the cell reaction,

$$Cu^{2+}\left(C_1, aq\right) + Zn(s) \rightleftharpoons Zn^{2+}\left(C_2, aq\right) + Cu(s)$$

of an electrochemical cell, the change in free energy (G) at a given temperature is a function of
a) $\ln(C_1)$ b) $\ln(C_2/C_1)$ c) $\ln(C_2)$ d) $\ln(C_2+C_1)$

72. A current of 1.40 ampere is passed through 500 mL of 0.150 M solution of zinc sulphate for 200 seconds. What will be the molarity of Zn^{2+} ions after deposition of zinc?
a) 0.154 M b) 0.177 M c) 2 M d) 0.180 M

73. Standard electron potential of three metals X, Y and Z are -1.2 V + 0.5 V and -3.0 V respectively. The reducing power of these metals will be :
a) Y > X > Z b) Z > X > Y c) X > Y > Z d) Y > Z > X

74. A standard hydrogen electrode has a zero potential because

a) hydrogen can be most easily oxidised b) hydrogen has only one electron
c) the electrode potential is assumed to be zero d) hydrogen is the lightest element.

75. Same amount of electric current is passed through the solutions of $AgNO_3$ and HC!. If LOS g of silver is obtained from $AgNO_3$ solution, the amount of hydrogen liberated at STP will be
a) 1.008 g b) 11.2 g c) 0.01 g d) 1.1 g

76. Standard electrode potential for Sn^{4+}/Sn^{2+} couple is +0.15 V and that for the Cr^{3+}/Cr couple is - 0.74. These two couples in their standard state are connected to make a cell. The cell potential will be :
a) + 0.89 V b) + 0.18 V c) + 1.83 V d) + 1.199 V

77. A button cell used in watches functions as following
$Zn_{(s)} + Ag_2O_{(s)} + H_2O_{(l)} \rightleftharpoons 2\,Ag_{(s)} + Zn^{2+}_{(aq)} + 20H^-_{(aq)}$
If half-cell potentials are :
$Zn^{2+}_{(aq)} + 2e^- \longrightarrow Zn_{(s)}$, $E^0 = -0.76$ V
$Ag_2O_{(s)} + H_2O_{(l)} + 2e^- \longrightarrow 2Ag_{(s)} + 2OH^-_{(aq)}$, $E^0 = 0.34$ V
The cell potential will be :
a) 1.10 V b) 0.42 V c) 0.84 V d) 1.34 V

78. Which of the following is not an application of electrochemical series?
a) To compare the relative oxidising and reducing power of substances.
b) To predict evolution of hydrogen gas on reaction of metal with acid.
c) To predict spontaneity of a redox reaction
d) To calculate the amount of metal deposited on cathode.

79. The amount of chlorine evolved by passing 2 A of current in an aqueous solution of NaCl for 30 minutes is:
a) 2.64 g b) 1.32 g c) 3.62 g d) 4.22 g

80. The cell constant of a conductivity cell_____
a) changes with change of electrolyte
b) changes with change of concentration of electrolyte
c) changes with temperature of electrolyte d) remains constant for a cell

81. An electric charge of 5 Faradays is passed through three electrolytes $AgNO_3$, $CuSO_4$ and $FeCl_3$ solution. The grams of each metal liberated at cathode will be:
a) Ag = 10.8 g, Cu = 12.7 g, Fe = l.11 g b) Ag = 540 g, Cu = 367.5 g, Fe = 325 g
c) Ag = 108 g, Cu = 63.5 g, Fe = 56 g d) Ag = 540 g, Cu = 158.8 g, Fe = 93.3 g

82. 4.5 g of aluminium (atomic mass 27u) is deposited at cathode from Al^{3+} solutions by a certain quantity of electric charge. The volume of hydrogen produced at STP from H^+ ions in solution by the same quantity of electric charge will be :
a) 44.8 L b) 22.4 L c) 11.2 L d) 5.6 L

83. What would be the equivalent conductivity of a cell in which 0.5 N salt solution offers a resistance of 40 ohm whose electrodes are 2 em apart and 5 cm^2 in area?
a) 10 $ohm^{-1}\ cm^{-2}\ eq^{-1}$ b) 20 $ohm^{-1}\ cm^{-2}\ eq^{-1}$ c) 30 $ohm^{-1}\ cm^{-2}\ eq^{-1}$
d) 25 $ohm^{-1}\ cm^{-2}\ eq^{-1}$

84. At 25^0C molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 $\Omega^{-1}\ cm^2\ mol^{-1}$ and at infinite dilution, its molar conductance is 238 $\Omega^{-1}\ cm^2\ mol^{-1}$. The degree of ionisation of ammonium hydroxide at the same concentration and temperature is :

a) 2.080 % b) 20.800 % c) 4.008 % d) 40.800 %

85. When water is added to an aqueous solution of an electrolyte, what is the change in specific conductivity of the electrolyte?
a) Conductivity decreases b) Conductivity increases c) Conductivity remains same
d) Conductivity does not depend on number of ions.

86. For the cell reaction $2Cu^{+}_{(aq)} \rightarrow Cu_{(s)} + Cu^{2+}_{(aq)}$ the standard cell potential is 0.36 V The equilibrium constant for the reaction is
a) 1.2 x 10^6 b) 7.4 x 10^{12} c) 2.4 x 10^6 d) 5.5 x 10^8

87. The weight of silver (at wt = 108) displaced by a quantity of electricity which displaces 5600 mL of O_2, at STP will be:
a) 5.4 g b) 10.8 g c) 54.9g d) 108.0 g

88. Ionic mobility of which of the following alkali metals ions is lowest when aqueous solution of their salts are put under an electric field:
a) K b) Rb c) Li d) Na

89. Aqueous solution of which of the following compounds is the best conductor of electric current?
a) Acetic acid, $C_2H_4O_2$ b) Hydrochloric acid, HCl c) Ammonia, NH_3
d) Fructose, $C_6H_{12}O_6$

90. Standard electrode potentials are : Fe^{+2}/Fe
$\left[E^\circ = -0.44\right]; Fe^{+3}/Fe^{+2} E^\circ = +0.77;$ if Fe^{2+}, Fe^{3+} and Fe blocks are kept together, then:
a) Fe^{2+} increases b) Fe^{3+} decreases c) $\frac{Fe^{+2}}{Fe^{+3}}$ remains unchanged d) Fe^{+2} decreases

91. Consider the half-cell reduction reaction:
$Mn^{2+} + 2e^- \rightarrow Mn, E^\circ = -1.18$ V
$Mn^{2+} \rightarrow Mn^{3+} + e^-, E^\circ = -1.51$ V
The E° for the reaction $3Mn^{2+} \rightarrow Mn^\circ + 2Mn^{3+}$, and possibility of the forward reaction are, respectively
a) -2.69 V and no b) -4.18 V and yes c) +0.33 V and yes d) +2.69 V and no

92. Electrode potential data of few cells is given below. Based on the data, arrange the ions in increasing order of their reducing power.
$Fe^{3+}_{(aq)} + e^- \rightarrow Fe^{2+}_{(aq)}$; E^0 = +0.77V
$Al^{3+}_{(aq)} + 3e^- \rightarrow Al_{(s)}$; E^0 = -1.66V
$Br_{2(aq)} + 2e^- \rightarrow 2Br^-_{(aq)}$; E^0 = +1.09 V
a) $Br^- < Fe^{2+} < Al$ b) $Fe^{2+} < Al < Br^-$ c) $Al < Br^- < Fe^{2+}$ d) $Al < Fe^{2+} < Br^-$

93. When 0.1 mol MnO_4^{2-} is oxidized the quantity of electricity required to completely oxidize MnO_4^{2-} to MnO_4^- is :
a) 96500 C b) 2 x 96500C c) 9650 C d) 96.50 C

94. The equilibrium constant of the reaction:
$Cu_{(s)} + 2Ag^{+}_{(aq)} \rightarrow Cu^{2+}_{(aq)} + 2Ag_{(s)}$:
$E^{\circ} = 0.46$ V it 298 K is
a) 2.0×10^{10} b) 4.0×10^{10} c) 4.0×10^{15} d) 2.4×10^{10}

95. A solution contains Fe^{2+}, Fe^{3+} and I ions. This solution was treated with iodine at 35°C. Eo for Fe^{3+}/Fe^{2+} is +0.77V and, E° for 0 $I_2/2I^{-} = 0.536$ V.1. The favourable redox reaction is:
a) I_2 will be reduced to I^- b) There will be no redox reaction c) I^- will be oxidised to I_2
d) Fe^{2+} will be oxidised io F^{3+}

96. **Assertion :** Kohlrausch law helps to find the molar conductivity of weak electrolyte at infinite dilution.
Reason : Molar conductivity of a weak electrolyte at infinite dilution cannot be determined experimentally.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

97. At 25°C, Nernst equation is
a) $E_{cell} = E^0_{cell} - \frac{0.0591}{n} log \frac{[ion]_{RHS}}{[ion]_{LHS}}$ b) $E_{cell} = E^0_{cell} - \frac{0.0591}{n} log \frac{[M]_{RHS}}{[M]_{LHS}}$ c) $E_{cell} = E^0_{cell} + \frac{0.0591}{n} log \frac{[ion]_{RHS}}{[ion]_{LHS}}$
d) $E_{cell} = E^0_{cell} + \frac{0.0591}{n} log \frac{[ion]_{LHS}}{[ion]_{RHS}}$

98. A compound is formed by cation C and anion A. The anions form hexagonal close packed (hcp) lattice and the cations occupy 75% of octahedral voids. The formula of the compound is
a) C_3A_2 b) C_3A_4 c) C_4A_3 d) C_2A_3

99. How long would it take to deposit 50 g of Al from an electrolytic cell containing Al_2O_3 using a current of 105 ampere?
a) 1.54 h b) 1.42 h c) 1.32 h d) 2.15 h

100. In the silver plating of copper, $K[Ag(CN)_2]$ is used instead of $AgNO_3$. The reason is:
a) A thin layer of Ag is formed on Cu b) more voltage is required
c) Ag^+ ions are completely removed from solution
d) Less availability of Ag^+ ions, as Cu cannot displace Ag from $[Ag(CN)_2]^-$ ion

101. For the cell prepared from electrodes A and B;
Electrode A; $Cr_2O_7^{-2} | Cr^{3+}, E^0_{red} = 1.33V$
Electrode B; $Fe^{3+} | Fe^{2+}, E^0_{red} = 0.77V$
Which of the following statements is correct?
a) The electrons will flow from B to A when connections are made.
b) The standard EMF of the cell will be 0.56 V. c) A will be a positive electrode.
d) All of these.

102. The overall reaction of a hydrogen-oxygen fuel cell is
a) $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$ b) $2H_{2(g)} + 4OH^-_{(aq)} \rightarrow 4H_2O_{(l)} + 4e^-$
c) $O_{2(g)} + 2H_2O_{(l)} + 4e^- \rightarrow 4OH^-_{(aq)}$ d) $4OH^-_{(aq)} + 4e^- \rightarrow 2H_2O_{(l)}$

103. What will be the reduction potential for the following half-cell reaction at 298 K?

(Given: $[Ag^+]$ = 0.1 M and E^0_{cell} = + 0.80 V)

a) 0.741 V b) 0.80 V c) -0.80 V d) -0.741 V

104. A weak monobasic acid is 5% dissociated in 0.01 mol dm^{-3} solution. Limiting molar conductivity of acid at infinite dilution is 4 x 10^{-2} ohm $^{-l}$ m 2mol $^{-1}$. What will be the conductivity of 0.05 mol dm-3 solution of the acid?

a) 8.94 x 10^{-6} ohm^{-1} cm^2 mol^{-1} b) 8.92 x 10^{-4} ohm^{-1} cm^2 mol^{-1}

c) 4.46 x 10^{-6} ohm^{-1} cm^2 mol^{-1} d) 2.23 x 10^{-5} ohm^{-1} cm^2 mol^{-1}

105. Match the column I with column II and mark the appropriate choice

	Column - I		Column -II
(A)	$Pb_{(s)} + SO^{2-}_{4(aq)} \rightarrow PbSO_{4(s)} + 2e^-$	(i)	Rusting of iron
(B)	$2SO^{2-}_{4(aq)} \rightarrow S_2O^{2-}_{8(aq)} + 2e^-$	(ii)	Reaction at anode in lead storage battery
(C)	$2H_{2(g)} + 40H^-_{(aq)} \rightarrow 4H_2O_{(l)} + 4e^-$	(iii)	Electrolysis of concentrated H_2SO_4
(D)	$2Fe_{(s)} + O_{2(g)} + 4H^+_{(aq)} \rightarrow 2Fe^{2+}_{(aq)} + 2H_2O_{(l)}$	(iv)	Reaction at anode in fuel cell

a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)

b) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)

c) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

106. The equilibrium constant of the reaction, $Cu_{(s)} + 2Ag^+_{(aq)} \longrightarrow Cu^{2+}_{(aq)} + 2Ag_{(s)}$, E^0 = 0.46 V at 298 K is :

a) 2.0 x 10^{10} b) 4.0 x 10^{10} c) 4.0 x 10^{15} d) 2.4 x 10^{10}

107. **Assertion:** In mercury cell, the cell potential is approximately 1.35 V and remains constant during its life.

Reason : The overall reaction in mercury cell is represented as $Zn(Hg) + HgO_{(s)} \rightarrow ZnO_{(s)} + Hg_{(l)}$

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

108. The standard EMF of a galvanic cell involving cell reaction with n =2 is found to be 0.295 V at 25^0C. The equilibrium constant of the reaction would be: (Given F = 96500 C mol^{-1}, R = 8.34 JK^{-1} mol^{-1})

a) 2.0 x 10^{11} b) 4.0 x 10^{12} c) 1.0 x 10^2 d) 1.0 X 10^{10}

109. Which cell will measure standard electrode potential of copper electrode?$Pt_{(s)}|$ H_2 (g.0.1 bar)H^+ (aq.,1M)||Cu^{2+}(aq.,1M)| Cu

a) $Pt_{(s)}|$ H_2 (g.1 bar)H^+ (aq.,1M)||Cu^{2+}(aq.,1M)|Cu

b) $Pt_{(s)}|$ H_2 (g.1 bar)H^+ (aq.,0.1M)||Cu^{2+}(aq.,1M)|Cu

c) $Pt_{(s)}|$ H_2 (g.0.1 bar)H^+ (aq.,1M)||Cu^{2+}(aq.,1M)| Cu

d) $Pt_{(s)}|$ H_2 (g.1 bar)H^+ (aq.,1M)||Cu^{2+}(aq.,2M)|Cu

110. The molar conductivity is maximum for the solution of concentration

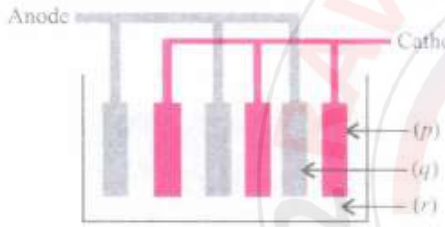
a) 0.004 M b) 0.002 M c) 0.005 M d) 0.001 M

111. **Assertion:** Molar conductivity increases with decrease in concentration.
Reason: Conductivity always decreases with decrease in concentration.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

112. Which of the statements about solutions of electrolytes is not correct?
a) Conductivity of solution depends upon size of ions.
b) Conductivity depends upon viscosity of solution.
c) Conductivity does not depend upon solvation of ions present in solution.
d) Conductivity of solution increases with temperature.

113. When an aqueous solution of $AgNO_3$ is electrolysed between platinum electrodes, the substances liberated at anode and cathode are
a) silver is deposited at cathode and O_2 is liberated at anode
b) silver is deposited at cathode and H_2 is liberated at anode
c) hydrogen is liberated at cathode and O_2 is liberated at anode
d) silver is deposited at cathode and Pt is dissolved in electrolyte

114. Label the given diagram showing lead storage battery:



a)

p	q	r
Pb	PbO_2	5M H_2SO_4

b)

p	q	r
PbO_2	Pb	conc.H_2SO_4

c)

p	q	r
Pb_3O_4	PbO_2	50% H_2SO_4

d)

p	q	r
PbO_2	Pb	dil.38% H_2SO_4

115. In the electrolysis of aqueous sodium chloride solution which of the half cell reaction will occur at anode?
a) $Na^+_{(aq)} + e^- \rightarrow Na_{(s)}; E^0_{cell} = -2.71V$ b) $2H_2O_{(l)} \rightarrow O_{2(g)} + 4H^+_{(aq)} + 4e^-; E^0_{cell} = 1.23V$
c) $H^+_{(aq)} + e^- \rightarrow \frac{1}{2}H_{2(g)}; E^0_{cell} = 0.00V$ d) $Cl^-_{(aq)} \rightarrow \frac{1}{2}Cl_{2(g)} + e^-; E^0_{cell} = 1.36V$

116. For the fell reaction, Cu^{2+} (l) + $Zn_{(s)} \rightleftharpoons Zn^{2+}$ (l) + $Cu_{(s)}$ Of an electrochemical cell, the change in free energy (ΔG) at a given temperature is a function of :
a) ln (C_1) b) ln (C_1/C_1) c) ln (C_2) d) ln ($C_1 + C_2$)

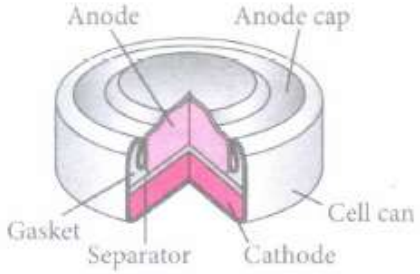
117. Without losing its concentration $ZnCl_2$ solution cannot be kept in contact with :
a) Au b) Al c) Pb d) Ag

118. Cell reaction is spontaneous when :
a) E^0_{red} is negative b) E^0_{red} is positive c) ΔG^0 is negative d) ΔG^0 is positive

119. The specific conductance of a 0.1 N KCl solution at 23°C is $0.012\Omega^{-1}\,cm^{-1}$. The resistance of cell containing the solution at the same temperature was found to be 55 . The cell constant will be:
a) 0.142 cm^{-1} b) 0.66 cm^{-1} c) 0.918 cm^{-1} d) 1.12 cm^{-1}

120. Which one of the following pairs of substances on reaction will not evolve H_2 gas?
a) Iron and H_2SO_4 (aq) b) Iron and steam c) Copper and HCl (aq)
d) Sodium and ethyl alcohol

121. Which of the given statements for mercury cell are incorrect?



(i) Mercury cell is suitable for low current devices like hearing aids, watches, ete.
(ii) It consists of zinc-mercury amalgam as anode and a paste of HgO and carbon as the cathode.
(iii) The electrolyte is a paste of $Zn(OH)_2$ and KO_2.
(iv) The electrode reactions for the cell are
At anode: $Zn(Hg)+H_2O \rightarrow ZnO_{(s)}+2OH^- +2e^-$
At cathode: $HgO + H_2O+ 2e^- \rightarrow Hg_{(l)} + 2OH^-$
a) (ii) and (iii) only b) (i) and (ii) only c) (i), (iii) and (iv) only d) (iii) and (iv) only

122. **Assertion:** Cu^{2+} ions get reduced more easily than H^+ ions.
Reason : Standard electrode potential of copper is 0.34 V.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

123. E^0_{cell} for the reaction $2H_2O \rightarrow H_3O^+ + OH^-$ at 25°C - 0.8277 V. The equilibrium constant for the reaction is
a) 10^{-14} b) 10^{-23} c) 10^{-7} d) 10^{-21}

124. The charge required for reducing 1 mole of MnO_4^- to Mn^{2+} is:
a) 1.93 x 10^5 C b) 2.895 x 10^5 C c) 4.28 x 10^5 C d) 4.825 x 10^5 C

125. How many coulombs of electricity is required to reduce 1 mole of $Cr_2O_7^{2-}$ in acidic medium?
a) 4 x 96500 C b) 6 x 96500 C c) 2 x 96500 C d) 1 x 96500 C

126. The cell reaction of the galvanic cell : Cu(s) | $Cu^{2+}_{(aq)}$ || $Hg^{2+}_{(aq)}$ | $Hg_{(l)}$ is
a) $Hg + Cu^{2+} \rightarrow Hg^{2+} + Cu$ b) $Hg + Cu^{2+} \rightarrow Cu^+ + Hg^+$ c) $Cu + Hg \rightarrow CuHg$
d) $Cu + Hg^{2+} \rightarrow Cu^{2+} + Hg$

127. Standard electrode potentials are:
Fe^{2+}/Fe, E^0 = - 0.44 V
Fe^{3+}/Fe^{2+}, E^0 = 0.77 V

Fe^{2+}, Fe^{3+} and Fe block are kept together, then :

a) Fe^{3+} increases b) Fe^{3+} decreases c) $\frac{Fe^{2+}}{Fe^{3+}}$ remains unchanged d) Fe^{2+} decreases

128. How much time is required to deposit 1 x 10^{-3} ern thick layer of silver (density is 1.05 g cm^{-3}) on a surface of area 100 cm^2 by passing a current of 5 A through $AgNO_3$ solution?
a) 125s b) 115s c) 18.7s d) 27.25s

129. **Assertion:** A standard hydrogen electrode is also called reversible electrode.
Reason: Standard hydrogen electrode can act both as anode as well as cathode in an electrochemical cell.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

130. In electrolysis of NaCl when Pt electrode is taken then H_2 is liberated at cathode while with Hg cathode it forms sodium amalgam because :
a) Hg is more inert than Pt b) more voltage is required to reduce H^+ at Hg than at Pt
c) Na is dissolved in Hg while it does not dissolve in Pt
d) concentration of H^+ ions is larger when Pt electrode is taken

131. Zinc can be coated on iron to produce galvanized iron but the reverse is not possible. It is because:
a) zinc is lighter than iron b) zinc has lower melting point than iron
c) zinc has lower negative electrode potential than iron
d) zinc has higher negative electrode potential than iron.

132. Match the column I with column II and mark the appropriate choice.

	Column I		Column - II
(A)	A_m	(i)	I/A
(B)	G*	(ii)	pl/A
(C)	k	(iii)	k/C
(D)	R	(iv)	G*/R

a) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)
b) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)
c) (A) → (ii), (B) → (iv), (C) → (iii), (D) → (i)
d) (A) → (iv), (B) → (ii), (C) → (i), (D) → (iii)

133. An electrochemical cellcan behave like an electrolytic cell when_____.
a) $E_{cell} = 0$ b) $E_{cell} > E_{ext}$ c) $E_{ext} > E_{cell}$ d) $E_{cell} = E_{ext}$

134. How long will it take for a uniform current of 6.00 A to deposit 78 g of gold from a solution of Au Cl_4^-? What mass of chlorine gas will be formed simultaneously at anode of the cell? (Atomic mass of Au = 197)
a) t = 3010 sec, w = 35.50 g b) t = 20306 sec, w = 45.54 g c) t = 19500 sec, w = 54.5 g
d) t = 19139.16 sec, w = 42.24 g

135. The formal potential of Fe^{3+}/Fe^{2+} in a sulphuric acid and phosphoric acid mixture (E^0 = +0.61 V)is much lower than the standard potential (E^0 = +0.77 V), This is due to
(i) formation of the species $[FeHPO_4]+$

(ii) lowering of potential upon complexation
(iii) formation of the species $[FeSO_4]^+$
(iv) high acidity of the medium.
a) (i) and (ii) only b) (i), (ii) and (iv) only c) (iii) only d) all of these.

136. Which reaction is not feasible?
a) $2KI + Br_2 \rightarrow 2KBr + I_2$ b) $2KBr + I_2 \rightarrow 2KI + Br_2$ c) $2KBr + Cl_2 \rightarrow 2KCl + Br_2$
d) $2H_2O + 2F_2 \rightarrow 4HF + O_2$

137. Standard electrode potential of three metals, X, Y and Z are -1.2 V, $+0.5$ V and -3.0 V respectively. The reducing power of three metals will be:
a) $Y > Z > X$ b) $X > Y > Z$ c) $Z > X > Y$ d) $Z > Y \geqslant X$

138. What will be standard cell potential of galvanic cell with the following reaction?
$2Cr_{(s)} + 3Cd^{2+}_{(aq)} \rightarrow 2Cr^{3+}_{(aq)} + 3Cd_{(s)}$
[Given: $E^0\ Cr^{3+}/Cr = -0.74$ V and $E^0\ Cd^{2+}/Cd = -0.40$ V]
a) 0.74 V b) 1.14 V c) 0.34 V d) -0.34 V

139. In electrolysis of dilute H_2SO_4, what is liberated at anode?
a) H_2 b) SO_4^{2-} c) SO_2 d) O_2

140. Molar conductivity of NH_4OH can be calculated by the equation,
a) $\Lambda^0_{NH_4OH} = \Lambda_{Ba(OH)_2} + \Lambda_{NH_4cl} - \Lambda_{Bacl_2}$ b) $\Lambda^0_{NH_4OH} = \Lambda_{Bacl_2} + \Lambda_{NH_4cl} - \Lambda_{Ba(OH)_2}$
c) $\Lambda^0_{NH_4OH} = \frac{\Lambda_{Ba(OH)_2} + 2\Lambda_{NH_4cl} - \Lambda_{Bacl_2}}{2}$ d) $\Lambda^0_{NH_4OH} = \frac{\Lambda_{NH_4cl} + \Lambda_{Ba(OH)_2}}{2}$

141. Electrolysis of an aqueous solution of $AgNO_3$ with silver electrodes produces (i) at cathode while (ii) ions are dissolved from anode. When Pt electrodes are used (iii) is produced at anode and (iv) is cathode.

a)

(i)	(ii)	(iii)	(iv)
H_2	NO_3^-	OH^-	H_2

b)

(i)	(ii)	(iii)	(iv)
Ag	H^+	O_2	H_2

c)

(i)	(ii)	(iii)	(iv)
Ag	Ag^+	O_2	Ag

d)

(i)	(ii)	(iii)	(iv)
Ag	H^+	Ag^+	O_2

142. $E^0_{Fe^{2+}/Fe} = -0.441$ V and $E^0_{Fe^{3+}/Fe^{2+}} = 0.771$ V, the standard emf, of the reaction $Fe + 2Fe^{3+} \rightarrow 3Fe^{2+}$ will be :
a) 0.111 V b) 0.330 V c) 1.653 V d) 1.212 V

143. The electrode potentials for
$Cu^{2+}_{(aq)} + e^- \longrightarrow Cu^+_{(aq)}$ and $Cu^+(aq) + e^- \longrightarrow Cu_{(s)}$ are + 0.15 V and + 0.50 V respectively. The value of $E^0_{Cu/Cu}$ will be :
a) 0.325 V b) 0.650 V c) 0.150 V d) 0.500 V

144. During electrolysis of a solution of $AgNO_3$, 9650 coulombs of charge is passed through the solution. What will be the mass of silver deposited on the cathode?
a) 108 g b) 10. 8 g c) 1.08 g d) 216 g

145. Which of the following is the cell reaction that occurs when the following half-cells are combined?
$I^2 + 2e^- \rightarrow 2I(1\ M)$; $E^o = +0.54$ V
$Br^2 + 2e^- \rightarrow 2Br^-(1\ M)$; $E^o = +1.09$ V
a) $2Br^- + I_2 \rightarrow Br_2 + 2I^-$ b) $I_2 + Br_2 \rightarrow 2I^- + 2Br^-$ c) $2I + Br_2 \rightarrow I_2 + 2Br^-$
d) $2I^- + 2Br^- \rightarrow I_2 + Br_2$

146. Fluorine is the best oxidising agent because it has
a) highest electron affinity b) highest reduction potential c) highest oxidation potential
d) lowest electron affinity

147. How many grams of cobalt metal will be deposited when a solution of cobalt (II) chloride is electrolyzed with a current of 10 amperes for 109 minutes (1 Faraday = 96,500 C; Atomic mass of Co = 59 u)
a) 0.66 b) 4.0 c) 20.0 d) 40.0

148. Zn gives hydrogen with H_2S0_4 and HCl but not with HNO_3 because
a) Zn acts as oxidising agent when reacts with HNO_3
b) HNO_3 is weaker acid than H_2SO_4 and HCl
c) Zn is above the hydrogen in electrochemical series
d) No_3^- is reduced in preference to H^+ ion.

149. Which of the following statements is true?
a) When an aqueous solution of NaCl is electrolysed, sodium metal is deposited at cathode.
b) There is no difference between specific conductivity and molar conductivity.
c) Silver nitrate solution can be stored in a copper container.
d) The addition of liquid bromine to iodide solution turns it violet.

150. When 0.1 mole of MnO_4^{2-} is oxidized, the quantity of electricity required to completely oxidize MnO_4^{2-} to MnO_4^- is :
a) 96500 C b) 2 x 96500 C c) 9650 C d) 96.50 C

151. **Assertion:** When a copper wire is dipped in silver nitrate solution, there is no change in the colour of the solution.
Reason: Copper cannot displace silver from its salt solution.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

152. $\triangle_r G^0$ for the cell with the cell reaction:
$Zn_{(s)} + Ag_2O_{(s)} + H_2O_{(l)} \rightarrow Zn^{2+}_{(aq)} + 2Ag_{(s)} + 20H^-_{(aq)}$
[$E^0_{Ag_2O/ag}$ = 0.344 V, $E^0_{Zn^{2+}/Zn}$ = -0.76 V]
a) 2.13 x 10^5 J mol^{-1} b) -2.13 x 10^5 J mol^{-1} c) 1.06 x 10^5 J mol^{-1} d) -1.06 x 10^5 J mol^{-1}

153. What will be the molar conductivity of Al^{3+} ions at infinite dilution if molar conductivity of $Al_2(SO_4)_3$ is 858 S cm^2 mol^{-l} and ionic conductance of SO_4^{2-} is 160 S cm^2 mol^{-1} at infinite dilution?
a) 189 S cm^2 mol^{-1} b) 698 S cm^2 mol^{-1} c) 1018 S cm^2 mol^{-1} d) 429 S cm^2 mol^{-1}

154. **Assertion:** To obtain maximum work from a galvanic cell charge has to be passed reversibly.
Reason: The reversible work done by a galvanic cell is equal to decrease in its Gibbs energy.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

155. In the electrochemical cell :

Zn $ZnSO_4$ (0.01 M) $CuSO_4$ (1.0M) Cu, the emf of this Daniel cell is E, When the concentration of $ZnSO_4$ is changed to 1.0 M and that of $CuSO_4$ changed to 0.01 M, the emf changes to E_2.

From the following, which one is the relationship between E_1 and E_4? (Given $\frac{RT}{F} = 0.059$)

a) $E_1 < E_2$ b) $E_1 > E_2$ c) $E_2 = 0 \neq E_1$ d) $E_1 = E_2$

156. Standard electrode potentials of few half-cell reactions are given below:

a) $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O; E^0 = 1.51V$ b) $Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 7H_2O; E^0 = 1.33V$

c) $Fe^{3+} + e^- \rightarrow Fe^{2+} + E^0 = 0.77V$ d) $Cl_2 + 2e^- \rightarrow 2Cl^-; E^0 = 1.36V$

157. Kohlrauch's law states that at:

a)
finite dilution,each ion makes definite contribution to equivalent conductance of an electrolyte, whatever be the nature of the other ion of electrolyte.

b)
infinite diiution each ion makes definite contribution to equivalent conductance of an electrolyte depending on the nature of the other ion of the electrolyte.

c)
infinite dilution, each i.n makes. definite contribution to conductance of an electrolyte whatever be the nature of the other ion of the electrolyte

d)
infinite dilution, each ion makes definite contribution to equivalent conduction of an electrolyte whatever be the nature of the other ion of the electrolyte.

158. Standard free energies of formation (in kJ/mol) at 298 K are - 237.2, - 394.4 and - 8.2 for $H_2O_{(l)}$, $CO_{2(g)}$ and pentane (g), respectively. The value of E^0_{cell} for the pentane-oxygen fuel cell is :

a) 1.968 V b) 2.0968 V c) 1.0968 V d) 0.0968 V

159. For a cell reaction: $M^{n+}_{(aq)} + ne^- \rightarrow M_{(S)}$ the Nernst equation for electrode potential at any concentration measured with respect to standard hydrogen electrode is represented as

a) $E_{(M^{n+}/M)} = E^0_{(M^{n+}/M)} - \frac{RT}{nF} ln \frac{1}{[M^{n+}]}$ b) $E_{\left(M/M^{n+}\right)} = E^0_{(M/M^+)} - \frac{RT}{nF} ln \frac{M^{n+}}{[M]}$

c) $E_{(M^{n+}/M)} = E^0_{(M^{n+}/M)} - \frac{RT}{nF} log \frac{1}{[M]}$ d) $E_{(M^{n+}/M)} = E^0_{(M^{n+}/M)} - \frac{RT}{nF} ln[M^{n+}]$

160. Which of the following statements is correct regarding variations of molar conductivity with concentration?

The variation in A_m with concentration for a strong electrolyte can be represented by the equation,

$A_m = A_m^0 - AC^{1/2}$

The value of constant A for a given solvent and temperature depends upon the type of electrolyte i.e., cations and anions produced on dissociation of electrolyte in the solution.

a) Molar conductivity decreases with decrease in concentration.

b) Variation in molar conductivity of weak and strong electrolytes is same.

c) Molar conductivity increases with decrease in concentration.

d)

When concentration of the solution approaches zero, the molar conductivity is known as conductance.

161. E^0 values of three metals are listed below.

$Zn^{2+}_{(aq)} + 2e^- \rightarrow Zn_{(s)}$; E^0 = -0.76 V

$Fe^{2+}_{(aq)} + 2e^- \rightarrow 2Fe_{(s)}$; E^0 = -0.44V

$Sn^{2+}_{(aq)} + 2e^- \rightarrow Sn_{(aq)}$; E^0 = -0.14 V

Which of the following statements are correct on the basis of the above information?

(i) Zinc will be corroded in preference to iron if zinc coating is broken on the surface.

(ii) If iron is coated with tin and the coating is broken on the surface then iron will be corroded.

(iii) Zinc is more reactive than iron but tin is less reactive than iron.

a) (i) and (ii) only b) (ii) and (iii) only c) (i), (ii) and (iii) d) (i) and (iii) only

162. Using the data given below find out the strongest reducing agent.

$E^0_{Cr_2^{2-}/Cr^{3+}} = 1.33V; E^0_{Cl2/Cl^-} = 1.36V$

$E^0_{MnO_4^-/Mn^{2+}} = 1.51V; E^0_{Cr^{3+}/cr} = -0.74V$

a) Cl^- b) Mn^{2+} c) Cr^{3+} d) Mn^{2+}

163. Which one of the following pairs of substances on reaction will not evolve H_2 gas?

a) Iron and $H_2SO_{4(aq)}$ b) Iron and steam c) Copper and $HCl_{(aq)}$

d) Sodium and ethyl alcohol

164. A gas X at 1 atm is bubbled through a solution containing a mixture of 1 M Y^- and 1 M Z^- at 25^0C. If the reduction potential of Z > Y> X, then

a) Y will oxidise X and not Z b) Y will oxidise Z and not X c) Y will oxidise both X and Z

d) Y will reduce both X and Z.

165. For the reduction of silver ions with copper metal the standard cell potential was found to be + 0.46 V at 25^0C. The value of standard Gibbs energy, ΔG^0 will be:

(F = 96500 C mol^{-1})

a) - 89.0 kJ b) - 89.0 J c) - 44.5 kJ d) - 98.0 kJ

166. The most convenient method to protect the bottom of ship made of iron is

a) Coating it with red load oxide b) White tin plating c) Connecting it with Mg block'

d) Connecting it with Pb block

167. The number of electrons delivered at the cathode during electrolysis by a current of 1 ampere in 60 second is: (charge on electron = 1.60 x 10^{-19} C)

a) 6 x 10^{23} b) 6 x 10^{20} c) 3.75 x 10^{20} d) 7.48 x 10^{23}

168. Al_2O_3 is reduced by electrolysis at low potential and high currents. If 4.0 x 10^4 A of current is passed through molten Al_2O_3 for 6 h, what mass of aluminium is produced? [Assume 100% current efficiency, atomic mass of Al = 27 g mol^{-1}]

a) 9.0 x 10^3 g b) 8.1 x 10^4 g c) 2.4 x 10^5 g d) 1.3 x 10^4 g

169. Mark the correct Nernst equation for the given cell

$Fe_{(s)}| Fe^{2+}(0.001 M)||H^+ (I M)|H_{2(g)} (I bar)|Pt_{(s)}$

a) $E_{cell} = E_{cell}^{o} - \frac{0.591}{2}\log\frac{[Fe^{2+}][H^{+}]^{2}}{[Fe][H_2]}$ b) $E_{cell} = E_{cell}^{o} - \frac{0.591}{2}\log\frac{[Fe][H^{+}]^{2}}{[Fe^{2+}][H_2]}$

c) $E_{cell} = E_{cell}^{o} - \frac{0.0591}{2}\log\frac{[Fe^{2+}][H_2]}{[Fe][H^{+2}]}$ d) $E_{cell} = E_{cell}^{o} - \frac{0.0591}{2}\log\frac{[Fe][H_2]}{[Fe^{2+}][H^{+}]^{2}}$

170. An electric current is passed through silver nitrate solution using silver electrodes. 15.25 g of silver was found to be deposited on cathode. What will be the weight of copper deposited on cathode if same amount of electricity is passed through copper sulphate solution using copper electrodes?
a) 4.49 g b) 6.4 g c) 12.5 g d) 3.2 g

171. When a lead storage battery is discharged,
a) lead sulphate is consumed b) oxygen gas is evolved c) lead sulphate is formed
d) lead sulphide is formed.

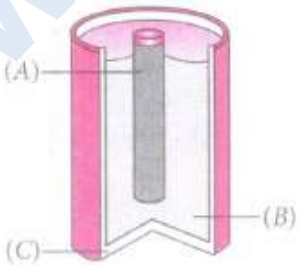
172. At 25°C molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 ohm-1 cm^2 mol^{-1} and at infinite dilution its molar conductance is 238 ohm^{-1} cm^2 mol^{-1}. The degree or ionisation of ammonium hydroxide at the same concentration and temperature is:
a) 20.800 % b) 4.008 % c) 40.800 % d) 2.080 %

173. Which of the following is the correct cell representation for the given cell reaction?
$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$
a) Zn I Zn^{2+}II H^+ I H_2 b) Zn I Zn^{2+} II H^+, H_2| Pt c) Zn I $ZnS0_4$|| H_2S0_4 I Zn
d) Zn I$H_2S0$4 I I $ZnS0_4$| H_2

174. Fill in the blanks with appropriate words.
The electrolytic solution is always neutral because the total charge on (i) is equal to (ii) on (iii).Unlike the metallic conductor, the electrolyte conducts the electric current by virtue of movement of its (iv). The property due to which a metal tends to go into solution in term of positive ions is known as (v).
(ii), (iii), (iv) and (v) respectively are
a) (a) cations, partial charge, anions, electrons, reduction
b) cations, total charge, anions, ions, oxidation
c) cations, ionic charge, anions, atoms, dissolution
d) cations, partial charge, anions, molecules, electrolysis.

175. Specific conductance of 0.1 M NaCl solution is 1.01 x 10^{-2} ohm^{-1} cm^{-1} Its molar conductance in ohm^{-1} cm^{-2} mol^{-1} is
a) 1.01 x 10^2 b) 1.01 x 10^3 c) 1.01 x 10^4 d) 1.01

176. Label the parts represented by (A), (B), and (C).



a)

A	B	C
Zinc rod	$NH_4Cl+MgCl_2$	Graphite rod

b)

A	B	C
Carbon rod	NH_4OH+carbon	Zinc rod

c)

A	B	C
Carbon rod	MnO_2+C+NH_4Cl	Zinc can

d)

A	B	C
Zinc rod	MnO_2+NH_4Cl	Carbon rod

177. $\triangle G^0$ for the reaction $Cu^{2+} + Fe \rightarrow Fe^{2+} + Cu$ is (Given : $E^0_{cu^{2+}|Cu} = +0.34V, E^0_{Fe^{2+}|Fe} = -0.44V$)
a) 1l.44 kJ b) 180.8 kJ c) 150.5 kJ d) 28.5 kJ

178. The pressure of H_2 required to make the potential of H_2 electrode zero in pure water at 298 K is :
a) 10^{-10} atm b) 10^{-4} atm c) 10^{-14} atm d) 10^{-12} atm

179. Given,
(i) $Cu^{2+} + 2e^- \longrightarrow Cu$, $E^0 = 0.337$ V
(ii) $Cu^{2+} + e^- \longrightarrow Cu +$, $E^0 = 0.153$ V
Electrode potential, E^0 for the reaction, $Cu^+ + e^- \longrightarrow Cu$, will be :
a) 0.52 V b) 0.90 V c) 0.30 V d) 0.36 V

180. An acidic solution of Cu^{2+} containing 0.4 g of Cu^{2+} ions is electrolysed until all the copper is deposited.What is the volume of oxygen evolved at NTP?
a) 141 cc b) 31.75 cc c) 64 cc d) 32 cc

181. **Assertion:** Current stops flowing when E_{cell} = O.
Reason : Equilibrium of the cell reaction is attained.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

182. On the basis of the information available. from the reaction : $\frac{4}{3}Al + O_2 \longrightarrow \frac{2}{3}Al_2O_3$, ΔG = - 827 kJ mol^{-1} of O_2, the minimum EMF required to carry out the electrolysis of Al_2O_3 is : (F = 96500 C mol^{-1})
a) 2.14 V b) 4.28 V c) 6.42 V d) 8.56 V

183. The standard reduction potential for the half-cell reaction, $Cl^2 + 2e^- \rightarrow 2Cl^-$ will be ($Pt^2+2Cl^- \rightarrow Pt + Cl_2$, E^o_{cell} = -0.15 V ;$Pt^2+ + 2e^- \rightarrow Pt$, E^o= 1.20 V)
a) -1.35 V b) +1.35 V c) -1.05 V d) +1.05 V

184. A hypothetical electrochemical cell is shown below $A\left|A^+(xM) \parallel B^+(yM)\right|B$ The emf measured is +0.20. The cell reaction is
a) $A^+ + e^- \rightarrow A; B^+ + e^- \rightarrow B$ b) The cell reaction cannot be predicted
c) $A + B^+ \rightarrow A^+ + B$ d) $A^+ + B^+ \rightarrow A + B^+$

185. Calculate the equilibrium constant for the reaction, $2Fe^{3+} + 3I^- \leftrightharpoons 2Fe^{2+} + I_3^-$. The standard reduction potentials in acidic conditions are 0.77 V and 0.54 V respectively for $Fe^{3+}|Fe^{2+}$ and I_3^- $|I^-$ couples.
a) 4.25 x 10^7 b) 7.05 x 10^5 c) 6.25 x 10^5 d) 6.25 x 10^7

186. **Assertion:** Electrolytic cell uses electrical energy to carry non-spontaneous chemical reactions.
Reason : Chemical energy of a spontaneous redox reaction can be converted into electrical energy.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

187. How many moles of Pt may be deposited on the cathode when 0.80 F of electricity is passed through a 1.0 M solution of Pt^{4+}?
a) 0.1 mol b) 0.2 mol c) 0.4 mol d) 0.6 mol

188. Molar conductivity of 0.025 mol L^{-1} methanoic acid is 46.1 S cm^2 mol^{-1}, the degree of dissociation and dissociation constant will be
(Given : $\lambda^0_{H^+}$ = 349.6 S cm^2 mol^{-1} and λ^0_{HCOO} cm^2 mol^{-1})
a) 11.4%, 3.67 x 10^{-4} mol L^{-1} b) 22.8%, 1.83 x 10^{-4} mol L^{-1} c) 52.2%, 4.25 x 10^{-4} mol L^{-1}
d) 1.14%,3. 67 x 10^{-6} mol L^{-1}

189. E^0 Value of Ni^{2+}/Ni is - 0.25 V and Ag^+/Ag is +0.80 V. If a cell is made by taking the two electrodes what is the feasibility of the reaction?
a) Since E^0 value for the cell will be positive, redox reaction is feasible.
b) Since E^0 value for the cell will be negative, redox reaction is not feasible.
c) Ni cannot reduce Ag^+ to Ag hence reaction is not feasible.
d) Ag can reduce Ni^{2+} to Ni hence reaction is feasible.

190. What will be the emf of the following concentration cell at 25°C?
Ag(s) I $AgNO_3$(0.01 M) II $AgNO_3$ (0.05 M) I $Ag_{(s)}$
a) 0.828 V b) 0.0413 V c) -0.0413 V d) -0.828 V

191. If 54 g of silver is deposited during an electrolysis reaction, how much aluminium will be deposited by the same amount of electric current?
a) 2.7 g b) 4.5 g c) 27 g d) 5.4 g

192. Standard reduction potentials at 25^0C of Li^+/Li, Ba^{2+}/Ba, Na^+/Na and Mg^{2+}/Mg are -3.05, -2.90, -2.71 and -2.37 V respectively. Which one of the following is the strongest oxidizing agent?
a) Mg^{2+} b) Ba^{2+} c) Na^+ d) Li^+

193. The specific conductivity of N/10 KCl solution at 20°C is 0.0212 ohm^{-1} cm^{-1} and the resistance of the cell containing this solution at 20°C is 55 ohm. The cell constant is
a) 3.324 cm^{-1} b) 1.166 cm^{-1} c) 2.372 cm^{-1} d) 3.682 cm^{-1}

194. Mark the correct relationship from the following:

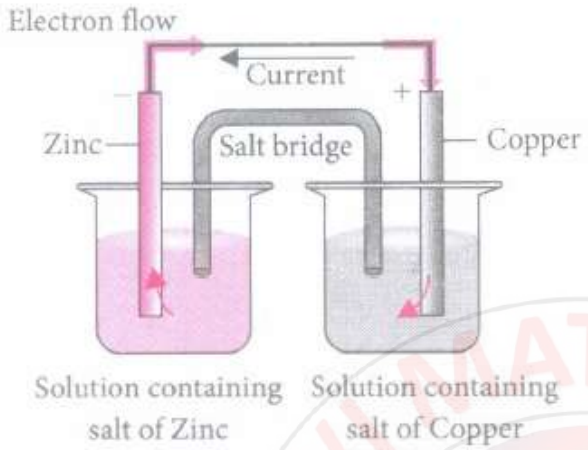
a) Equilibrium constant is related to emf as $logk = \frac{nFE}{2.303RT}$

b) EMF of a cell Zn I $Zn^{2+}_{(a1)}$ II $Cu^{2+}_{(a2)}$I Cu is $E = E^0 - \frac{0.591}{n} log \frac{[a_2]}{[a_1]}$

c) Nernst equation is $E_{cell} = E^0_{cell} - \frac{0.0591}{n} log \frac{[Products]}{[Reactants]}$

d) For the electrode M^{n+}/M at 273 K $E = E^0 - \frac{0.591}{n} log[M^{n+}]$

195. Which of the following statements is correct about the given Daniell cell?



a)
This cell converts the electrical energy liberated during the redox reaction to chemical energy.
b)
This cell has an electrical potential greater that 1.1 V when concentration of Zn^{2+} and Cu^{2+} ions is unity (1 mol dm^{-3})
c) In this cell, copper is acting as cathode and zinc is acting as anode.
Redox reaction occurring in this cell is
d) $Cu_{(s)} + Zn^{2+}_{(aq)} \rightarrow Cu^{2+}_{(aq)} + Zn_{(s)}$

196. Electrical conductance through metals is called metallic or electronic conductance and is due to the movement of electrons. The electronic conductance depends on
a) the nature and structure of the metal b) the number of valence electrons per atom
c) change in temperature d) all of these.

197. Which of the following reactions does not take place during rusting?
a) $H2CO_3$ $2H^+ \leftrightharpoons CO_3^{2-}$ b) $4Fe^{2+} + O_{2(dry)} \rightarrow Fe_2O_3$
c) $4Fe^{2+} + O_2 + 4H_2O \rightarrow 2Fe_2O_3 + 8H^+$ d) $Fe_2O_3 + xH_2O \rightarrow Fe_2O_3 + xH_2O$

198. Given below are the standard electrode potentials of few half-cells. The correct order of these metals in increasing reducing power will be K^+ I K = -2.93 V, Ag^+ I Ag = 0.80 V, Mg^{2+}| Mg = -2.93 V,Ag^+| Ag = 0.80 V, Mg^{2+} | Mg = -2.37V, Cr^{3+}| Cr = -0.74 V.
a) K < Mg < Cr < Ag b) Ag < Cr < Mg < K c) Mg < K < Cr < Ag d) Cr < Ag < Mg < K

199. The Gibbs energy for the decomposition of Al_2O_3 at 500°C is as follows:
$2/3Al_2O_3 \rightarrow 4/3Al + O_2$; Δ_rG= + 966 kJ/mol.
The potential difference needed for electrolytic reduction of Al_2O_3 at 500°C is at least
a) 5.0 V b) 4.5 V c) 3.0 V d) 2.5 V

200. Which of the following reactions cannot be a basis for electrochemical cell?

a) $H_2 + O_2 \rightarrow H_2O$ b) $AgNO_3 + Zn \rightarrow Zn(NO_3)_2 + Ag$

c) $AgNO_3 + NaCl \rightarrow AgCl \downarrow + NaNO_3$

d) $KMnO4+FeSO_4+H2SO_4 \rightarrow K_2SO_4+Fe2(SO_4)_3 + MnSO_4 + H_2O$

201. On the basis of the information available from the reaction $\frac{4}{3}Al + O_2 \rightarrow \frac{2}{3}Al_2O_3, \Delta G = -827\ kJ\ mol^{-1}$ O_2 the minimum e.m.f. required to carry out an electrolysis of Al_2O_3 is $\left(F = 96500 C mol^{-1}\right)$

a) 8.56 V b) 2.14 V c) 4.28 V d) 6.42 V

202. Which of the following reaction is possible at anode?

a) $2Cr^{3+} + 7H_2O \rightarrow Cr_2O_7^{2-} + 14H^+$ b) $F_2 \rightarrow 2F^-$ c) $(1/2)O_2 + 2H^+ \rightarrow H_2O$

d) None of these.

203. A hypothetical electrochemical cell is shown below

A | A^+ (xM) | | B^+ (yM) | B The EMF measured is + 0.20 V. The cell reaction is :

a) $A + B^+ \longrightarrow A^+ + B$ b) $A^+ - B \longrightarrow A + B^+$ c) $A^+ + B^- \longrightarrow A$, $B^+ + e^- \longrightarrow B$

d) The cell reaction cannot be predicted

204. The reaction which is taking place in nickel - cadmium battery can be represented by which of the following equation?

a) $Cd + NiO_2 + 2H_2O \rightarrow Cd(OH)_2 + Ni(OH)_2$ b) $Cd + NiO_2 + 20H^- \rightarrow Ni + Cd(OH)_2$

c) $Ni + Cd(OH)_2 \rightarrow Cd + Ni(OH)_2$ d) $Ni(OH)_2 + Cd(OH) \rightarrow Ni + Cd + 2H_2O$

205. Match the column I with column II and mark the appropriate choice.

	Column -I		Column - II
(A)	Kohlrausch's law	(i)	$\Lambda_{eq}^0 = \Lambda_c^0 + \Lambda_a$
(B)	Molar conductivity	(ii)	$\Lambda_m = \frac{K}{C}$
(C)	Degree of dissociation	(iii)	$a = \frac{\Lambda_m}{A_m^0}$
(D)	IDissociation constant	(iv)	$K_a = \frac{ca^2}{1-a}$

a) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

b) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)

c) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

d) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)

206. Consider for following relations for emf of a electrochemical cell:

emf of cell = (Oxidation potential of anode) - (Reduction potential of cathod

emf of cell = (Oxidation potential of anode) + (Reduction potential of cathode)

emf of cell = (Reduction potential of anode) + (Reduction potential of cathode)

emf of cell = (Oxidation potential of anode) - (Oxidation potential of cathode)

Which of the above relations are correct?

a) (ii) and (iv) b) (iii) and (i) c) (i) and (ii) d) (iii) and (iv)

207. The equivalent conductivity of N/10 solution of .acetic acid at 25°C is 14.3 ohm^{-1} cm^2 $equiv^{-1}$. What will be the degree of dissociation of acetic acid?

($\Lambda_{\infty CH_3CooH}$ = 390.71 ohm^{-1} cm^2 $equiv^{-1}$)

a) 3.66 % b) 3.9 % c) 2.12 % d) 0.008 %

208. Limiting molar conductivity of NH_4OH:

$\left(\text{is } \overset{\circ}{\Lambda}_m\left(NH_4OH\right)\right)$ is equal to:

a) $\overset{o}{\Lambda}m\left(NH_4Cl\right) + \Lambda_{m(NaCl)} - \overset{\circ}{\Lambda}_{m(NaOH)}$ b) $\overset{o}{\Lambda}_{m(NaOH)} + \Lambda^{o}_{m(NaCl)} - \overset{o}{\Lambda}\Lambda_m\left(NH_4Cl\right)$

c) $\overset{o}{\Lambda}_m\left(NH_4OH\right) + \Lambda^{o}_m\left(NH_4Cl\right) - \Lambda^{o}_{m(HCl)}$ d) $\Lambda_m\left(NH_4Cl\right) + \overset{o}{\Lambda}_m(NaOH) - \Lambda^{o}_{m(NaCl)}$

209. Using the data given in find out in which option the order of reducing power is correct

$E^0_{Cr_2{}^{2-}_7/Cr^{3+}} = 1.33V; E^0_{Cl2/Cl^-} = 1.36V$

$E^0_{MnO_4^-/Mn^{2+}} = 1.51V; E^0_{Cr^{3+}/cr} = -0.74V$

a) $Cr^{3+} < Cl^- < Mn^{2+} < Cr$ b) $Mn^{2+} < Cl^- < Cr^{3+} < Cr$ c) $Cr^{3+} < Cl^- < Cr_2O_7^{2-} < MnO_4^-$

d) $Mn^{2+} < Cr^{3+} < Cl^- < Cr$

210. E^0 for the cell, Zn | Zn^{2+}(aq) | | Cu^{2+}(aq) | Cu is 1.10 V at 25^{0}C. The equilibrium constant for the reaction,

Zn(s) + Cu^{2+}(aq) ⟶ Cu(s) + Zn^{2+}(aq) is of the order :

a) 10^{-37} b) 10^{-28} c) 10^{18} d) 10^{17}

211. In an electrolytic cell, the flow of electrons is

a) from cathode to anode in the solution b) from cathode to anode through external supply

c) from cathode to anode through internal supply

d) from anode to cathode through internal supply.

212. A device that converts energy of combustion of fuels like hydrogen and methane, directly into electrical energy is known as

a) Electrolytic cell b) Dynamo c) Ni-Cd Cell d) Fuel cell

213. During the electrolysis of dilute sulphuric acid, the following process is possible at anode.

a) $2H_2O_{(l)} \rightarrow O_{2(g)} + 4H^+_{(aq)} + 4e^-$ b) $2So^{2-}_{4(aq)} \rightarrow S_2O^{2-}_{8(aq)} + 2e^-$

c) $H_2O_{(l)} \rightarrow H^+_{(aq)} + OH^-_{(aq)}$ d) $H_2O_{(l)} + e^- \rightarrow \frac{1}{2}H_{2(g)} + OH^-_{(aq)}$

214. In a galvanic cell, the salt bridge

(i) does not participate chemically in the cell reaction

(ii) stops the diffusion of ions from one electrode to another

(iii) is necessary for the occurrence of the cell reaction

(iv) ensures mixing of the two electrolytic solutions.

a) (i) and (iii) only b) (i) and (ii) only c) (iii) and (iv) only d) all of these.

215. Use the data given in and find out the most stable ion in its reduced form.

$E^0_{Cr_2{}^{2-}_7/Cr^{3+}} = 1.33V; E^0_{Cl2/Cl^-} = 1.36V$

$E^0_{MnO_4^-/Mn^{2+}} = 1.51V; E^0_{Cr^{3+}/cr} = -0.74V$

a) Cl^- b) Cr^{3+} c) Cr d) Mn^{2+}

216. On electrolysis of dil. sulphuric acid using platinum (pt) electrode, the product obtained at anode will be:
a) SO_2 gas b) Hydrogen gas c) Oxygen gas d) H_2S gas

217. Which of the following is the correct order in which metals displace each other from the salt solution of their salts?
a) Zn, Al, Mg, Fe, Cu b) Cu, Fe, Mg, Al, Zn c) Mg, Al, Zn, Fe, Cu d) Al, Mg, Fe, Cu, Zn

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Time : 1 Mins **EQUILIBRIUM 1** **Marks : 739**

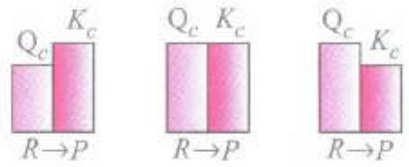
1. K_1 and K_2 are equilibrium constants for reactions (i) and (ii)
   $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$ ...(i)
   $NO_{(g)} \rightleftharpoons N_{2(g)} + \frac{1}{2}O_{2(g)}$ ...(ii)
   Then,
   a) $K_1=\left(\frac{1}{K_2}\right)^2$ b) $K_1=K_2^2$ c) $K_1=\frac{1}{K_2}$ d) $K_1=(K_2)^0$
2. We know that the relationship between K_c and K_p is
   $K_p=K_c(RT)^{\Delta n}$
   What would be the value of Δn for the reaction:
   $NH_4Cl(s) \rightleftharpoons NH_3(g)+HCl(g)$?
   a) 1 b) 0.5 c) 1.5 d) 2
3. If the concentration of OH^- ions in the reaction, $Fe(OH)_{3(s)} \rightleftharpoons Fe^{3+}_{(aq)} + 30H^-_{(aq)}$ is decreased by $\frac{1}{4}$ times, then equilibrium concentration of Fe^{3+} will increase by :
   a) 8 times b) 16 times c) 64 times d) 4 times
4. A solution which is 10^{-3} M each in Mn^{2+}, Fe^{2+}, Zn^{2+} and Hg^{2+} is treated with 10^{-16} M sulphide ion. If K_{sp} of MnS, FeS, ZnS and HgS are 10^{-15}, 10^{-25}, 10^{-20} and 10^{-54} respectively, which one will precipitate first?
   a) FeS b) MnS c) HgS d) ZnS
5. When I_2 dissociates to its atomic form the following reaction occurs:
   $I_{2(g)} \rightleftharpoons 2I_{(g)}$; ΔH^0 = +150 kJ mol^{-1}
   The reaction is favoured at
   a) low temperature b) high temperature c) no change with temperature
   d) high pressure
6. Aqueous solution of which of the following compounds is the best conductor of electric current?
   a) Hydrochloric acid, HCl b) Ammonia, NH_3 c) Fructose, $C_6H_{12}O_6$
   d) Acetic acid, $C_2H_4O_2$
7. At 350 K, K_p for the reaction given below is 3.0 x 10^{10} bar^{-1} at equilibrium. What will be the value of K_c at this temperature?
   $2N_{2(g)} + O_{2(g)} \rightleftharpoons 2N_2O_{(g)}$
   a) 7.4 x 10^{11} L mol^{-1} b) 8715 x 10^{10} L mol^{-1} c) 0.08 L mol^{-1} d) 8.715 x 10^{11} L mol^{-1}
8. The pH value of blood does not change appreciably by a small addition of an acid or base, because the blood

a) is a body fluid b) can be easily coagulated c) contains iron as a part of the molecule
d) contains serum protein that acts as buffer

9. If the equilibrium constant for the reaction, $2XY \rightleftharpoons X_2 + Y_2$ is 81 what is the value of equilibrium constant for the reaction
$XY \rightleftharpoons \frac{1}{2}X_2 + \frac{1}{2}Y_2$
a) 81 b) 9 c) 6561 d) 40.5

10. According to Lewis concept, an acid is a/an
a) proton donor b) electron pair donor c) proton acceptor d) electron pair acceptor.

11. Predict the direction of the reaction from the comparison of Q_c and K_c Mark the incorrect statement.



a) If $Q_c < K_c$ reaction goes from left to right. b) If $Q_c = K_c$ reaction goes from right to left.
c) If $Q_c > K_c$, net reaction goes from right to left.
d) If $Q_c = K_c$, reactants and products are at equilibrium.

12. The solubility product of AgCl is 1.5625×10^{-10} at 25°C. Its solubility in grams per litre will be
a) 143.5 b) 108 c) 1.57×10^{-8} d) 1.79×10^{-3}

13. The dissociation constant of a weak acid is 1×10^{-4}. In order to prepare a buffer solution with a pH = 5 the [Salt]/ [Acid] ratio should be
a) 1:10 b) 4:5 c) 10: 1 d) 5:4

14. The yield of NH_3 in the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$; ΔH = -22.08 kcal mol^{-1} is affected by
a) change in pressure and temperature b) change in temperature and concentration of N_2
c) change in pressure and concentration of N_2
d) change in pressure, temperature and concentration of N_2.

15. If the concentration of OH^- ion in the reaction $Fe(OH)_3(s) \rightleftharpoons Fe^{3+}(aq) + 3OH^-(aq)$ is decreased by $\frac{1}{4}$ times, then equilibrium concentration of Fe^{3+} will increase by:
a) 8 times b) 16 times c) 64 times d) 4 times

16. What will be the solubility of AgCl in 0.05 M NaCl aqueous solution if solubility product of AgCl is 1.5×10^{-10} mol^{2}L^{-2}?
a) 3×10^{-9} mol L^{-1} b) 0.05 mol L^{-1} c) 1.5×10^{-5} mol L^{-1} d) 3×10^{9} mol L^{-1}

17. Calculate the pOH of a solution at 25°C that contains 1×10^{-10} M of hydronium ions,i.e.,H_3O^+.
a) 4.000 b) 9.0000 c) 1.000 d) 7.000

18. Which one of the following compounds is not a protonic acid?
a) $SO_2(OH_2)$ b) $B(OH)_3$ c) $PO(OH)_3$ d) $SO(OH_2)$

19. The K_{sp} of Ag_2CrO_4, AgCl, AgBr and AgI are respectively, 1.1×10^{-12}, 1.8×10^{-10}, 5.0×10^{-12}, 8.3×10^{-17}. which one of the following salts will precipitate last if $AgNO_3$ solution is added to the solution containing equal moles of NaCl, NaBr, NaI and Na_2CrO_4?
a) AgCl b) AgBr c) Ag_2CrO_4 d) AgI

20. Ionisation constant of CH_3COOH is 1.7×10^{-5} and concentration of H^+ ions is 3.4×10^{-4}. Then, find out initial concentration of CH_3COOH molecules.
    a) 3.4×10^{-4} b) 3.4×10^{-3} c) 6.8×10^{-4} d) 6.8×10^{-3}

21. The solubility product of CuS, CdS and HgS are 10^{-31}, 10^{-44},10^{-54}respectively. The solubility of these sulphides are in the order:
    a) CdS> HgS > CuS b) HgS > CdS> CuS c) CdS> CuS > HgS d) CuS > CdS> HgS

22. Solubility of a M_2S salt is 3.5×10^{-6}, then its solubility product will be
    a) 1.7×10^{-16} b) 1.7×10^{-6} c) 1.7×10^{-18} d) 1.7×10^{-12}

23. The values of K_{p1} and K_{p2} for the reactions
    $X \rightleftharpoons Y + Z$ ...(i)
    and $A \rightleftharpoons 2B$ ...(ii)
    are in the ratio of 9: 1. If the degree of dissociation of X and A be equal, then total pressure at equilibrium (i) and (ii) are in the ratio:
    a) 3:1 b) 1:9 c) 36:1 d) 1:1

24. On increasing the pressure, in which direction will the gas phase reaction proceed to reestablish equilibrium, is predicted by applying the Le Chatelier's principle. Consider the reaction:
    $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$
    Which of the following is correct, if the total pressure at which the equilibrium is established, is increased without changing the temperature?
    a) K will remain same b) K will decrease c) Kwill increase.
    d) K will increase initially and decrease when pressure is very high.

25. Fill in the blanks in the given table with the appropriate choice.

Species	Conjugate acid	Conjugate base
HCO_3^-	___p___	CO_3^{2-}
HSO_4^-	H_2SO_4	___q___
NH_3	___r___	___s___
H_2O	___t___	OH^-

a)

p	q	r	s	t
H_2CO_3	SO_4^{2-}	NH_4^+	NH_2^-	H_3O^+

b)

p	q	r	s	t
HCO_3^-	H_2SO_3	NH_2^-	NH_4^+	H_3O^+

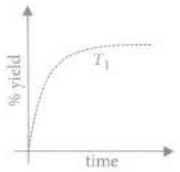
c)

p	q	r	s	t
H_2CO_3	HSO_4^-	NH_4^+	NH_2^-	H_2O

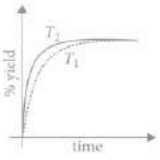
d)

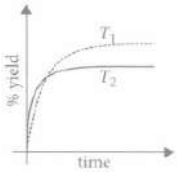
p	q	r	s	t
HCO_3^-	H_2SO_4	NH_2^+	NH_2^-	OH^-

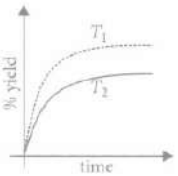
26. The % yield of ammonia as a function of time in the reaction
    $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}, \Delta H < 0$ at (P,T_1) is given below.

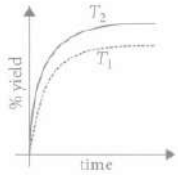


If this reaction is conducted at (P, T_2), with $T_2 > T_1$, the % yield of ammonia as a function of time is represented by

a) 

b) 

c) 

d) 

27. Which of the following is an example of homogeneous equilibrium?
a) $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$ b) $C_{(s)} + H_2O_{(g)} \rightleftharpoons CO_{(g)} + H_{2(g)}$
c) $CaCO_{3(s)} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$ d) $NH_4HS_{(s)} \rightleftharpoons NH_{3(g)} + H_2S_{(g)}$

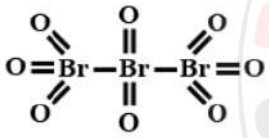
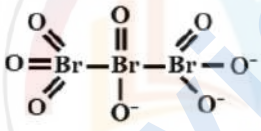
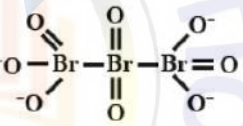
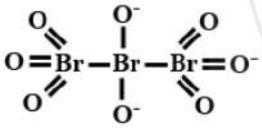
28. $NH_4COONH_2(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$. If equilibrium pressure is 3 atm for the given reaction, K_p for the reaction is:
a) 27 b) 4 c) 3 d) 9

29. HCl was passed through a solution of $CaCl_2$, $MgCl_2$ and NaCl. Which of the following compound(s) crystallise(s):
a) NaCl, $MgCl_2$ and $CaCl_2$ b) Both $CaCl_2$ and $MgCl_2$ c) Only NaCl d) Only $MgCl_2$

30. Which of the following is not a Lewis acid?
a) SiF_4 b) $FeCl_3$ c) BF_3 d) C_2H_2

31. Equal volumes of three acid solutions of pH 3, 4 and 5 are mixed in a vessel. What will be the H^+ ion concentration in the mixture:
a) 1.l l x 10^{-4} M b) 3.7 x 10^{-4}M c) 3.7 x 10^{-3} M d) 1.l l x 10^{-3} M

32. The correct structure of tribromooctaoxide is:

a) 
b) 
c) 
d) 

33. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
Assertion: In the dissociation of PCl_5 at constant pressure and temperature addition of helium at equilibrium increases the dissociation of PCl_5 .
Reason: Helium reacts with Cl_2 and hence shifts the equilibrium in forward direction.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

34. Which of the following salts will give highest pH in water?
a) KCl b) NaCl c) Na_2CO_3 d) $CuSO_4$

35. Which of the following reactions will not get affected on increasing the pressure?
a) $2H_{2(g)} + CO_{(g)} \rightleftharpoons CH_3OH_{(g)}$ b) $4NH_{3(g)} + 5O_{2(g)} \rightleftharpoons 4NO_{(g)} + 6H_2O_{(g)}$
c) $CH_{4(g)} + 2S_{2(g)} \rightleftharpoons CS_{2(g)} + 2H_2S_{(g)}$ d) $PCl_{s(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$

36. Which one of the following is true for any diprotic acid, H_2X?
a) $Ka_2 = Ka_1$ b) $Ka_2 > Ka_1$ c) $Ka_1 > Ka_2$ d) $Ka_2 = \frac{1}{Ka_1}$

37. Concentration of the Ag^+ ions in a saturated solution of $Ag_2C_2O_4$ is $2.2 \times 10^{-4} mol^{-1}$ solubility product of $Ag_2C_2O_4$ is :
a) 2.42×10^{-8} b) 2.66×10^{-12} c) 4.5×10^{-11} d) 5.3×10^{-12}

38. Which of the following is not true about a reversible reaction?
a) The reaction does not proceed to completion. b) It cannot be influenced by a catalyst
c) Number of moles of reactants and products is always equal.
d) It can be attained only in a closed container

39. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion : Benzoic acid is stronger acid than acetic acid.
Reason : K_a for benzoic acid is 6.5×10^{-5} and for acetic acid is 1.74×10^{-5}
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is If both but reason is false d) If both assertion and reason are false.

40. A 20 litre container at 400 K contains $CO_2(g)$ at pressure 0.4 atm an excess of SrO (neglect the volume of solid SrO. The volume of the container is now decreased by moving the movable piston fitted in the container. The maximum volume of the container, when pressure of CO_2 attains its maximum value,
Given that: $SrC0_{3(S)} \rightleftharpoons SrO_{(s)} + CO_{2(g)}$, ($K_P$= 1.6 atm)
a) 5 L b) 10 L c) 10 L d) 2 L

41. PCl_5 , PCl_3 and Cl_2 are at equilibrium at 500 K with concentration 2.1 M PCl_3, 2.1 M Cl_2 and 1.9 M PCl_5 , The equilibrium constant for the given reaction is
$PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$
a) 2.32 b) 1.79 c) 4.2 d) 3.8

42. Consider the following liquid-vapour equilibrium
$$\text{Liquid} \rightleftharpoons \text{Vapour}$$
Which of the following relations is correct?
a) $\frac{d\ell nG}{dT^2} = \frac{\Delta H_v}{RT^2}$ b) $\frac{d\ell nP}{dT} = \frac{\Delta H_v}{RT}$ c) $\frac{d\ell nP}{dT^2} = \frac{-\Delta H_v}{T^2}$ d) $\frac{d\ell nP}{d\,T} = \frac{\Delta H_v}{RT^2}$

43. Solution of a monobasic acid has a pH = 5. If one mL of it is diluted to 1 litre, what will be the pH of be the resulting solution?
a) 3.45 b) 6.96 c) 8.58 d) 10.25

44. For the reaction $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$, the equilibrium constant is K_1. The equilibrium constant is K_2 for the reaction
$$2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g)$$
What is K for the reaction
$$NO_2(g) \rightleftharpoons \frac{1}{2} N_2(g) + O_2(g)^+$$
a) $1/(2K_1K_2)$ b) $1/(4K_1K_2)$ c) $[1/K_1K_2]^{1/2}$ d) $1/(K_1\ K_2)$

45. The pH of 0.001 M $Ba(OH)_2$ solution will be
a) 2.7 b) 2 c) 8.4 d) 11.3

46. What will be the pH of a soft drink if hydrogen ion concentration in sample is 3.8×10^{-3} M?
a) 3.8 b) 5.04 c) 2.42 d) 9.2

47. Equimolar solutions of the following were prepared in water separately. Which of one the solutions will record the highest pH'?
a) $SrCl_2$ b) $BaCl_2$ c) $MgCl_2$ d) $CaCl_2$

48. The solubility product of AgI at 25°C is 1.0 x 10^{-l6} mol^2L^{-2}. The solubility of AgI in 10^{-4} N solution of KI at 25°C is approximately(in mol L^{-1})
a) 1.0 x 10^{-8} b) 1.0 x 10^{-16} c) 1.0 x 10^{-12} d) 1.0 x 10^{-10}

49. When sulphur is heated at 900 K, S_8 is converted to S_2 . What will be the equilibrium constant for the reaction if initial pressure of 1 atm falls by 25% at equilibrium?
a) 0.75 atm^3 b) 2.55 atm^3 c) 25.0 atm^3 d) 1.33 atm^3

50. A physician wishes to prepare a buffer solution at pH = 3.58 that efficiently resist changes in pH yet contains only small concentration of the buffering agents. Which one of the following weak acid together with its sodium salt would be best to use?
a) m-chlorobenzoic acid (pK_a = 3.98) b) p-chlorocinnamic acid (pK_a = 4.41)
c) 2, 5- dihydroxy benzoic acid (pK_a = 2.97) d) Acetoacetic acid (pK_a = 3.58)

51. Calculate Kp for the equilibrium,
$NH_4HS_{(s)} \rightleftharpoons NH_{3(g)} + H_2S_{(g)}$
if the total pressure inside the reaction vessel is 1.12 atm at 105°C.
a) 0.56 b) 1.25 c) 0.31 d) 0.63

52. NH_4CN is a salt of weak acid HCN (Ka = 6.2 x 10^{-10}) and a weak base NH_4OH (Kb = 1.8 x 10^{-5}). A one molar solution of NH_4CN will be
a) neutral b) strongly acidic c) strongly basic d) weakly basic.

53. If the value of an equilibrium constant for a particular reaction is 16 x 10^{12}, then at equilibrium the system will contain:
a) mostly reactants b) mostly products c) similar amounts of reactants and products
d) all reactants

54. In the two gaseous reactions (i) and (ii) at 250°C
(i) $NO(g) + \frac{1}{2}O_2(g) \leftrightharpoons NO_2(g)$, K_1
(ii) $2NO_2(g) \leftrightharpoons 2NO(G) + O_2(g)$, K_2
the equilibrium constants K_1 and K_2 are related as
a) $K_2=\frac{1}{K_1}$ b) $K_2=K_1^{1/2}$ c) $K_2=\frac{1}{K_1^2}$ d) $K_1 = (K_2)^{1/2}$

55. 0.05 mole of NaOH is added to 5 litres of water. What will be the pH of the solution?
a) 12 b) 7 c) 2 d) 10

56. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
Assertion: The pH of NH_4Cl solution in water is less than 7 and pH of CH_3COONa solution is more than 7.
Reason: NH_4Cl is a salt of weak base NH_4 OH and strong acid HCl whereas CH_3COONa is salt of a weak acid CH_3COOH and strong base NaOH.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

57. In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: When ice and water are kept in a perfectly insulated thermos flask at 273 K and the atmospheric pressure, there is no change in mass of ice and water.
Reason: The system is in static equilibrium.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

58. Which of the following pairs constitute a buffer?
a) NaOH and NaCl b) HNO_3 and NH_4NO_3 c) HCl and KCl d) HNO_2 and $NaNO_2$

59. In the relation, $K_p = K_c(RT)^{\Delta n}$ the value of Δn is
a)
number of moles of gaseous reactants - number of moles of gaseous products in a balanced equation
b)
number of moles of gaseous products - number of moles of gaseous reactants in a balanced equation.
c)
number of moles of gaseous products x number of moles of gaseous reactants in a balanced equation.
d)
number of moles of gaseous reactants + number of moles of gaseous products in balanced equation.

60. MY and NY_3, two nearly insoluble salts, have the same K_{sp} values of 6.2×10^{-13} at room temperature. Which statement would be true in regard to MY and NY_3?
a) The salts MY and NY_3 are more soluble in 0.5M KY than in pure water.
b)
The addition of the salt of KY to solution of MY and NY_3will have no effect on their solubilities
c) The molar solubilities of MY and NY_3 in water are identical
d) The molar solubility of MY in water is less than that of NY_3.

61. A mixture of 1.57 mol of N_2, 1.92 mol of H_2 and 8.13 mol of NH_3 is introduced into a 20 L reaction vessel at 500 K. At this temperature, the equilibrium constant, K, for the reaction, $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ is 1.7×10^2. What is the direction of the net reaction?
a) Forward b) Backward c) At equilibrium d) Data is insufficient

62. Equimolar solutions of HF, HCOOH and HCN at 298 K have the values of K_a as 6.8×10^{-4} ,1.8×10^{-4} and 4.8×10^{-9} respectively. What will be the order of their acidic strength?
a) HF> HCN > HCOOH b) HF > HCOOH > HCN c) HCN> HF > HCOOH
d) HCOOH > HCN > HF

63. The value of H for the reaction $X_{2(g)}+ 4Y_{2(g)}2XY_{4(g)}$ is less than zero. Formation of will be favoured at :
a) Low pressure and low temperature b) High temperature and low pressure
c) High pressure and low temperature d) High temperature and high pressure

64. The reaction $2SO_2 + O_2 \rightleftharpoons 2SO_3$ + Heat, will be favoured by

a) high temperature and low pressure b) low temperature and high pressure
c) high temperature and high pressure d) low temperature and low pressure.

65. The dissociation constants for acetic acid and HCN at 25°C are 1.5×10^{-5} and 4.5×10^{-10}, respectively. The equilibrium constant for the following equilibrium, $CN^- + CH_3COOH \rightleftharpoons HCN + CH_3COO^-$ would be :
a) 3.0×10^5 b) 3.0×10^{-5} c) 3.0×10^{-4} d) 3×10^4

66. What is pOH of an aqueous solution with hydrogen ion concentration equal to 3×10^{-5} mol L^{-1}?
a) 9.47 b) 4.52 c) 12.69 d) 11.69

67. The ionisation constant of an acid, K_a is the measure of strength of an acid. The K_a values of acetic acid, hypochlorous acid and formic acid are 1.74×10^{-5}, 3.0×10^{-8} and 1.8×10^{-4} respectively. Which of the following orders of pH of 0.1 mol dm^{-3} solutions of these acids is correct?
a) Acetic acid> Hypochlorous acid> Formic acid
b) Hypochlorous acid> Acetic acid> Formic acid
c) Formic acid> Hypochlorous acid> Acetic acid
d) Formic acid> Acetic acid> Hypochlorous acid

68. 0.6 mole of PCl_5 , 0.3 mole of PCl_3 and 0.5 mole of Cl_2 are taken in a 1 L flask to obtain the following equilibrium:
$PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$
If the equilibrium constant K_c for the reaction is 0.2. Predict the direction of the reaction.
a) Forward direction b) Backward direction
c) Direction of the reaction cannot be predicted d) Reaction does not move in any direction

69. pH of a saturated solution of $Ca(OH)_2$ is 9. The solubility product(K_{sp}) of $Ca(OH)_2$ is:
a) 0.25×10^{-10} b) 0.125×10^{-15} c) 0.5×10^{-10} d) 0.5×10^{-15}

70. At 1127 K and 1 atm pressure, a gaseous mixture of CO and CO_2 in equilibrium with solid carbon has 90.55% CO by mass,
$C_{(s)} + CO_{2(g)} \rightleftharpoons 2CO_{(g)}$
K_c for this reaction at the above temperature is
a) 1.53 b) 0.153 c) 0.53 d) 0.76

71. The strongest conjugate base is
a) NO_3^- b) Cl^- c) SO_4^{2-} d) CH_3COO^-

72. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: K_p can be less than, greater than or equal to K_c
Reason: Relation between K_p and K_c depends on the change in number of moles of gaseous reactants and products (Δn).
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

73. $KMnO_4$ can be prepared from K_2MnO_4 as per reaction, $3MnO_4^{2-} + 2H_2O \rightleftharpoons 2MnO_4^- + MnO_2 + 4OH^-$. The reaction can go to completion by removing OH^- ions by adding:
a) HCl b) KOH c) CO_2 d) SO_2

74. Which of the following species can act both as an acid as well as a base?
a) SO_4^{2-} b) HSO_4^- c) PO_4^{3-} d) OH^-

75. Equimolar solutions of the following substances were prepared separately. Which of these will record the highest pH value
a) $BaCl_2$ b) $AlCl_3$ c) LiCl d) $BeCl_2$

76. For dibasic acid correct order is
a) $K_{a1}a2$ b) $K_{a1} > K_{a2}$ c) $K_{a1} = K_{a2}$ d) not certain

77. For the reversible reaction:
$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) +$ heat
The equilibrium shifts in forward direction:
a) By increasing the concentration of $NH_{3(g)}$ b) By decreasing the pressure
c) By decreasing the concentration of $N_{2(g)}$ and $H_{2(g)}$
d) By increasing pressure and decreasing temperature.

78. For a reaction, $2SO_{2(g)} + O_{2(g)} \Leftrightarrow 2SO_{3(g)}$ 1.5 moles of SO_2 and 1 mole of O_2 are taken in a 2 L vessel. At equilibrium the concentration of SO_3 was found to be 0.35 mol L^{-1}. The K_c for the reaction would be
a) 5.1 L mol^{-1} b) 1.4 L mol^{-1} c) 0.6 L mol^{-1} d) 2.95 L mol^{-1}

79. According to Le-Chatelier's principle, adding heat to a $\text{Solid} \rightleftharpoons \text{Liquid}$ equilibrium will cause the
a) temperature to increase b) temperature to decrease c) amount of liquid to decrease
d) amount of solid to decrease

80. Which of the following is most soluble?
a) Bi_2S_3 $\left(K_{sp} = 1 \times 10^{-70}\right)$ b) MnS $\left(K_{sp} = 7 \times 10^{-16}\right)$ c) CuS $\left(K_{sp} = 8 \times 10^{-37}\right)$
d) Ag_2S $\left(K_{cn} = 6 \times 10^{-51}\right)$

81. What is the minimum concentration of SO_4^{2-} required to precipitate $BaSO_4$ in a solution containing 1 x 10^{-4} mole of Ba^{2+}? (K_{sp} for $BaSO_4$ = 4 x 10^{-10})
a) 4 x 10^{-10} M b) 2 x 10^{-10} M c) 4 x 10^{-6} M d) 2 x 10^{-3} M

82. For the reaction, $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$ the equilibrium constant is K_1. The equilibrium constant is K_2 for the reaction, $2NO_{(g)} + O_{2(g)} \rightleftharpoons 2NO_{2(g)}$,
What is K for the reaction, $NO_{2(g)} \rightleftharpoons \frac{1}{2}N_{2(g)} + O_{2(g)}$?
a) $1/(4K_1K_2)$ b) $[1/K_1K_2]^{\frac{1}{2}}$ c) $1/(K_1K_2)$ d) $1/(2K_1K_2)$

83. Given below are the dissociation constant values of few acids. Arrange them in order of increasing acidic strength.
H_2SO_3 = 1.3 X 10^{-2} , HNO_2 = 4 X 10^{-4},
CH_3COOH = 1.8 x 10^{-5}, HCN = 4 x 10^{-10}
a) $HCN < CH_3COOH < HNO_2 < H_2SO_3$ b) $CH_3COOH < HNO_2 < HCN < H_2SO_3$
c) $CH_3COOH < HCN < H_2SO_3 < HNO_2$ d) $HNO_2 < H_2SO_3 < CH_3COOH < HCN$

84. The conjugate acid of NH_2^- is :
a) N_2H_4 b) NH_4^+ c) NH_2OH d) NH_3

85. For the chemical reaction
$$N_2(g) + 3H_2(g) \rightleftarrows 2NH_3(g)$$
The correct option is:

a) $-\frac{d[N_2]}{dt} = 2\frac{d[NH_3]}{dt}$ b) $-\frac{d[N_2]}{dt} = \frac{1}{2}\frac{d[NH_3]}{dt}$ c) $-\frac{d[H_2]}{dt} = 2\frac{d[NH_3]}{dt}$ d) $-\frac{1}{3}\frac{d[H_2]}{dt} = -\frac{1}{2}\frac{d[NH_3]}{dt}$

86. Find out the solubility of $Ni(OH)_2$ in 0.1 M NaOH. Given that the ionic product of $Ni(OH)_2$ is 2 x 10^{-15}.
a) 1 x 10^{8}M b) 2 x 10^{-13}M c) 2 x 10^{-8} M d) 1 x 10^{-13}M

87. 18.4 g of N_2O_4 is taken in a 1L dosed vessel and heated till the equilibrium is reached.
$N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$
At equilibrium it is found that 50% of N_2O_4 is dissociated. What will be the value of equilibrium constant?
a) 0.22 b) 2 c) 0.4 d) 0.8

88. At 473 K, equilibrium constant, K_c for decomposition of phosphorus pentachloride, PCl_5 is 8.3 X 10^{-3}. If decomposition is depicted as :
$PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$; $\Delta_r H^o$ = 124.0 kJ mol^{-1}
what would be the effect on reaction if the temperature is increased?
a) Reaction will shift in the backward direction b) Reaction will shift in the forward direction
c) Reaction is in equilibrium.
d) Reaction first moves forward and then remains at equilibrium.

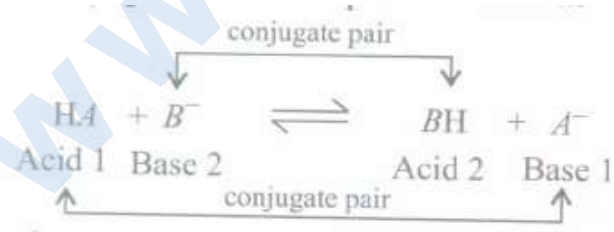
89. K_a for CH_3COOH is 1.8 x 10^{-5} and Kb for NH_4OH is 1.8 x 10^{-5}. The pH of ammonium acetate will be
a) 7.005 b) 4.75 c) 7.0 d) between 6 and 7

90. If α is the fraction of HI dissociated at equilibrium in the reaction, $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$ starting with the 2 moles of HI, then the total number of moles of reactants and products at equilibrium are
a) 2+2α b) 2 c) 1+α d) 2-α

91. Which of the following is conjugate acid of SO_4^{2-}?
a) HSO_4^- b) H^+ c) H_2SO_4 d) SO_4^{2-}

92. Which of the following is not an application of solubility product?
a) Predicting precipitation formation b) Predicting solubility of sparingly soluble salt
c) Predicting pH of a buffer solution d) Qualitative analysis

93. According to Bronsted-Lowry concept of acids and bases a conjugate acid-base pair can exist as



Mark the option in which conjugate pair is correctly matched.

a)

Species	Conjugate acid	Conjugate base
HCO_3^-	CO_3^{2-}	H_2CO_3

b)

Species	Conjugate acid	Conjugate base
HPO_4^{2-}	$H_2PO_4^-$	PO_4^{3-}

c)

Species	Conjugate acid	Conjugate base
NH_3	NH_2^-	NH_4^+

d)

Species	Conjugate acid	Conjugate base
HS^-	S^{2-}	H_2S

94. If the equilibrium constant for
$N_2O + O_2(g) \rightleftharpoons 2NO(g)$ is K
the equilibrium constant for
$\frac{1}{2} N_2(g) = \frac{1}{2} O_2(g) \rightleftharpoons NO(g)$ will be
a) $K^{\frac{1}{2}}$ b) $\frac{1}{2}$ K c) K d) K^2

95. Following solutions were prepared by mixing different volumes of NaOH and HCl of different concentrations:
(1) 60 ml $\frac{M}{10}$ HCl +40 ml $\frac{M}{10}$NaOH
(2) 55 ml $\frac{M}{10}$ HCl +45 ml $\frac{M}{10}$NaOH
(3) 75 ml $\frac{M}{5}$ HCl +25 ml $\frac{M}{5}$NaOH
(4) 100 ml $\frac{M}{10}$ HCl + 100 ml $\frac{M}{10}$NaOH
pH of which one of them will be equal to 1?
a) 2 b) 1 c) 4 d) 3

96. Acidic character of BF_3 can be explained on the basis of which of the following concepts?
a) Arrhenius concept b) Bronsted-Lowry concept c) Lewis concept
d) Bronsted-Lowry as well as Lewis concept

97. Nucleophiles are _____ while electrophiles are _____
a) Lewis bases, Lewis acids b) Lewis acids, Lewis bases
c) Bronsted acids, Bronsted bases d) Lewis acids, Bronsted bases

98. Which of the following statements about pH and H^+ ion concentration is incorrect?
a) Addition of one drop of concentrated HCl in NH_4OH solution decreases pH of the solution.
b)
A solution of the maximum of one equivalent of each of CH_3COOH and NaOH has a pH of 7.
c) pH of pure neutral water is not zero.
d)
A cold and concentrated H_2SO_4 has lower H^+ ion concentration than a dilute solution of H_2SO_4

99. Formation of ClF_3 from Cl_2 and F_2 is an exothermic process. The equilibrium system can be represented as
$Cl_{2(g)} + 3F_{2(g)} \rightleftharpoons 2ClF_3$; ΔH = -329 kJ mol^{-1}
Which of the following will increase quantity of ClF_3 in the equilibrium mixture?
a) Increase in temperature, decrease in pressure, addition of Cl_2
b) Decrease in temperature and pressure, addition of ClF_3
c) Increase in temperature and pressure, removal of Cl_2
d) Decrease in temperature, increase in pressure, addition of F_2.

100. Which of these is least likely to act as Lewis base?
a) CO b) F^- c) BF_3 d) PF_3

101. Solution of 0.1 N NH_4OH and 0.1N NH_4Cl has pH 9.25, then find out pK_b of NH_4OH:
a) 9.25 b) 4.75 c) 3.75 d) 8.25

102. In which of the following, the solubility of AgCl will be minimum?
a) 0.1M $NaNO_3$ b) Water c) 0.1M NaCl d) 0.1M NaBr

103. Predict if there will be any precipitate by mixing 50 mL of 0.01 M NaCl and 50 mL of 0.01 M $AgNO_3$ solution. The solubility product of AgCl is 1.5 x 10^{-10}
a) Since ionic product is greater than solubility product no precipitate will be formed.
b) Since ionic product is lesser than solubility product, precipitation will occur.
c) Since ionic product is greater than solubility product, precipitation will occur.
d) Since ionic product and solubility product are same, precipitation will not occur.

104. 5 moles of PCl_5 are heated in a closed vessel of 5litre capacity. At equilibrium 40% of PCl_5 is found to be dissociated. What is the value of K_c?
a) 0.266 M b) 0.133 M c) 2.5 M d) 0.20 M

105. Which of the following salts will give basic solution on hydrolysis?
a) NH_4Cl b) KCl c) K_2CO_3 d) $(NH_4)_2CO_3$

106. What is the concentration $[OH^-]$ in the final solution prepared by mixing 20.0 mL of 0.050M HCl with 30.0mL of 0.10MBa$(OH)_2$?
a) 0.10M b) 0.40M c) 0.0050M d) 0.12M

107. Which has the highest pH?
a) CH_3COOH b) Na_2CO_3 c) NH_4Cl d) $NaNO_3$

108. In which of the following reactions, the equilibrium remains unaffected on addition of small amount of argon at constant volume?
a) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ b) $PCI_{5(g)} \rightleftharpoons PCI_{3(g)} + Cl_{2(g)}$ c) $PCI_{5(g)} \rightleftharpoons PCI_{3(g)} + Cl_{2(g)}$
d) The equilibrium will remain unaffected in all the three cases.

109. The dissociation equilibrium of a gas AB_2 can be represented as $2AB_{2(g)} \rightleftharpoons 2AB_{(g)} + B_{2(g)}$ The degree of dissociation is x and is small compared to 1. The expression relating the degree of dissociation (x) with equilibrium constant K_p and total pressure P is :
a) $(2K_P/P)$ b) $(2K_P/P)^{1/3}$ c) $(2K_p/P)^{1/2}$ d) (K_p/P)

110. Identify the correct order of solubility in aqueous medium:
a) ZnS > Na_2S > CuS b) Na_2S>CuS>ZnS c) Na_2S > ZnS > CuS d) CUS>ZnS>Na_2S

111. A buffer solution is prepared in which the concentration of NH_3 is 0.30 M and the concentration of NH_4^+ is 0.20 M. If the equilibrium constant, K_b for NH_3 equals 1.8 x 10^{-5}, what is the pH of this solution?
a) 9.08 b) 9.43 c) 11.72 d) 8.73

112. The reaction $2A_{(g)} + B_{(g)} \rightleftharpoons 3C_{(g)} + D_{(g)}$ is begun with the concentration of Aand B both at an initial value of 1.00 M. When equilibrium is reached, the concentration of D is measured and found to be 0.25 M. The value for the equilibrium constant for this reaction is given by the express
a) $\left[(0.75)^3(0.25)\right] \div \left[(0.75)^3(0.25)\right]$ b) $\left[(0.75)^3(0.25)\right] \div \left[(1.00)^2(1.00)\right]$
c) $\left[(0.75)^3(0.25)\right] \div \left[(0.50)^2(0.75)\right]$ d) $\left[(0.75)^3(0.25)\right] \div \left[(0.50)^2(0.25)\right]$

113. $N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$; K_c = 5.7 x 10^{-9} at 298 K At equilibrium:
a) concentration of NO_2 is higher than that of N_2O_4
b) concentration of N_2O_4 is higher than that of NO_2
c) both N_2O_4 and NO_2 have same concentration
d) concentration of N_2O_4 and NO_2 keeps on changing

114. Classify the following as acid or base according to Bronsted-Lowry concept.
(i) CH^3COO-
(ii) H_3O^+
(iii) SO_4^{2-}
(iv) HCl
a)

(i)	(ii)	(iii)	(iv)
Bronsted base	Bronsted base	Bronsted base	Bronsted acid

b)

(i)	(ii)	(iii)	(iv)
Bronsted acid	Bronsted acid	Bronsted acid	Bronsted base

c)

(i)	(ii)	(iii)	(iv)
Bronsted base	Bronsted acid	Bronsted base	Bronsted acid

d)

(i)	(ii)	(iii)	(iv)
Bronsted acid	Bronsted acid	Bronsted base	Bronsted base

115. The rate constant for forward and backward reactions of hydrolysis of ester are 1.1 x $10^{-2}$and 1.5 x 10^{-3}per minute. Equilibrium constant for the reaction, $CH_3COOC_2H_5 + H+ \ CH_3COOH + C_2H_5OH$ is:
a) 4.33 b) 5.33 c) 6.33 d) 7.33

116. Concentration of the Ag^+ ion in a saturated solution of $Ag_2C_2O_2$ is 2.2 x 10^{-4} mol L^{-1}. Solubility product of $Ag_2C_2O_2$ is:
a) 2.66x 10^{-12} b) 4.5 x 10^{-11} c) 5.3 x 10^{-12} d) 2.42 x 10^{-8}

117. A buffer solution is prepared in which the concentration of NH_3 is 0.30 M and the concentration of $NH_4^+$is 0.20 M. If the equilibrium constant, K_b for NH_3 equals 1.8 x 10^{-5}, what is the pH of this solution? (log 2.7 = 0.43)
a) 9.43 b) 11.72 c) 8.73 d) 9.08

118. In a buffer solution containing equal concentration of B- and HB, Kb for B- is 10-1°. The pH of buffer solution is:
a) 10 b) 7 c) 6 d) 4

119. The values of K_{p1} and K_{p2} for the reactions:
$X \rightleftharpoons Y + Z \quad (a)$ and $A \rightleftharpoons 2B \ldots \ (b)$ are in the ratio of 9: 1. If degree of dissociation of X and A be equal, then total pressure at equilibrium (a) and (D) are in the ratio:
a) 3: 1 b) 1: 9 c) 36: 1 d) 1: 1

120. Given that the equilibrium constant for the reaction $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ has a value of 278 at a particular temperature. What is the value of the equilibrium constant for the following reaction at the same temperature?
$SO_3(g) \rightleftharpoons SO_2(g) + \frac{1}{2}O_2(g)$
a) 1.8 x 10^{-3} b) 3.6 x 10^{-3} c) 6.0 x 10^{-2} d) I.3 x 10^{-3}

121. Which one of the following orders of acid strength is correct?

a) RCOOH > HC ≡ CH > HOH > ROH b) RCOOH > ROH > HOH > HC ≡ CH
c) RCOOH > HOH > ROH > HC ≡ CH d) $RCOOH > HOH > HC \equiv CH > ROH$

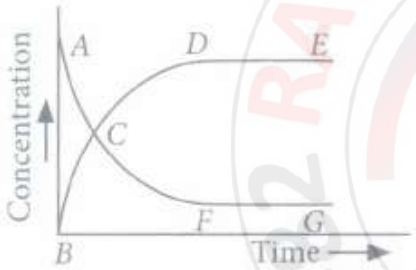
122. Conjugate acid of NH_2^- is
a) NH_2^+ b) NH_3 c) NH_2 d) NH

123. Accumulation of lactic acid ($HC_3H_5O_3$), a monobasic acid in tissues leads to pain and a feeling of fatigue. In a 0.10 M aqueous solution, lactic acid is 3.7% dissociated. The value of dissociation constant, k_a for this acid will be:
a) 2.8×10^{-4} b) 1.4×10^{-5} c) 1.4×10^{-4} d) 3.7×10^{-4}

124. For the reaction a + b $\rightleftharpoons$ c + d, initially concentrations of a and b are equal and at equilibrium the concentration of d will be twice of that of a. What will be the equilibrium constant for the reaction?
a) 2 b) 9 c) 4 d) 3

125. Which one of the following conditions will favour maximum formation of the product in the reaction, $A_2(g) + B_2(g) \rightleftharpoons X_2(g)$, $\triangle_r H = - X$ kJ?
a) Low temperature and high pressure b) Low temperature and low pressure
c) High temperature and high pressure d) High temperature and low pressure

126. Reversible reaction is studied graphically as shown in the given figure.
$N_2O_4 \rightleftharpoons 2NO_2$, $K_c = 4$



Select the correct statements out of I, II and III.
I. Reaction quotient has maximum value at point A.
II. Reaction proceeds left to right at a point when $[N_2O_4] = [NO_2] = 0.1$ M.
III. $K_c = Q$ when point D or F is reached.
a) I,II b) II,III c) I,III d) I,II,III

127. For the reaction $2NO_{2(g)} \rightleftharpoons N_2O_{4(g)p}$ K_p/K_c is equal to
a) $\frac{1}{RT}$ b) $\sqrt{RT}$ c) RT d) $(RT)^2$

128. The reaction quotient (Q) for the reaction $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ is given by

$$Q = \frac{[NH_3]^2}{[N_2][H_2]^3}$$

The reaction will process towards right side, if :
a) $Q > K_C$ b) $Q = 0$ c) $Q = K_C$ d) $Q < K_C$

129. Which of the following statements is correct for a reversible process in a state of equilibrium?
a) $\triangle G^o = -2.30$ RT log K b) $\triangle G = 2.30$ RT log K c) $\triangle G^o = 2.30$ RT log K
d) $\triangle G = - 2.30$ RT log K

130. pK_a of a weak acid is 5.76 and pK_b of a weak base is 5.25. What will be the pH of the salt formed by the two?
a) 7.255 b) 7.005 c) 10.225 d) 4.255

131. H_2S gas when passed through a solution containing HCl precipitates the cations of second group of qualitative analysis but not those belonging to the fourth group. It is because:
a) Presence of HCl decreases the sulphide ion concentration
b) Presence of HCl decreases the sulphide ion concentration
c) Solubility product of group IIsulphides is more than that of group IV sulphides
d) Sulphides of group IV cations are unstable in HCl

132. Using the Gibbs change, ΔG^o = +63.3kJ, for the following reaction, the K_{sp} of $Ag_2CO_3(s)$ in water at 25°C is:
$Ag_2CO_3(g) \rightleftharpoons 2Ag^+(aq) + CO_3^{2-}(aq)$ (R = 8.314JK^{-1}mol^{-1})
a) 3.2 x 10^{-26} b) 8.0 x 10^{-12} c) 2.9 x 10^{-3} d) 7.9 x 10^{-2}

133. For a reversible reaction at 298 K the equilibrium constant K is 200. What is the value of ΔG^0 at 298 K?
a) -13.13 kcal b) -0.13 kcal c) -3.158 kcal d) -0.413 kcal

134. The solubility product of sparingly soluble salt AX_2 is 3.2 x 10^{-11}. Its solubility (in mol/L) is :
a) 5.6 x 10^{-6} b) 3.1 x 10^{-4} c) 2 x 10^{-4} d) 4 x 10^{-4}

135. The ionization constant of benzoic acid is 6.46 x 10^{-5} and Ksp for silver benzoate is 2.5 x 10^{-13}. How many times is silver benzoate more soluble in a buffer of pH = 3.19 compared to its solubility in pure water?
a) 4 b) 3.32 c) 3.01 d) 2.5

136. What will be the correct order of vapour pressure of water, acetone and ether at 30°C, Given that among these compounds, water has maximum boiling point and ether has minimum boiling point?
a) Water < Ether < Acetone b) Water < Acetone < Ether c) Ether < Acetone < Water
d) Acetone < Ether < Water

137. K_I and K_2 are equilibrium constant for reactions (i) and (ii)
$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$
$NO(g) \rightleftharpoons N_2(g) + \frac{1}{2}O_2(g)$
a) $K_1 = \left(\frac{1}{K_2}\right)^2$ b) $K_1 = K_2^2$ c) $K_1 = \frac{1}{K_2}$ d) $K_1 = (K_2)^0$

138. The concentration of [H$^+$] and concentration of [OH$^-$] of a 0.1 M aqueous solution of 2M ionised weak acid is: [ionic product ofwater = I x 10^{-14}].
a) 0.02 x 10^3 M and 5 x 10^{-11} M b) 1 x 10^{-3} M and 3 x 10^{-11} M
c) 2 x 10^{-3} M and 5 x 10^{-12} M d) 3 x 10^{-2} M and 4 x 10^{-13} M

139. For the reaction $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$, the forward reaction at constant temperature is favoured by
a) introducing an inert gas at constant volume b) introducing Cl_2 at constant volume
c) introducing inert gas at constant pressure d) reducing the volume of the container

140. Buffer solutions have constant acidity and alkalinity because:
a) These give unionized acid or base on reaction with added acid or alkali
b) Acids and alkalies in these solutions are shielded from attack by other ions
c) They have large excess of H$^+$ or OH$^-$ ions d) They have fixed value of pH

141. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
Assertion: The solubility of salts of weak acids like phosphates decreases at lower pH.
Reason: This is because at lower pH concentration of cations increases.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

142. If pH of a saturated solution of $Ba(OH)_2$ is 12, the value of its $K_{(sp)}$ is:
a) $4.00 \times 10^{-6} M^3$ b) $4.00 \times 10^{-7} M^3$ c) $5.00 \times 10^{-6} M^3$ d) $5.00 \times 10^{-7} M^3$

143. If the equilibrium constant for the given reaction is 0.25 NO $\rightleftharpoons \frac{1}{2}N_2 + \frac{1}{2}O_2$, then the equilibrium constant for the reaction $\frac{1}{2}N_2 + \frac{1}{2}O_2 \rightleftharpoons$NO will be
a) 1 b) 2 c) 3 d) 4

144. In the following reaction:
$NO_{(g)} + Cl_{2(g)} \rightleftharpoons 2NOCl_{(g)}$
it is observed that equilibrium is not attained and the rate of forward reaction is greater than rate of backward reaction. Which of the following is true for the reaction?
a) $K_p = Q_p$ b) $Q_p > K_p$ c) $Q_p < K_p$ d) $Q_p = 0$

145. 1 mole of NO and 1 mole of O_3 are taken in a 10 L vessel and heated. At equilibrium, 50% of NO (by mass) reacts with O_3 according to the equation:
$NO_{(g)} + O_{3(g)} \rightleftharpoons NO_{2(g)} + O_{2(g)}$
What will be the equilibrium constant for this reaction?
a) 1 b) 2 c) 3 d) 4

146. For the reaction:
$CH_4(g) + 2O_2(g) \rightleftharpoons CO_2(g) + 2H_2O(l)$
$\Delta H_r = -170.8\ kJmol^{-1}$
Which of the following statements is not true?
a) At equilibrium, the concentrations of $CO_2(g)$ and $H_2O_{(l)}$ are not equal
b) The equilibrium constant for the reaction is given by $K_C = \frac{[CO_2]}{[CH_4][O_2]}$
c) Addition of $CH_{4(g)}$ or $O_{2(g)}$ at equilibrium will cause a shift to the right.
d) The reaction is exothermic

147. For the equilibrium, $MgCO_3(s) \Leftrightarrow MgO(s) + CO_2(g)$ Which of the following expressions is correct?
a) $Kp = P_{CO2}$ b) $K_p = \frac{[KgO][CO_2]}{[MgCO_3]}$ c) $K_p = \frac{p_{MgO} \cdot P_{CO_3}}{P_{MgCO_3}}$ d) $K_p = \frac{p_{MgO} \cdot P_{CO_2}}{P_{MgCO_3}}$

148. Which of the following statements is incorrect?
a)
In equilibrium mixture of ice and water kept in perfectly insulated flask, mass of ice and water does not change with time.
b)
The intensity of red colour increases when oxalic acid is added to a solution containing iron (III) nitrate and potassium thiocyanate.

c) On addition of catalyst, the equilibrium constant value is not affected.

d)

Equilibrium constant for a reaction with negative ΔH value decreases as the temperature increases.

149. Solubility product expression of salt MX_4 which is sparingly soluble with a solubility s can be given as

a) $256s^5$ b) $16s^3$ c) 5s d) $25s^4$

150. If is α the fraction of HI dissociated at equilibrium in the reactions, $2HI(g) \Leftrightarrow H_2(g) + I_2(g)$ starting with the 2 moles of HI, then the total number of moles of reactants and products at equilibrium are:

a) $2 + 2\alpha$ b) 2 c) $1 + \alpha$ d) $2 - \alpha$

151. The hydrogen ion concentration of a 10^{-8} M HCl aqueous solution at 298 K ($K_w = 10^{-14}$) is

a) 11×10^{-8}M b) 9.525×10^{-8}M c) 10×10^{-8}M d) 10×10^{-6} M

152. What is $[H^+]$ in mol/L of a solution that is 0.20Min CH_3COONa and 0.10M in CH_3COOH? (K_a for $CH_3COOH = 1.8 \times 10^{-5}$)

a) 3.5×10^{-4} b) 1.1×10^{-5} c) 1.8×10^{-5} d) 9.0×10^{-6}

153. In HS^-, I^-, $R - NH_2$ and NH_3, order of proton accepting tendency will be:

a) $I^- > NH_3 > RNH_2 > HS^-$ b) $HS^- > RNH_2 > NH_3 > I^-$ c) $R - NH_2 > NH_3 > HS^- > I^-$

d) $NH_3 > RNH_2 > HS^- > I^-$

154. If K_1 and k_2 are the respective equilibrium constants for the two reactions

$$XeF_6(g) + H_2O(g) \rightleftharpoons XeOF_4(g) + 2HF(g)$$

$$XeO_4(g) + XeF_6(g) \rightleftharpoons XeOF_4(g) + XeO_3F_2(g)$$

The equilibrium constant of the reaction,

$$XeO_4(g) + 2HF(g) \rightleftharpoons XeO_3F_2(g) + H_2O(g)$$

a) $K_1/(K_2)^2$ b) K_1/K_2 c) K_1/K_2 d) K_2/K_1

155. The following equilibrium constant are given

$$N_2 + 3H_2 \rightleftharpoons 2NH_3; K_1$$

$$N_2 + O_2 \rightleftharpoons 2NO; K_2$$

$$H_2 + \frac{1}{2}O_2 \rightleftharpoons H_2O; K_2$$

The equilibrium constant for the oxidation of NH_3 by oxygen to given NO is

a) $\frac{K_2 K_3^2}{K_1}$ b) $\frac{K_2^3 K_3}{K_1}$ c) $\frac{K_1 K_2}{K_3}$ d) $\frac{K_2 K_3^3}{K_1}$

156. Consider the nitration of benzene using mixed conc. of H_2SO_4 and NHO_3. If a large amount of $KHSO_4$ is added to the mixture, the rate of nitration will be:

a) faster b) slower c) unchanged d) doubled

157. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: A solution of NH_4Cl in water is acidic in nature.

Reason: Ammonium ions undergo hydrolysis to form NH_4OH

a) If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false d) If both assertion and reason are false.

158. For a given exothermic reaction K_p and K'_p the equilibrium constants at temperature T_1 and T_2 .respectively. Assuming that heat of reaction is constant in temperature range between T_1 and T_2, it is readily observation that:
a) $K_P > K'_p$ b) $K_P < K'_p$ c) Kp = K'p d) $K_P = \frac{1}{K'_p}$

159. Solubility of MX2- type electrolytes is 0.5 x 10^{-4} mole/lit, then find out K_{sp} of electrolytes
a) 5 x 10^{-12} b) 25 x 10^{-10} c) 5 x 10^{-13} d) 5 x 10^{-13}

160. An acidic buffer solution can be prepared by mixing the solution of
a) sodium acetate and acetic acid b) ammonium acetate and ammonium hydroxide
c) sodium chloride and sodium hydroxide d) potassium sulphate and sulphuric acid.

161. At 500 K, the equilibrium constant for the reaction $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_g$ is 24.8. If $\frac{1}{2}$ mol/L of HI is present at equilibrium, what are the concentrations of H_2 and I_2, assuming that we started by taking HI and reached the equilibrium at 500 K?
a) 0.068 mol L^{-1} b) 1.020 mol L^{-1} c) 0.10 mol L^{-1} d) 1.20 mol L^{-1}

162. A reaction is said to be in equilibrium when:
a)
the rate of transformation of reactants to products is equal to the rate of transformation of products to the reactants
b) 50% of the reactants are converted to products
c) the reaction is near completion and all the reactants are converted to products
d) the volume of reactants is just equal to the volume of the products.

163. The expression for equilibrium constant, K_c for thefollowing reaction is:
$Fe^{3+}_{(aq)} + 3OH^-_{(aq)} \rightleftharpoons Fe(OH)_{3(s)}$
a) $K_c = \frac{[Fe(OH)_3]}{[Fe^{3+}][OH^-]^3}$ b) $K_c = \frac{[Fe(OH)_3]}{[Fe^{3+}][OH^-]}$ c) $K_c = \frac{1}{[Fe^{3+}][OH^-]^3}$ d) $Fe(OH)_{3(s)}$

164. 0. 1 m solution of which one of these substances will be basic?
a) Sodium borate b) Calcium nitrate c) NH_4Cl d) Sodium sulphate

165. Reaction, $BaO_2(s) \rightleftharpoons BaO(s) + O_2(g)$, ΔH = +ve. In equilibrium condition, pressure of O_2 depends on:
a) Increased mass of BaO_2 b) Increased mass of BaO
c) Increased temperature on equilibrium d) Increased mass of BaO_2 and BaO both

166. The pH of neutral water at 25°C is 7.0. As the temperature increases, ionisation of water increases, however, the concentration of H^+ ions and OH^- ions are equal. What will be the pH of pure water at 60°C?
a) Equal to 7.0 b) Greater than 7.0 c) Less than 7.0 d) Equal to zero

167. In a vessel N_2 ,H_2 and NH_3 are at equilibrium. Some helium gas is introduced into the vessel so that total pressure increases while temperature and volume remain constant. According to Le Chatelier's principle, the dissociation of NH_3
a) increases b) decreases c) remains unchanged d) equilibrium is disturbed.

168. What will be the amount of $(NH_4)_2SO_4$ (in g) which must be added to 500 mL of 0.2 M NH_4OH to yield a solution of pH 9.35? [Given, pK_a of NH_4^+ = 9.26, pK_b NH_4OH = 14 - pK_a (NH_4^+)]
a) 5.35 b) 6.47 c) 10.03 d) 7.34

169. Aqueous solution of acetic acid contains:

a) CH_3COO^- and H^+ b) CH_3COO^-, H_3O^+ and CH_3COOH c) CH_3COO^-, H_3O^+ and H^+
d) CH_3COOH, CH_3COO^- and H^+

170. A mixture of N_2 and Ar gas in a cylinder contains 7g of N_2 and 8g of Ar. If the total pressure of the mixture of gases in the cylinder is 27 bar, the partical pressure of N_2 is: [Use atomic masses (in g mol^{-1}) : N = 14, Ar = 40]
a) 18 bar b) 9 bar c) 12 bar d) 15 bar

171. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
Assertion: Weak acids have very strong conjugate bases while strong acids have weak conjugate bases.
Reason: Conjugate acid-base pair differ only by one proton.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

172. Which one of the following information can be obtained on the basis of Le-Chatelier's principle?
a) Dissociation constant of a weak acid b) Entropy change in a reaction
c) Equilibrium constant of a chemical reaction
d) Shift in equilibrium position on changing value of a constant

173. The solubility product of AgCl is 1.8 x 10^{-10}. Precipitation of AgCl will occur by mixing which of the following solutions are mixed in equal volumes?
a) 10^{-8} M Ag^+ and 10^{-8} M Cl^- ions b) 10^{-3} M Ag^+ and 10^{-3} M Cl^- ions
c) 10^{-6} M Ag^+ and 10^{-6} M Cl^- ions d) 10^{-10} M Ag^+ and 10^{-10} M Cl^- ions

174. Hydrolysis of sucrose is given by the following reaction

$$\text{Sucrose} + H_2O \rightleftharpoons \text{Glucose} + \text{Fructose}$$

If the equilibrium constant (K_c) is 2 x 10^{13} at 300K, the value of $\Delta_r G^\Theta$ at the same temperaiure will be
a) -8.314J mol^{-1} K^{-1} x 300K x ln(4 x 10^{13}) b) -8.314J mol^{-1} K^{-1} x 300K x ln(2 x 10^{13})
c) 8.314J mol^{-1} K^{-1} x 300K x ln(2 x 10^{13}) d) 8.314J mol^{-1} K^{-1} x 300K x ln(3 x 10^{13})

175. The ionization constant of ammonium hydroxide is 1.77 x 10^{-5} at 298 K. Hydrolysis constant of ammonium chloride is:
a) 6.50 x 10^{-12} b) 5.65 x 10^{-13} c) 5.65 x 10^{-12} d) 5.65 x 10^{-10}

176. Calculate the pOH of solution at 25°C that contains 1 X 10^{-10}M of hydronium ion?
a) 7.00 b) 4.00 c) 9.00 d) 1.00

177. In which of the following reactions the increase in pressure will favour the increase in products?
a) $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$ b) $PCl_{3(g)} + Cl_{2(g)} \rightleftharpoons PCl_{5(g)}$ c) $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$
d) $2CO_{2(g)} \rightleftharpoons 2CO_{(g)} + O_{2(g)}$

178. Which of the following is not a general characteristic of equilibria involving physical processes?
a) Equilibrium is possible only in a closed system at a given temperature.
b) The equilibrium is dynamic in nature c) All the physical processes stop at equilibrium.
d) Equilibrium can be attained from both sides of the reaction.

179. What is the pH of a solution obtained by mixing 10 mL of 0.1 M HCl and 40 mL of 0.2 M H_2SO_4?
a) 0.74 b) 7.4 c) 4.68 d) 0.468

180. The percentage of pyridine (C_5H_5N) that forms pyridinium ion ($C_5H_5N^+H$) in a 0.10 M aqueous pyridine solution (K_b for C_5H_5N = 1.7 x 10^{-9}) is :
a) 0.0060% b) 0.013% c) 0.77% d) 1.6%

181. The dissociation equilibrium of a gas AB_2 can be represented as
$$2AB_2(g) \rightleftharpoons 2AB(g) + B_2(g)$$
The degree of dissociation is x, and is small compared to 1. The expression relating the degree of dissociation (x) with equilibrium constant K_p and total pressure p is:
a) $(2K_p/P)$ b) $(2K_p/P)^{1/3}$ c) $(2K_p/P)^{1/2}$ d) (k_P/P)

182. pH of a saturated solution of $Ba(OH)_2$ is 12. The value of solubility product K_{sp} of $Ba(OH)_2$ is :
a) 3.3 x 10^{-7} b) 5.0 x 10^{-7} c) 4.0 x 10^{-6} d) 5.0 x 10^{-6}

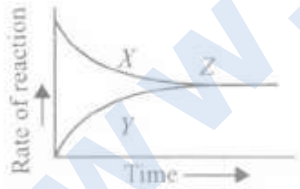
183. Which of the following molecules acts as a Lewis acid?
a) $(CH_3)_2O$ b) $(CH_3)_3P$ c) $(CH_3)_3N$ d) $(CH_3)_3B$

184. In the system X + 2 Y $\rightleftharpoons$ Z, the equilibrium concentrations are, [X] = 0.06 mol L^{-1}, [y] = 0.12 mol L^{-1}, [Z] = 0.216 mol L^{-1}. Find the equilibrium constant of the reaction.
a) 250 b) 500 c) 125 d) 273

185. For the reaction
$$2BaO_2(s) \rightleftharpoons 2BaO(s) + O_2(g)$$
$\Delta H = +ve.$ In equilibrium condition, pressure of O_2 is dependent on
a) mass of BaO_2 b) mass of BaO c) temperature of equilibriunr
d) mass of BaO_2 and BaO both

186. The concentration of Ag^+ in a satureted solution of Ag_2CrO_4 at 20^0C is 1.5 $\times$ 10^{-4}molL^{-1}. The solubility product of Ag_2CrO_4 at 20^0C is?
a) 1.687 x 10^{-12} b) 1.75 x 10^{-10} c) 3.0 x 10^{-8} d) 4.5 x 10^{-10}

187. Study the given figure and label X, Y and Z.



a)

X	Y	Z
Backward reation	Forward reaction	Products

b)

X	Y	Z
Forward reaction	Backward reation	Equilibrium

c)

X	Y	Z
Reversible reaction	Irreversible reation	Equilibrium

d)

X	Y	Z
Forward reaction	Forward reaction	Backward reaction

188. A base when dissolved in water yields a solutions with a hydroxyl ion concentration of 0.05 mol litre^{-1}. The solution is:
a) basic b) acidic c) neutral d) either b'or'c'

189. The pH value of a 10M solution of HCl is :
a) Less than 0 b) Equal to 0 c) Equal to 1 d) Equal to 2

190. Solubility of CaF_2 is 0.5 x 10^{-4} mol L^{-1}. The value of K_{sp} for the salt is:
a) 5 x 10^{-12} b) 2.5 x 10^{-16} c) 1 x 10^{-13} d) 5 x 10^{-13}

191. If K_I and K_2 are the respective equilibrium constants for the two reactions,
$XeF_{6(g)} + H_2O_{(g)} \rightleftharpoons XeOF_{4(g)} + 2HF_{(g)}$
$XeO_4(g) + XeF_{6(g)} \rightleftharpoons XeOF_{4(g)} + XeO_3F_2(g)$
The equilibrium constant of the reaction. $XeO_{4(g)} + 2HF_{(g)} \rightleftharpoons XeO_3F_2(g) + H_2O_{(g)}$ will be:
a) $K_1/(K_2)^2$ b) $K_1.K_2$ c) K_1/K_2 d) K_2/K_I

192. The following reaction is at equilibrium,
$Fe^{3+}_{(aq)} + SCN^-_{(aq)} \rightleftharpoons [Fe(SCN)]^{2+}_{(aq)}$; $K_c = \frac{[Fe(SCN)]^{2+}}{[Fe^{3+}][SCN^-]}$
In the above reaction, colour intensity of red colour can be increased by
a) addition of KSCN b) addition of oxalic acid which reacts with Fe^{3+} ions.
c) addition of Hg^{2+} ions which react with SCN^- ions
d) red colour intensity cannot be changed

193. For the reaction, $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$. What is K_c when the equilibrium concentration of $[SO_2]$ = 0.60 M, $[O_2]$ = 0.82 M and $[SO_3]$ = 1.90 M?
a) 12.229 L mol^{-1} b) 24.5 L mol^{-1} c) 36.0 L mol^{-1} d) 2.67 x 10^3 L mol^{-1}

194. The reaction quotient (Q) for reaction
$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ is given by $Q = \frac{[NH_3]^2}{[N_2][H_2]^2}$ The reaction will proceed from right to left
a) Q=0 b) Q = K_c c) Q < K_c d) Q > K_c

195. The values of K_{sp} of $CaCO_3$ and CaC_2O_4 are 4.7 x 10^{-9} and 1.3 x 10^{-9} respectively at 25°C. If the mixture of these two is washed with water, what is the concentration of Ca^{2+} ions in water:
a) 7.746 x 10^{-5}M b) 5.831 x 10^{-5}M c) 6.856 x 10^{-5}M d) 3.606 x 10^{-5}M

196. In which of the following equilibrium K_c and K_p are not equal
a) $2NO_{(g)} \rightleftharpoons N_{2(g)} + O_{2(g)}$ b) $SO_{2(g)} + NO_{2(g)} \rightleftharpoons SO_{3(g)} + NO_{(g)}$
c) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ d) $2C_{(s)} + O_{2(g)} \rightleftharpoons 2CO_{2(g)}$

197. Equimolar solution of the following substances were prepared separately. Which one of these will record the highest pH value?
a) $BaCl_2$ b) $AlCl_3$ c) LiCl d) $BeCl_2$

198. The equilibrium constant for the reaction. Az ⇌2A at 500 K and 700K are 1 x 10^{-10} and 1 x 10^{-5}.The given reaction is :
a) Exothermic b) Slow c) Endothermic d) Fast

199. For the reaction $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$ the value of K_c, at 800°C is 0.1. When the equilibrium concentration of both the reactants is 0.5 mol, what is the value of K_p at the same temperature?

a) 0.5 b) 0.01 c) 0.05 d) 0.1

200. Dissociation constants of CH_3COOH and NH_4OH in aqueous solution are 10^{-5}. If pH of a CH_3COOH solution is 3, What will be the pH of NH_4OH?
a) 3.0 b) 4.0 c) 10.0 d) 11.0

201. What is the correct relationship between the pHs of isomolar solutions of sodium oxide (pH_1), sodium sulphide (pH_2), sodium selenide (pH_3) and sodium telluride (pH_4)?
a) $pH_1 > pH_2 > pH_3 > pH_4$ b) $pH_1 > pH_2 \approx pH_3 > pH_4$ c) $pH_1 > pH_2 < pH_3 < pH_4$
d) $pH_1 > pH_2 < pH_3 \approx pH_4$

202. Mark the appropriate choice to fill up the blanks in the given paragraph. A solution which maintains constant pH when small amounts of acid or base are added is known as a ___(i)___ A mixture of acetic acid and sodium acetate acts as___(ii)____with a pH around ___(iii)___ and a mixture of ammonium chloride and ammonium hydroxide acts as ___(iv)____ with a pH around ___(v)____ .

a)

(i)	(ii)	(iii)	(iv)	(v)
buffer capacity	basic buffer	9.25	acidic buffer	4.75

b)

(i)	(ii)	(iii)	(iv)	(v)
buffer solution	acidic buffer	9.25	basic buffer	4.75

c)

(i)	(ii)	(iii)	(iv)	(v)
buffer solution	basic buffer	4.75	acidic buffer	9.25

d)

(i)	(ii)	(iii)	(iv)	(v)
buffer solution	acidic buffer	4.75	basic buffer	9.25

203. PCl_5, PCl_3 and Cl_2 are at equilibrium at 500 K in a closed container and their concentrations are 0.8×10^{-3} mol L^{-1}, 1.2×10^{-3} mol L^{-1} and 1.2×10^{-3} mol L^{-1} respectively. The value of K_c for the reaction:
$PCl_5 \rightleftharpoons PCl_3(g) + Cl_2(g)$ will be
a) 1.8×10^{3} mol L^{-1} b) 1.8×10^{-3} c) 1.8×10^{-3} L mol^{-1} d) 0.55×10^{4}

204. 5 moles of SO_2 and 5 moles of O_2 react in a dosed vessel. At equilibrium 60% of the SO_2 is consumed. The total number of gaseous moles (SO_2 , O_2 and SO_3) in the vessel is
a) 5.1 b) 3.9 c) 10.5 d) 8.5

205. The degree of ionisation of an acid HA is 0.00001 at 0.1 M concentration. Its dissociation constant will be
a) 10^{-9} b) 10^{-11} c) 10^{-8} d) 10^{-7}

206. If the equilibrium constant for $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ is K, the equilibrium constant for $\frac{1}{2}N_2(g) + \frac{1}{2}O_2(g) \rightleftharpoons NO(g)$ will be :
a) $\frac{1}{2}$K b) K c) K^2 d) $K^{\frac{1}{2}}$

207. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
Assertion: The acidic strength of haloacids increases in the order: HI << HBr << HCl << HF
Reason: Strength of acid HA depends only on the electronegativity difference between H and A.

a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

208. The solubility of $AgCl_{(s)}$ with solubility product 1.6×10^{-10} in 0.1 M NaCl solution would be :
a) 1.26×10^{-5}M b) 1.6×10^{-9}M c) 1.6×10^{-11}M d) Zero

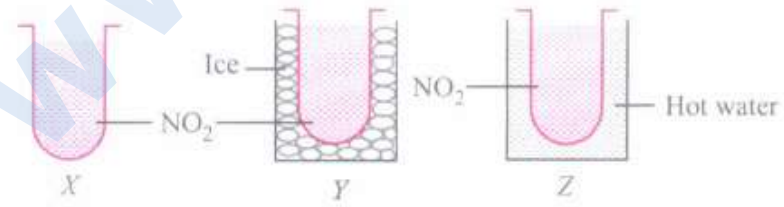
209. The hydride ion H^- is stronger base than its hydroxide ion OH^- which of the following reactions will occur if sodium hydride (NaH) is dissolved in water?
a) $2H^-_{(aq)} + H_2O_{(l)} \longrightarrow H_2O + H_2 + 2e^-$ b) $H^-_{(aq)} + H_2O_{(l)} \longrightarrow OH^- + H_2$
c) $H^- + H_2O_{(l)} \longrightarrow$ No reaction d) None of the above

210. pH of a saturated solution of $Ba(OH)_2$ is 12. The value of solubility product (K_{sp}) of $Ba(OH)_2$ is:
a) 3.3×10^{-7} b) 5.0×10^{-7} c) 4.0×10^{-6} d) 5.0×10^{-6}

211. For the reversible reaction:
$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) + \text{heat}$$
The equilibrium shifts in forward direction:
a) By increasing the concentration of NH_3(g) b) By decreasing the pressure
c) By decreasing concentration of N_2(g) and H_2(g)
d) By increasing pressure and decreasing temperature.

212. Which of the following reactions are disproportionation reaction?
$(A) 2Cu^+ \rightarrow Cu^{2+} + Cu^0$
$(B) 3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$
$(C) 2KMnO_4 \xrightarrow{\Delta} K_2MnO_4 + 2MnO_2 + O_2$
$(D) 2MnO_4^- + 3Mn^{2+} + 2H_2O \rightarrow 5MnO_2 + 4H^+$
Select the correct option from the following:
a) (A), (B) and (C) b) (A),(C) and (D) c) (A) and (D) only d) (A) and (B) only

213. In an experiment, NO_2 gas is prepared and taken into 3 test tubes X, Y and Z. NO_2 gas which is brown in colour dimerises into N_2O_4 which is colourless. Test tube X is kept at room temperature, Y is kept in ice and Z is kept in hot water. What colour changes will you observe in the test tubes and why?
$2NO_{2(g)} \rightleftharpoons N_2O_{4(g)}$; $\Delta H = -57.2$ kJ mol^{-1}
(Brown) (Colourless)



a)
In test tube X, brown colour intensifies since backward reaction is favoured at low temperature.
b)
In test tube Y, brown colour intensifies since backward reaction takes place at room temperature.

c)

In test tube Z, brown colour intensifies since high temperature favours the backward reaction.

d)

Brown colour of test tubes X, Y and Z remains same since there is no effect of change in temperature on the reaction.

214. Which of the following relations between the reactions and equilibrium constant for a general reaction, aA + bB $\rightleftharpoons$ cC + dD is not correct?

a) aA + bB $\rightleftharpoons$ cC + dD : K_c b) cC + dD $\rightleftharpoons$ aA + bB : $K_c' = \frac{1}{K_c}$

c) naA + nbB $\rightleftharpoons$ncC + ndD : $K_c'' = K_c''$ d) aA + bB $\rightleftharpoons$ cC + dD : $K_c = K_p$

215. The equilibrium constants for following reactions are given

$N_2 + 3H_2 \rightleftharpoons 2NH_3, K_I$

$N_2 + O_2 \rightleftharpoons 2NO, K_2$

$H_2 + \frac{1}{2}O_2 \rightleftharpoons H_2O, K_3$

The equilibrium constant (K) of the reaction, $2NH_3 + \frac{5}{2}O_2 \rightleftharpoons 2NO + 3H_2O$ will be:

a) $\frac{K_1(K_3)^2}{K_2}$ b) $\frac{K_2(K_3)^3}{K_1}$ c) $K_1K_2K_3$ d) $\frac{K_2K_2}{K_3}$

216. For a reaction, $A_xB_y \rightleftharpoons xA^{y+} + yB^{x-}$, k_{sp} can be represented as

a) $[A^{y+}]^x[B^{x-}]^y$ b) $[A]^y[B]^x$ c) $[A]^x[B]^y$ d) $[A]^{x+y}[B]^{x-y}$

217. At 25°C, the dissociation constant of a base, BOH is 1.0×10^{-12}. The concentration of hydroxyl ions in 0.01 M aqueous solution of the base would be:

a) 2.0×10^{-6} mol L^{-1} b) 1.0×10^{-5} mol L^{-1} c) 1.0×10^{-6} mol L^{-1} d) 1.0×10^{-7} mol L^{-1}

218. The value of equilibrium constant of the reaction, $HI_{(g)} \rightleftharpoons \frac{1}{2}H_{2(g)} + \frac{1}{2}I_{2(g)}$ is 8.0. The equilibrium constant of the reaction, $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

a) 1/6 b) 1/64 c) 16 d) 1/8

219. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	$Fe(OH)_3$	(i)	$K_{sp}=s^2$
(B)	Ag_2CrO_4	(ii)	$K_{sp} = 27s^4$
(C)	CH_3COOAg	(iii)	$K_{sp} = 108s^5$
(D)	$Ca_3(PO_4)_2$	(iv)	$K_{sp} = 4s^3$

a) (A)→(iii), (B)→(ii), (C)→(iv), (D)→(i) b) (A)→(ii), (B)→(iv), (C)→(i), (D)→(iii)

c) (A)→(i), (B)→(iii), (C)→(ii), (D)→(iv) d) (A)→(iv), (B)→(i), (C)→(iii), (D)→(ii)

220. For the following reaction:

$$NO_{(g)} + O_{3(g)} \rightleftharpoons NO_{2(g)} + O_{2(g)}$$

The value of K_c is 8.2×10^4. What will be the value of K_c for the reverse reaction?

a) 8.2×10^4 b) $\frac{1}{8.2\times10^4}$ c) $(8.2 \times 10^4)^2$ d) $\sqrt{8.2 \times 10^4}$

221. The value of equilibrium constant of the reaction

$$HI(g) \rightleftharpoons \frac{1}{2}H_2(g) + \frac{1}{2}I_2 \text{ is } 8.0$$

The equilibrium constant of the reaction

$$H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$$

a) $\frac{1}{16}$ b) $\frac{1}{64}$ c) 16 d) $\frac{1}{8}$

222. In which of the following equilibrium K_c and K_p are not equal?
a) $2NO_{(g)} \rightleftharpoons N_{2(g)} + O_{2(g)}$ b) $SO_{2(g)} + NO_{2(g)} \rightleftharpoons S0_{3(g)} + NO_{(g)}$ c) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$
d) $2C_{(s)} + O_{2(g)} \rightleftharpoons 2CO_{2(g)}$

223. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: For the reaction:
$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$, $K_p = K_c$
Reason: Concentration of gaseous reactants and products is taken as unity.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

224. Given the reaction between 2 gases represented by A_2 and B_2 to give the compound AB(g).
$$A_2(g) + B_2(g) \rightleftharpoons 2AB(g)$$
At equilibrium, the concentration
of $A_2 = 3.0 \times 10^{-3}$ M
of $B_2 = 4.2 \times 10^{-3}$M
of AB = 2.8×10^{-3}M
If the reaction takes place in a sealed vessel at 527°C, then the value of K. will be:
a) 2.0 b) 1.9 c) 0.62 d) 4.5

225. The solubility product of $BaCl_2$ is 3.2×10^{-9}. What will be its solubility in mol L^{-1}?
a) 4×10^{-3} b) 3.2×10^{-9} c) 1×10^{-3} d) 1×10^{-9}

226. For the reaction
$$CH_4(g) + 2O_2(g) \rightleftharpoons CO_2(g) + 2H_2O(l)$$
$$\triangle H_r = 170.8 \text{ kJmol}^{-1}$$
Which of the following statement is not true?
a) The equilibrium constant for the reaction is given by $K_C = \frac{[CO_2]}{[CO_4][O_2]}$
b) Addition of $CH_{4(g)}$, or $O_{2(g)}$ at equilibrium will cause a shift to the right.
c) The reaction is exothermic
d) At equilibrium, the concentrations of $CO_2(g)$ and $H_2O(l)$ are not equal

227. Which of the following salts with a concentration 0.1 M will give a basic solution?
a) Ammonium acetate b) Ammonium chloride c) Ammonium sulphate
d) Sodium acetate

228. Solubility of Mx_2 type electrolytes is 0.5×10^{-4} mol/lit, then find out K_{sp} of electrolytes.
a) 5×10^{-12} b) 25×10^{-10} c) 1×10^{-13} d) 5×10^{-13}

229. A weakacid, HA, has K_a of 1.00×10^{-5}. If 0.100 mol of this acid is dissolved in one litre of water, the percentage of acid dissociated at equilibrium is closest to
a) 1.00% b) 99.9% c) 0.100% d) 99.0%

230. The equilibrium constant for the following reaction will be
$P_{4(s)} + 5O_{2(g)} \rightleftharpoons P_4O_{10(s)}$
a) $K_c = \frac{[P_4][O_2]^5}{[P_4O_{10}]}$ b) $K_c = \frac{1}{[O_2]^5}$ c) $K_c = \frac{[P_4O_{10}]}{[P_4][O_2]^5}$ d) $K_c = [O_2]^5$

231. What is the pH at which $Mg(OH)_2$ begins to precipitate from a solution containing 0.1 M Mg^{2+} ions? [Ksp for $Mg(OH)_2 = 1.0 \times 10^{-11}$]
a) 4 b) 6 c) 9 d) 7

232. In which of the following solvents is silver chloride most soluble?
a) 0.1 mol dm^{-3} $AgNO_3$ solution b) 0.1 mol dm^{-3} HCl solution c) H_2O
d) Aqueous ammonia

233. For which of the following reactions, $K_p = K_c$?
a) $PCl_{3(g)} + Cl_{2(g)} \rightleftharpoons PCl_{5(g)}$ b) $H_{2(g)} + Cl_{2(g)} \rightleftharpoons 2HCl_{(g)}$ c) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$
d) $CaCO_{3(g)} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$

234. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
Assertion: pH of the buffer solution is not affected by dilution.
Reason: pH = $pK_a + \log \frac{[conjugate\ acid]}{[base]}$
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false.

235. What will be the ionisation constant of formic acid if its 0.01 M solution is 14.5% ionised?
a) 2.1×10^{-4} b) 14.5 c) 0.145 d) 1.45×10^{-4}

236. For a cell involving one electron E^{o}_{cell} = 0.59 V at 298 K, the equilibrium constant for the cell reaction is
[Given that $t \frac{2.303RT}{F} 0.059\ V\ at\ T = 298\ K$]
a) 1.0×10^5 b) 1.0×10^{10} c) 1.0×10^{30} d) 1.0×10^2

237. For a polybasic acid, the dissociation constants have a different values for each step, e.g.,
$H_3A \rightleftharpoons H^+ + H_2A^-$; K = K_{a_1}
$H_2A^- \rightleftharpoons H^+ + HA^{2-}$; K = K_{a_2}
$HA^{2-} \rightleftharpoons H^+ + A^{3-}$; K = K_{a_3}
What is the observed trend of dissociation constants in successive stages?
a) $K_{a_1} > K_{a_2} > K_{a_3}$ b) $K_{a_1} = K_{a_2} = K_{a_3}$ c) $K_{a_1} < K_{a_2} < K_{a_3}$ d) $K_{a_1} = K_{a_2} + K_{a_3}$

238. If the value of equilibrium constant K_c for the reaction, $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is 7. The equilibrium constant for the reaction $2N_2 + 6H_2 \rightleftharpoons 4NH_3$ will be
a) 49 b) 7 c) 14 d) 28

239. When hydrochloric acid is added to cobalt nitrate solution at room temperature, the following reaction takes place and the reaction mixture becomes blue. On cooling the mixture, it becomes pink. On the basis of this information mark the correct answer.

$$\underset{Pink}{[Co(H_2O)_6]^{3+}_{(aq)}} + 4Cl^-_{(aq)} \rightleftharpoons \underset{Blue}{[CoCl_4]^{2-}_{(aq)}} + 6H_2O_{(l)}$$

a) $\Delta H > 0$ for the reaction b) $\Delta H < 0$ for the reaction c) $\Delta H = 0$ for the reaction
d) The sign of ΔH cannot be predicted on the basis of this information.

240. Solution of 0.1 N NH_4OH and 0.1 N NH_4Cl has pH 9.25. Then find out pK_b, of NH_4OH.
a) 9.25 b) 4.75 c) 3.75 d) 8.25

241. For a reversible reaction, if the concentrations of the reactants are doubled, the equilibrium constant will be
a) one-fourth b) Halved c) Doubled d) remains the same

242. The correct relationship between free energy change in a reaction and the corresponding equilibrium constant, K is
a) $-\Delta G = RT \ln K$ b) $\Delta G^o = RT \ln K$ c) $\Delta G = -RT \ln K$ d) $-\Delta G^o = RT \ln K$

243. What will be the value of pH of 0.01 mol dm^{-3} CH_3COOH ($K_a = 1.74 \times 10^{-5}$)?
a) 3.4 b) 3.6 c) 3.9 d) 3.0

244. Consider the equilibrium set up:
$2H_{2(g)} + CO_{(g)} \rightleftharpoons CH_3OH_{(g)}$
What will be the effect of the following on the equilibrium of the reaction?
(i) Addition of H_2
(ii) Addition of CH_3OH
(iii) Removal of CO
(iv) Removal of CH_3OH

a)

(i)	(ii)	(iii)	(iv)
Forward direction	Backward direction	Backward direction	Forward direction

b)

(i)	(ii)	(iii)	(iv)
Backward direction	Backward direction	Forward direction	Forward direction

c)

(i)	(ii)	(iii)	(iv)
Forward direction	Forward direction	Backward direction	Backward direction

d)

(i)	(ii)	(iii)	(iv)
Backward direction	Forward direction	Forward direction	Backward direction

245. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	Liquid ↔ Vapour	(i)	Saturated solution
(B)	Solid ↔ Liquid	(ii)	Boiling point
(C)	Solid ↔ Vapour	(iii)	Sublimation point
(D)	Solute(s) ↔ Solute (solution)	(iv)	Melting point

a) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv) b) (A) → (ii), (B) → (iv), (C) → (iii), (D) → (i)
c) (A) → (iv), (B) → (ii), (C) → (i), (D) → (iii) d) (A) → (iii), (B) → (iv), (C) → (ii), (D) → (i)

246. Which of the following salts does not show its correct nature mentioned against it?
a) KBr solution - Neutral b) NaCN solution - Acidic c) NH_4NO_3 solution - Acidic
d) KF solution - Basic

247. A solution which is 10^{-3} M each in Mn^{2+}, Fe^{2+}, Zn^{2+} and Hg^{2+} is treated with 10^{-16}M sulphide ion. If K_{sp} of MnS, FeS, ZnS and HgS are 10^{-15}, 10^{-25}, 10^{-20} and 10^{-54} respectively, which one will precipitate first?
a) FeS b) MnS c) HgS d) ZnS

248. In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: The equilibrium constant for the reverse reaction is equal to the inverse of the

equilibrium constant for the forward reaction.

Reason: The value of equilibrium constant is independent of initial concentrations of the reactants and products.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is If both but reason is false. d) If both assertion and reason are false

249. At 100°c the K_w of water is 55 times its value at 25°C. What will be the pH of neutral solution? (log 55 = 1.74).

a) 6.13 b) 7.00 c) 7.87 d) 5.13

250. The solubility of a saturated solution of calcium fluoride is 2 x 10^{-4}mol/L. Its solubility product is:

a) 12 x 10^{-2} b) 14 x 10^{-4} c) 22 x 10^{-11} d) 32 x 10^{-12}

251. The compound whose aqueous solution hai the highest pH is

a) NaCl b) $NaHCO_3$ c) Na_2CO_3 d) NH_4Cl

252. K_{a1}, K_{a2} and K_{a3} are the respective ionisation constants for the following reactions:

$$H_2S \rightleftharpoons H^+ + HS^-$$
$$HS^- \rightleftharpoons H^+ + S^{2-}$$
$$H_2S \rightleftharpoons 2H^+ + S^{2-}$$

The correct relationship between K_{a1}, K_{a2} and K_{a3} is

a) $K_{a3} = K_{a1} \times K_{a2}$ b) $K_{a3} = K_{a1} + K_{a2}$ c) $K_{a3} = K_{a1} - K_{a2}$ d) $K_{a3} = K_{a1}/K_{a2}$

253. At 473 K, K_c, for the reaction $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$ g) is 8.3 x 10^{-3}. What will be the value of K_c for the formation of PCl_5 at the same temperature?

a) 8.3 x 10^3 b) 120.48 c) 8.3 x 10^{-3} d) 240.8

254. Value of K_p in the reaction

$$MgCO_{3(s)} \rightarrow MgO_{(s)} + CO_{2(g)}$$

a) $K_P = P_{CO_2}$ b) $K_P = P_{CO_2} \times \frac{P_{CO_2} \times P_{MgO}}{P_{MgCO_3}}$ c) $K_P = \frac{P_{CO_2} \times P_{MgO}}{P_{MgCO_3}}$ d) $K_P = \frac{P_{MgCO}}{P_{CO_2} \times P_{MgO}}$

255. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: The pH of an aqueous solution of acetic acid remains unchanged on addition of sodium acetate.

Reason: The ionization of acetic acid is increased by addition of sodium acetate.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false d) If both assertion and reason are false.

256. The value of K_c for the following equilibrium is

$CaCO_{3(s)} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$

Given K_p = 167 bar at 1073 K.

a) 1.896 mol L^{-1} b) 4.38 x 10^{-4} mol L^{-1} c) 6.3 x 10^4 mol L^{-1} d) 6.626 x mol L^{-1}

257. The solubility product of a sparingly soluble salt AX_2 is 3.2 x 10^{-11}.Its solubility(in moles/litre) is:

a) 5.6×10^{-6} b) 3.1×10^{-4} c) 2×10^{-4} d) 4×10^{-4}

258. Which one of the following molecular hydrides acts as a Lewis acid?
a) NH_3 b) H_2O c) B_2H_6 d) CH_4

259. If the pH of a solution is 2, the hydrogen ion concentration in moles per litre is
a) 1×10^{-14} b) 1×10^{-2} c) 1×10^{-7} d) 1×10^{-12}

260. What will be the pH of 1×10^{-4} M H_2SO_4 solution?
a) 10.4 b) 3.70 c) 3 d) 13

261. What is $[H^+]$ in mol/L of a solution that is 0.20 M in CH_3COONa and 0. 10 M in CH_3COOH? k_a for $CH_3COOH = 1.8 \times 10^{-5}$
a) 3.5×10^{-4} b) 1.1×10^{-5} c) 1.8×10^{-5} d) 9.0×10^{-6}

262. The K_{sp} of Ag_2CrO_4, AgCl, AgBr and AgI are .respectively, 1.1×10^{-12}, 1.8×10^{-10}, 5.0×10^{-13}, 8.3×10^{-17}.Which one of the following salts will precipitate last if $AgNO_3$ solution is added to the solution containing equal moles of NaCl, NaBr NaI and Na_2CrO_4?
a) AgBr b) Ag_2CrO_4 c) AgI d) AgCl

263. What is the percentage dissociation of 0.1 M solution of acetic acid? ($K_a = 10^{-5}$)
a) 10% b) 100% c) 1% d) 0.01%

264. At 500 K, equilibrium constant, Kc>for the following reaction is 5.
$2HI_{(g)} \rightleftharpoons H_{2(g)} + I_{2(g)}$?
What would be the equilibrium constant K; for the reaction:
a) 0.04 b) 0.4 c) 25 d) 2.5

265. The rapid change of pH near the stoichiometric point of an acid base titration is the basis of indicator detection. pH of the solution is related to ratio of the concentrations of the conjugate acid [HIn] and base [In^-] :

4 3 2 1

a) $log\frac{[In^-]}{[HIn]}$ = pKIn - pH b) CH=C-CH=CH2 c) $log\frac{[HIn]}{[In^-]}$ = pH - pK_{In} d) $log\frac{[In^-]}{[HIn]}$ = pH - pK_{In}

266. The rate of reaction depends upon the :
a) Volume b) Force c) Pressure d) Concentration of reactants

267. For the reaction: $H_2(g)+I_2(g) \rightleftharpoons 2HI(g)$, the standard free energy is $\Delta G^0>0$. The equilibrium constant (K) would be _____
a) K=0 b) K>1 c) K=1 d) K<1

268. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	CH_3COONa	(i)	Almost neutral, pH > 7 or < 7
(B)	NH_4Cl	(ii)	Acidic, pH < 7
(C)	$NaNO_3$	(iii)	Alkaline, pH > 7
(D)	CH_3COONH_4	(iv)	Neutral, pH = 7

a) (A)→(i), (B)→(ii), (C)→(iii), (D) →(iv) b) (A)→(ii), (B)→(iii), (C)→(iv), (D)→(i)
c) (A)→(iii), (B)→(ii), (C)→(iv), (D)→(i) d) (A)→(iv), (B)→(i), (C)→(iii), (D)→(ii)

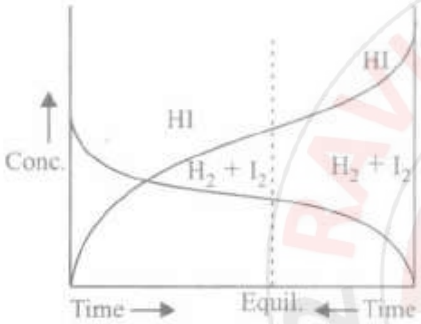
269. In qualitative analysis, the metals of group I can be separated from other ions by precipitating them as chloride salts. A solution initially contains Ag^+ and Pb^{2+} at a concentration of 0.10 M. Aqueous HCl is added to this solution until the Cl^- concentration is 0.10 M. What will the

concentrations of Ag^+ and Pb^{2+} be at equilibrium?
$(K_{SP}$ for $AgCl = 1.8 \times 10^{-10}$
K_{SP} for $PbCl_2 = 1.7 \times 10^{-5}$,
a) $[Ag^+] = 1.8 \times 10^{-7}M : [Pb^{2+}] = 1.7 \times 10^{-6}M$
b) $[Ag^+] = 1.8 \times 10^{-11}M; [Pb^{2+}] = 8.5 \times 10^{-5}M$
c) $[Ag^+] = 1.8 \times 10^{-9}M; [Pb^{2+}] = 1.7 \times 10^{-3}M$
d) $[Ag^+] = 1.8 \times 10^{-11}M; [Pb^{2+}] = 8.5 \times 10^{-4}M$

270. What is the pH of the resulting solution when equal volumes of 0.1M NaOH and 0.01M HCl are mixed?
a) 2.0 b) 7.0 c) 1.04 d) 12.6

271. The solubility of $BaSO_4$ in water 2.42 x $10^{-3}gL^{-1}$ at 298 K.The value of solubility product (K_{sp}) will be (Given molar mass of $BaSO_4$ = 233 g mol^{-1})
a) 1.08 x $10^{-10}mol^2L^{-2}$ b) 1.08 x $10^{-12}mol^2L^{-2}$ c) 1.08 x $10^{-14}mol^2L^{-2}$
d) 1.08 x $10^{-8}mol^2L^{-2}$

272. Consider the following graph and mark the correct statement.



a) Chemical equilibrium in the reaction, $H_2 + I_2 \rightleftharpoons 2HI$ can be attained from either directions.
b) Equilibrium can be obtained when Hz and Iz are mixed in an open vessel.
c)
The concentrations of H_2 and I_2 keep decreasing while concentration of HI keeps increasing with time.
d) We can find out equilibrium concentration of H_2 and I_2 from the given graph.

273. Which of the following will produce a buffer solution when mixed in equal volumes?
a) 0.1 mol dm^{-3} NH_4OH and 0.1 mol dm^{-3} HCl
b) 0.5 mol dm^{-3} NH_4OH and 0.1 mol dm^{-3} HCl
c) 0.1 mol dm^{-3} NH_4OH and 0.5 mol dm^{-3} HCl
d) 0.1 mol dm^{-3} CH_3COONa and 0.1 mol dm^{-3} NaOH

274. Consider the reaction: $2Cu(NO_3)_{2(s)} \rightarrow 2CuO_{(s)} + 4NO_{2(g)} + O_{2(g)}$, which of the following gives the value of K_c of this equilibrium?
a) $K_c = \frac{[CuO_{(s)}]^2[NO_{2(g)}]^4}{[Cu(NO_3)_{2(s)}]^2}$ b) $K_c = \frac{[NO_{2(g)}]^4[O_{2(g)}]}{[Cu(NO_3)_{2s}]^2}$ c) $K_C=[NO_2]^4[O_2]$ d) $K_c = \frac{[CuO_{(s)}]^2}{[Cu(NO_3)_{2(s)}]^2}$

275. Which of these is least likely to act as a Lewis base?
a) H_2O b) NH_3 c) BF_3 d) OH^-

276. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
Assertion: Higher order ionization constants (Ka_2 , Ka_3) are smaller than the lower order

ionization constant (Ka_1) of polyprotic acid.

Reason: Polyprotic acid solutions contain a mixture of acids.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

277. Using the Gibbs energy change, $\Delta G = + 63.3$ kJ for the following reaction, $Ag_2CO^3(s) \rightleftharpoons 2Ag^+_{(aq)} + CO_32^-_{(aq)}$. The K_{sp} of $Ag_2CO_{3(s)}$ in water at 25°C is ($R = 8.314 JK^{-1}mol^{-1}$)

a) 3.2×10^{-26} b) 8.0×10^{-12} c) 2.9×10^{-3} d) 7.9×10^{-2}

278. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: If reaction quotient, Q_c for a particular reaction is greater than K_c the reaction will proceed in the direction of reactants.

Reason: Reaction quotient is defined in the same way as the equilibrium constant K_c except that the concentrations in Q_c are not necessarily equilibrium values.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false

279. Solubility product of radium sulphate is $4 \times 10^{-11} mol^2L^{-2}$. What will be the solubility of Ra^{2+} in 0.10 M $Na_2\ SO_4$?

a) 4×10^{-10} M b) 2×10^{-5} M c) 4×10^{-5} M d) 2×10^{-10} M

280. The rapid change of pH near the stoichiometric point of an acid-base titration is the basic indicator detection. pH of the solution is related to ratio of the concentrations of the conjugate acid (Hln) and base ($1n^-$) forms of the indicator by the expression

a) $\log \frac{[ln^-]}{[H\ ln]} = pK_{ln} - pH$ b) $\log \frac{[H\ ln]}{[ln^-]} = pK_{ln} - pH$ c) $\log \frac{[H\ ln]}{[ln^-]} = pH - pK_{ln}$

d) $\log \frac{[ln^-]}{[H\ ln]} = pH - pK_{ln}$

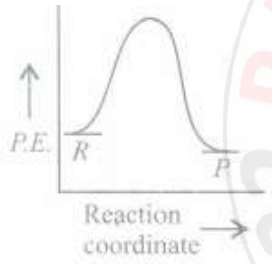
RAVI MATHS TUITION CENTRE , WHATSAPP - 8056206308

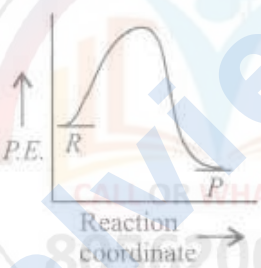
Time : 1 Mins **CHEMICAL KINETICS 1** **Marks : 850**

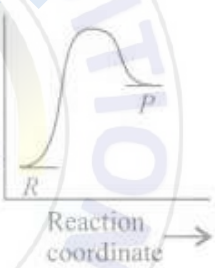
1. Rate constant in case of first order reaction is
   a) inversely proportional to the concentration units
   b) independent of concentration units c) directly proportional to concentration units
   d) inversely proportional to the square of concentration units

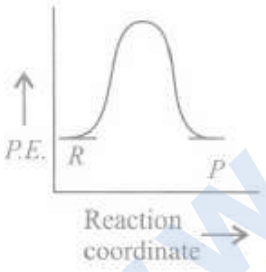
2. 3A ⟶ 2B, rate of reaction + $\frac{d[B]}{dt}$ is equal to :
   a) $-\frac{3}{2}\frac{d[A]}{dt}$ b) $-\frac{2}{3}\frac{d[A]}{dt}$ c) $-\frac{1}{3}\frac{d[A]}{dt}$ d) $+2\frac{d[A]}{dt}$

3. An endothermic reaction with high activation energy for the forward reaction can be shown by th figure

a) 

b) 

c) 

d) 

4. Mechanism of a hypothetical reaction
   $X_2 + Y_2 \rightarrow 2XYi$ is given below:
   $(i)\ X_2 \rightarrow X + X(fast)$
   $(ii)\ X + Y_2 \rightleftharpoons XY + Y(s0)$
   $(iii)\ X + Y \rightarrow XY(fast)$
   The overall order of the reaction will be:
   a) 2 b) 0 c) 1.5 d) 1

5. In acidic medium, the rate of reaction between [BrO_3^-] and [Br^-] ions is given by the expression $-\frac{d[BrO_3^-]}{dt}$ = k[BrO_3^-][Br^-][H^+]^2 It means
   (i) rate constant of the reaction depends upon the concentration of H^+ ions

(ii) rate of reaction is independent of the concentration of acid added
(iii) the change in pH of the solution will affect the rate of reaction
(iv) doubling the concentration of H^+ ions will increase the reactions rate by 4 times.
a) Only (ii) b) Only (iii) c) Only (i) and (ii) d) Only (iii) and (iv)

6. The temperature dependence of the rate of a chemical reaction can be explained by Arrhenius equation which is
a) $k=Ae^{E_a/RT}$ b) $k=Ae^{-E_a/RT}$ c) $k=Ae \times \frac{E_a}{RT}$ d) $k=Ae \times \frac{RT}{E_a}$

7. For the reaction $N_2 + 3H_2 \longrightarrow 2NH_3$, if $\frac{d[NH_3]}{dt}$=2 x 10^{-4} mol L^{-1} s^{-1}, the value of $\frac{-d[H_2]}{dt}$ would be:
a) 3 x 10^{-4} mol $L^{-1}s^{-l}$ b) 4 X 10^{-4} mol $L^{-1}s^{-l}$ c) 6 X 10^{-4} mol L^{-1} s^{-l} d) 1 x 10^{-4} mol $L^{-1}s^{-l}$

8. For a first order reaction A $\longrightarrow$ B, the reaction rate at reactant concentration of 0.01 M is found to be 2.0 x 10^{-5} mol L^{-1} s^{-1}. The half-life period of the reaction is :
a) 220 s b) 30 s c) 300 s d) 347 s

9. What will be the half-life of the first order reaction for which the value of rate constant is 200 s^{-1}?
a) 3.46 x 10^{-2} s b) 3.46 x 10^{-3} s c) 4.26 X 10^{-2} s d) 4.26 x 10^{-3} s

10. Activation energy (E_a) and rate constants (k_1 and k_2) of a chemical reaction at two different temperatures (T_1 and T_2) are related by:
a) $\ln \frac{k_2}{k_1} = -\frac{E_a}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$ b) $\ln \frac{k_2}{k_1} = -\frac{E_a}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$
c) $\ln \frac{k_2}{k_1} = -\frac{E_a}{R}\left(\frac{1}{T_2} + \frac{1}{T_1}\right)$ d) $\ln \frac{k_2}{k_1} = \frac{E_a}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$

11. The increase in concentration of the reactants lead to change:
a) ΔH b) collision frequency c) activation energy d) equilibrium constant

12. Assertion: Rate of reaction increases with increase in temperature.
Reason: Number of effective collisions increases with increase in temperature.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

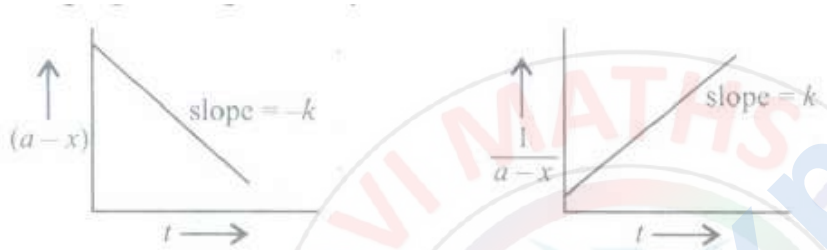
13. Which one of the following is wrongly matched?
a) Saponification of $CH_3COOC_2H_5$ - Second order reaction
b) Hydrolysis of CH_3COOCH_3 - Pseudounimolecular reaction
c) Decomposition of H_2O_2 - First order reaction
d) Combination of H_2 and Br_2 to give HBr - Zero order reaction

14. Assertion: The rate of a reaction sometimes does not depend on concentrations.
Reason: Lower the activation energy, faster is the reaction.

a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

15. The value of rate of a pseudo first order reaction depends upon:
a) the concentration of both the reactants present in the reaction
b) the concentration of the reactant present in small amount
c) the concentration of the reactant present in excess
d) the value of ΔH of the reaction

16. Two plots are shown below between concentration and time t. Which of the given orders are shown by the graphs respectively



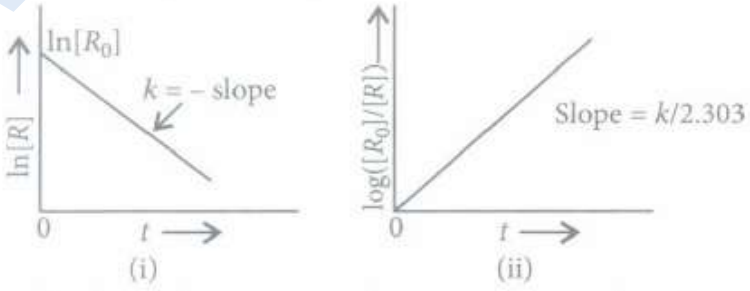
a) Zero order and first order b) First order and second order
c) Zero order and second order d) First order and first order

17. Find the values of A, B and C in the following table for the reaction X + Y ⟶ Z. The reaction is of first order w.r.t X and zero order w.r.t. Y.

Exp.	[X](mol L^{-1})	[Y](mol L^{-1})	Initial rate (mol $L^{-1}s^{-1}$)
1.	0.1	0.1	2 x 10^{-2}
2.	A	0.2	4 x 10-2
3.	0.4	0.4	B
4.	C	0.2	2 x 10^{-2}

a) A = 0.2 mol L^{-1}, B = 8 x 10^{-2} mol L^{-1} s^{-1}, C = 0.1 mol L^{-1}
b) A = 0.4 mol L^{-1}, B = 4 x 10^{-2} mol L^{-1} s^{-1}, C = 0.2 mol L^{-1}
c) A = 0.2 mol L^{-1}, B = 2 x 10^{-2} mol L^{-1} s^{-1}, C = 0.4 mol L^{-1}
d) A = 0.4 mol L^{-1}, B = 2 x 10^{-2} mol L^{-1} s^{-1}, C=0.4 mol L^{-1}

18. Observe the given graphs carefully.



Which of the given orders are shown by the graphs respectively?

a)

(i)	(ii)
First order	First order

b)

(i)	(ii)
Second order	Zero order

c)

(i)	(ii)
Zero order	First order

d)

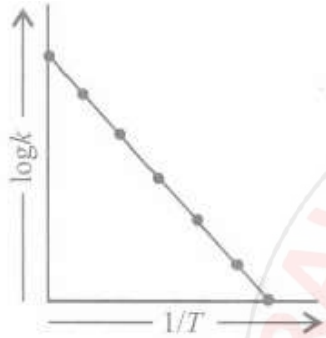
(i)	(ii)
First order	Zero order

19. For a chemical reaction, X ⟶ Y, the rate of reaction increases by a factor of 1.837 when the concentration of X is increased by 1.5 times, the order of the reaction with respect to X is
    a) 1 b) 1.5 c) 2 d) 2.5
20. For a first reaction A - B the reaction rate at reactant concentration of 0.01 M is found to be 2.0 x 10^{-5} mol L^{-1} s^{-l}. The half-life period of the reaction is:
    a) 30 s b) 220 s c) 300 s d) 347 s
21. The rate of a first order reaction is 0.04 mol l^{-1} s^{-1} at 10 seconds and 0.03 mol $l^{-1}s^{-l}$ at 20 seconds after initiation of the reaction. The half-life period of the reaction is:
    a) 24.1 s b) 34.1 s c) 44.1 s d) 54.1 s
22. For the reaction $N_2 + 3H_2 \longrightarrow 2NH_3$ how are the rate of reaction expressions inter-related $\frac{d[H_2]}{dt}$ and $\frac{d[NH_3]}{dt}$?
    a) $-\frac{1}{3}\frac{d[H_2]}{dt} = +\frac{1}{2}\frac{d[NH_3]}{dt}$ b) $-\frac{1}{2}\frac{d[H_2]}{dt} = +\frac{1}{3}\frac{d[NH_3]}{dt}$ c) $+\frac{1}{2}\frac{d[H_2]}{dt} = -\frac{1}{3}\frac{d[NH_3]}{dt}$
    d) $+\frac{1}{3}\frac{d[H_2]}{dt} = -\frac{1}{2}\frac{d[NH_3]}{dt}$
23. For the reaction $2A + B \rightarrow 3C + D$
    which of the following does not express the reaction rate?
    a) $-\frac{d[B]}{dt}$ b) $\frac{d[D]}{dt}$ c) $-\frac{1}{2}\frac{d[A]}{dt}$ d) $-\frac{1}{3}\frac{d[C]}{dt}$
24. For the reaction, 2A + B ⟶ 3C + D which of the following does not express the reaction rate?
    a) $-\frac{d[C]}{3\,dt}$ b) $-\frac{d[B]}{dt}$ c) $\frac{d[D]}{dt}$ d) $-\frac{d[A]}{2\,dt}$
25. Assertion: Complex reaction takes place in different steps and the slowest step determines the rate of reaction.
    Reason: Order and molecularity of a reaction are always equal.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false d) If both assertion and reason are false

26. A hypothetical reaction, A2 + B2 ⟶ 2AB follows the mechanism as given below:
A2 ⇌ A + A ....(fast)
A + B2 ⟶ AB + B .....(slow)
A + B ⟶ AB ..... (fast)
The order of the overall reaction is
a) 2 b) 1 c) 3/2 d) zero

27. Rate constant of two reactions are given below Identifying their order of reaction.
(i) $k = 5.3 \times 10^{-2}$ L mol^{-1} s^{-1}
(ii) $k = 3.8 \times 10^{-4}$ s^{-1}
a) (i) second order, (ii) first order b) (i) first order, (ii) second order
c) (i) zero order, (ii) first order d) (i) second order, (ii) zero order

28. The temperature dependence of the rate constant k I.S expresse d as $k = Ae^{-E}$ a./RT
When a plot between log k and l/T is plotted we get the graph as shown.



What is the value of slope in the graph?
a) $\frac{E^a}{RT}$ b) $-\frac{E_a}{2.303R}$ c) $-\frac{E_a}{2.303RT}\log A$ d) $-\frac{E_a}{2.303}\frac{R}{T}$

29. Which of the following statements is correct?
a)
The rate of a reaction decreases with passage of time as the concentration of reactants decreases
b) The rate of a reaction is same at any time during the reaction
c) The rate of a reaction is independent of temperature change
d) The rate of a reaction decreases with increase in concentration of reactant(s)

30. Assertion: Molecularity greater than three is not observed.
Reason: The overall molecularity of a complex reaction is equal to molecularity of the slowest step.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

31. When a chemical reaction takes place, during the course of the reaction the rate of reaction:

a) keeps on increasing with time b) remains constant with time
c) keeps on decreasing with time d) shows irregular trend with time

32. In the reaction
$BrO_{3(aq)}^{-} + 5Br_{(aq)}^{-} + 6H^{+} \rightarrow 3Br_{2(l)} + 3H_2O(l)$ The rate of appearance of bromine (Br_2) is related to rate of disappearance of bromide ions as following:
a) $\frac{d[Br_2]}{dt} = -\frac{5}{3}\frac{d[Br^-]}{dt}$ b) $\frac{d[Br_2]}{dt} = \frac{5}{3}\frac{d[Br^-]}{dt}$ c) $\frac{d[Br_2]}{dt} = \frac{3}{5}\frac{d[Br^-]}{dt}$
d) $\frac{d[Br_2]}{dt} = -\frac{3}{5}\frac{d[Br^-]}{dt}$

33. Half-life period of a first order reaction is 10 min. What percentage of the reaction will be completed in 100 min?
a) 25% b) 50% c) 99.9% d) 75%

34. If 60% of a first order reaction was completed in 60% minutes, 50% of the same reaction would be completed in approximately
$(\log 4 = 0.60, \log 5 = 0.69)$
a) 45 minutes b) 60 minutes c) 40 minutes d) 50 minutes

35. In pseudo unimolecular reactions,
a) both the reactants are present in low concentration
b) both the reactants are present in same concentration
c) one of the reactant is present in excess d) one of the reactant is non-reactive

36. The chemical reaction, $2O_3 \rightarrow 3O_2$ proceeds as
$O_3 \rightleftharpoons O_2 + [O]$ (fast)
$[O] + O_3 \xrightarrow{k_2} 2O_2$ (slow)
The rate law expression will be
a) Rate = k[O][O_3] b) Rate = k[O_3]^2 [O_2]$^{-1}$ c) Rate = k[O_3]^2 d) Rate = k[O_2] [O]

37. In a first order reaction, A $\longrightarrow$ B, if k is rate constant and initial concentration of the reaction A is 0.5 M, then the half-life is :
a) $\frac{0.693}{0.5k}$ b) $\frac{log\ 2}{k}$ c) $\frac{log\ 2}{k\sqrt{0.5}}$ d) $\frac{ln\ 2}{k}$

38. Assertion: All molecular collisions lead to the formation of products.
Reason: Reactant molecules undergo chemical change irrespective of their collision
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

39. Assertion: The decomposition of gaseous ammonia on a hot platinum surface is a zero order reaction at high pressure.
Reason: For a zero order reaction, the rate of reaction is independent of initial concentration.

a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

40. Which of the following statements is not correct for the catalyst?
a) It catalyses the forward and backward reaction to the same extent
b) It alters ΔG of the reaction
c) It is a substance that does not change the equilibrium constant of a reaction
d)
It provides an alternate mechanism by reducing activation energy between reactants and products

41. Which of the following statements is not correct?
a) For a zero order reaction, $t_{1/2}$ is proportional to initial concentration
b)
The relationship of variation of rate constant with temperature is given by $\frac{k_2}{k_1} = \frac{E_a}{2.303R}\left[\frac{T_2-T_1}{T_1T_2}\right]$.
c) The unit of rate constant for a reaction is $mol^{1-n}L^{n-1}s^{-1}$ where n is order of the reaction
d) The unit of rate of reaction changes with order of reaction

42. The rate of the reaction $2NO + Cl_2 \rightarrow 2NOCl$ is given by the rate equation rate = $k[NO]_2\,[Cl_2]$
The value of the rate constant can be increased by:
a) increasing the concentration of NO b) increasing the temperature
c) increasing the concentration of the Cl_2 d) doing all of these

43. A first order reaction has a rate constant 1.15 x 10^{-3} s^{-1} How long will 5 g of this reactant take to reduce to 3 g?
a) 444 s b) 400 s c) 528 s d) 669 s

44. For the reaction $2NH_3 \rightarrow N_2+3H_2$
$-\frac{d[NH_3]}{dt} = k_1[NH_3]$, $\frac{d[N_2]}{dt} = K_2[NH_3]$, $\frac{d[H_2]}{dt} = k_3[NH_3]$then the relation between k_1, k_2 and k_3 is
a) $k_1=k_2=k_3$ b) $k_1=3k_2=2k_3$ c) $1.5k_1=3k_2=k_3$ d) $2k_1=k_2=3k_3$

45. Which of the following factors are responsible for the increase in the rate of a surface catalysed reaction?
(i) A catalyst provides proper orientation for the reactant molecules to react.
(ii) Heat of adsorption of reactants on a catalyst helps reactant molecules to overcome activation energy.
(iii) The catalyst increases the activation energy of the reaction.
a) (i) and (iii) b) (i) and (ii) c) (ii) and (iii) d) (i), (ii) and (iii)

46. The reaction $2NO + Br_2 \longrightarrow 2NOBr$, obeys the following mechanism:
$NO + Br_2 \overset{Fast}{\rightleftharpoons} NOBr_2$; $NOBr_2 + NO \overset{Slow}{\longrightarrow} 2NOBr$
The rate expression of the above reaction can be written as
a) $r=k[NO]^2[Br_2]$ b) $r=k[NO][Br_2]$ c) $r=k[NO][Br_2]$ d) $r=k[NOBr_2]$

47. The rate of reaction between two reactants A and B decreases by a factor of 4 if the concentration of reactant B is doubled. The order of this reaction with respect to reactant B is
a) 2 b) -2 c) 1 d) -1

48. The number of molecules of the reactants taking part in a single step of the reaction is indicative of
a) order of a reaction b) molecularity of a reaction
c) fast step of the mechanism of a reaction d) half-life of the reaction

49. For exothermic reaction, the energy of activation of the reactants is :
a) equal to the energy of activation of products
b) less than the energy of activation of products
c) greater than the energy of activation of products
d) sometimes greater and sometimes less than that of the products

50. The half-life of the reaction $X \longrightarrow Y$, following first order kinetics, when the initial concentration of X is 0.01 mol L^{-1} and initial rate is 0.00352 mol L^{-1} min^{-1} will be
a) 19.69 min. b) 1.969 min c) 7.75 min d) 77.5 min.

51. For a unimolecular reaction,
a) the order and molecularity of the slowest step are equal to one
b) molecularity of the reaction can be zero, one or two
c) more than one reacting species are involved in one step
d) molecularity of the reaction can be determined only experimentally

52. The decomposition of a hydrocarbon follows the equation $k = (4.5 \times 10^{11}\ s^{-1})e^{-28000K/T}$. What will be the value of activation energy?
a) 669 kJ mol^{-1} b) 669 kJ mol^{-1} c) 4.5×10^{11} kJ mol^{-1} d) 28000 kJ mol^{-1}

53. For a reaction $X \longrightarrow Y$, the rate of reaction becomes twenty seven times when the concentration of X is increased three times. What is the order of the reaction?
a) 2 b) 1 c) 3 d) 0

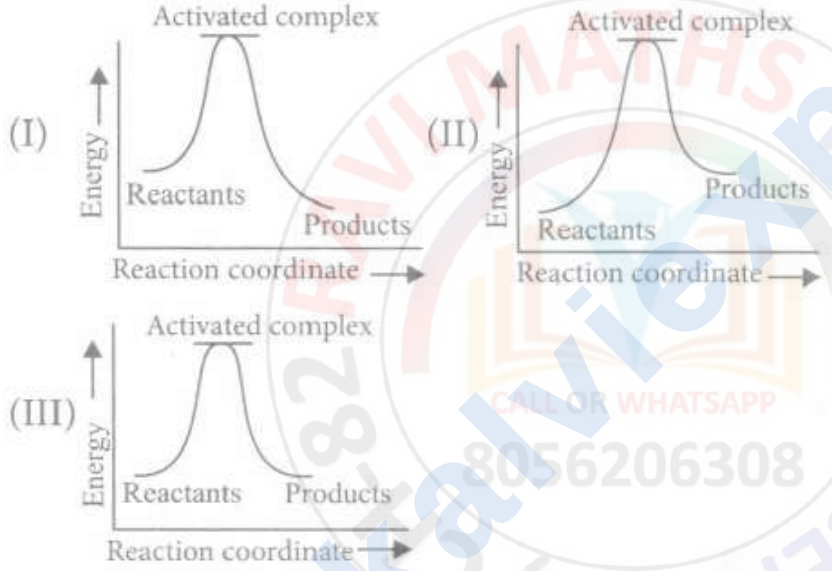
54. The decomposition of dimethyl ether is a fractional order reaction. The rate of reaction is given by rate = $k_{(PCH3OCH3)}^{3/2}$. If the pressure is measured in bar and time in minutes, then what are the units of rate and rate constant?
a) bar min^{-1}, bar^2 min^{-1} b) bar min^{-1}, $bar^{1/2}$ min^{-1} c) $bar^{-1/2}$ min^{-1}, bar^2 min^{-1}
d) bar min^{-1}, $bar^{1/2}$ min^{-1}

55. Which of the following is an example of a fractional order reaction?
a) $NH_4NO_2 \longrightarrow N_2 + 2H_2O$ b) $NO + O_3 \longrightarrow NO_2 + O_2$ c) $2NO + Br_2 \longrightarrow 2NOBr$
d) $CH_3CHO \longrightarrow CH_4 + CO$

56. Assertion: A catalyst increases the rate of reaction without itself undergoing any permanent chemical change.
Reason: A catalyst changes the Gibbs energy (ΔG) of the reaction and equilibrium constant of the reaction.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If assertion is true but reason is false

57. The rate constant of a reaction depends upon
a) temperature of the reaction b) extent of the reaction
c) initial concentration of the reactants d) the time of completion of reaction

58. Which of the following graphs represents exothermic reaction?



a) (I) only b) (II) only c) (III) only d) (I) and (II)

59. For the reaction A + B products, it is observed that:
1. on doubling the initial concentration of A only, the rate ofreaction is also doubled and
2. on doubling the initial concentrations of both A and B, there is a change by a factor of 8 in the rate of the reaction.
The rate of this reaction is given by:
a) rate = $k[A][B]^2$ b) rate = $k[A]^2[B]^2$ c) rate = k[A][B] d) rate = $k[A]^2[B]$

60. For a reaction P + Q ⟶ 2R + S. Which of the following statements is incorrect?
a) Rate of disappearance of P = Rate of appearance of S
b) Rate of disappearance of Q = 2 x Rate of appearance of R
c) Rate of disappearance of P = Rate of disappearance of Q
d) Rate of disappearance of Q = $\frac{1}{2}$ x Rate of appearance of R

61. Which of the following statements is not correct about order of a reaction?
a) The order of a reaction can be a fractional number
b) Order of a reaction is experimentally determined quantity

c)
The order of a reaction is always equal to the sum of the stoichiometric coefficients of reactants in the balanced chemical equation for a reaction

d)
The order of a reaction is the sum of the powers of molar concentration of the reactants in the rate law expression

62. The decomposition of a substance follows first order kinetics. If its concentration is reduced to 1/8 of its initial value in 12 minutes, the rate constant of the decomposition system is
a) $\left(\frac{2.303}{12}\log\frac{1}{8}\right) min^{-1}$. b) $\left(\frac{2.303}{12}\log 8\right) min^{-1}$. c) $\left(\frac{0.693}{12}\right) min^{-1}$.
d) $\left(\frac{1}{12}\log 8\right) min^{-1}$.

63. The rate of the reaction:
$CH_3COOC_2H_5$ + NaOH ⟶ CH_3COONa + C_2H5OH is given by the equation,
rate = k[$CH_3COOC_2H_5$] [NaOH]
If concentration is expressed in mol/L, the units of k are
a) $mol^{-2}\ L^2\ s^{-1}$ b) $mol\ L^{-1}\ s^{-1}$ c) $L\ mol^{-1}\ s^{-1}$ d) s^{-1}

64. The decomposition of phosphine (PH_3) on tungsten at low pressure is a first-order reaction. It is because the :
a) rate is proportional to the surface coverage
b) rate is inversely proportional to the surface coverage
c) rate is independent of the surface coverage d) rate of decomposition is very slow.

65. Fill up the following with suitable terms.
(i) Activation energy = Threshold energy __
(ii) Half-life period of zero order reaction = __
(iii) Average rate of reaction = ____
(iv) Instantaneous rate of reaction = _____

a)

(i)	(ii)	(iii)	(iv)
Potential energy	$\frac{0.693}{k}$	$\frac{dx}{dt}$	$\frac{\triangle[A]}{\triangle t}$

b)

(i)	(ii)	(iii)	(iv)
Energy of reactants	$\frac{1}{k}$	$\frac{\triangle[A]}{\triangle t}$	$\frac{dx}{dt}$

c)

(i)	(ii)	(iii)	(iv)
Energy of reaction	$\frac{logk}{t}$	$\frac{\triangle[A]}{\triangle t}$	$\frac{dx}{dt}$

d)

(i)	(ii)	(iii)	(iv)
Average kinetic energy of reactants	$\frac{a}{2k}$	$\frac{\triangle[A]}{\triangle t}$	$\frac{dx}{dt}$

66. The plot of concentration of the reactant versus time for a reaction is a straight line with a negative slope. This reaction follows :
a) zero order rate equation b) first order rate equation c) second order rate equation
d) third order rate equation

67. The rate constants k_1 and k_2 for two different reactions are $10^{16}.e^{-2000/T}$ and $10^{15}.e^{-1000/T}$, respectively. The temperature at which $k_1 = k_2$ is :
a) 1000 K b) $\frac{2000}{2.303} K$ c) 2000 K d) $\frac{1000}{2.303} K$

68. The rate constant for the reaction, $2N_2O_5 \longrightarrow 4NO_2 + O_2$ is 2×10^{-5} s^{-1}. If rate of reaction is 1.4×10^{-5} mol L^{-1} s^{-1}, what will be the concentration of N_2O_5 in mol L^{-1}?
a) 0.8 b) 0.7 c) 1.2 d) 1

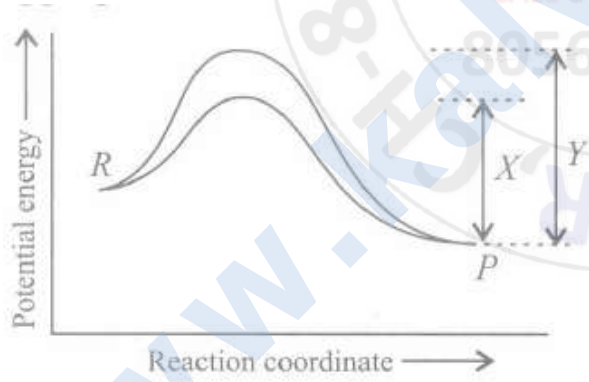
69. Rate law for the reaction, A + 2B ⟶ C is found to be Rate =k[A][B]
Concentration of reactant 'B' is doubled, keeping the concentration of 'A' constant, the value of rate constant will be _____
a) the same b) doubled c) quadrupled d) halved

70. Nitrogen dioxide (NO_2) dissociates into nitric oxide (NO) and oxygen (O_2) as follows:
$2NO_2 \longrightarrow 2NO + O_2$
If the rate of decrease of concentration of NO_2 is 6.0×10^{-12} mol L^{-1} s^{-1}. What will be the rate of increase of concentration of O_2?
a) 3×10^{-12} mol L^{-1} s^{-1} b) 6×10^{-12} mol $L^{-1}s^{-1}$ c) 1×10^{-12} mol L^{-1} s^{-1}
d) 1.5×10^{-12} mol L^{-1} s^{-1}

71. The order of reaction is decided by
a) temperature b) mechanism of reaction as well as relative concentration of reactants
c) molecularity d) pressure

72. For the reaction $4NH_3 + 5O_2 \longrightarrow 4NO + 6H_2O$, if the rate of disappearance of NH_3 is 3.6×10^{-3} mol L^{-1} s^{-1}, what is the rate of formation of H_2O?
a) 5.4×10^{-3} mol L^{-1} s^{-1} b) 3.6×10^{-3} mol L^{-1} s^{-1} c) 4×10^{-4} mol L^{-1} s^{-1}
d) 0.6×10^{-4} mol L^{-1} s^{-1}

73. The graph of the effect of catalyst on activation energy is given below. Fill up the blanks X and Y with appropriate statements.



a) X = energy of activation without catalyst, Y = energy of activation with catalyst
b) X = path of reaction with catalyst, Y = path ofm reaction without catalyst
c) X = energy of activation with catalyst, Y = energy of activation without catalyst
d) X = energy of endothermic reaction, Y= energy of exothermic reaction

74. For the reaction, $N_2O_{5(g)} \longrightarrow 2NO_{2(g)} + \frac{1}{2}O_{2(g)}$. The value of rate of disappearance of N_2O_5 is given as 6.25×10^{-3} mol $L^{-1}s^{-1}$. The rate of formation of NO_2 and O_2 is given respectively as :
a) 6.25×10^{-3} mol L^{-1} s^{-1} and 6.25×10^{-3} mol L^{-1} s^{-1}
b) 1.25×10^{-2} mol $L^{-1}s^{-1}$ and 3.125×10^{-3} mol $L^{-1}s^{-1}$
c) 6.25×10^{-3} mol $L^{-1}s^{-1}$ and 3.125×10^{-3} mol L^{-1} s^{-1}
d) 1.25×10^{-2} mol $L^{-1}s^{-1}$ and 6.25×10^{-3} mol $L^{-1}s^{-1}$

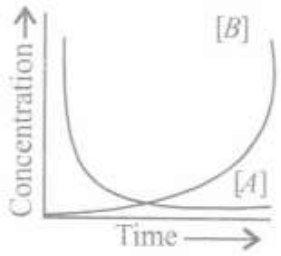
75. A first order reaction takes 40 min for 30% decomposition. What will be $t_{1/2}$?
a) 77.7 min. b) 52.5 min c) 46.2 min. d) 22.7 min

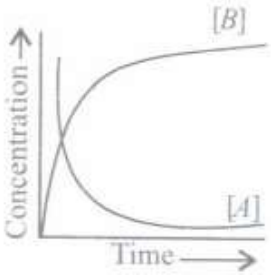
76. Consider a first order gas phase decomposition reaction given below:
$A_{(g)} \rightarrow B_{(g)} + C_{(g)}$
The initial pressure of the system before decomposition of A was P_i. After lapse of time 't' total pressure of the system increased by x units and became P_t: The rate constant k for the reaction is given as _____.
a) $k = \frac{2.303}{t} \log \frac{P_i}{P_i - x}$ b) $k = \frac{2.303}{t} \log \frac{P_i}{2P_i - P_t}$ c) $k = \frac{2.303}{t} \log \frac{P_i}{2P_i + P_t}$
d) $k = \frac{2.303}{t} \log \frac{P_i}{2P_i + x}$

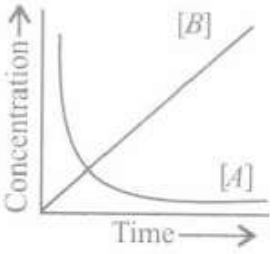
77. The rate of formation of a dimer in a second order dirnerisation reaction is 9.1 x 10^{-6} mol L^{-1} s^{-1} at 0.01 mol L^{-1} monomer concentration. What will be the rate constant for the reaction?
a) 9.1 x 10^{-2} L mol^{-1} s^{-1} b) 9.1 x 10^{-6} L mol^{-1} s^{-1} c) 3 x 10^{-4} L mol^{-1} s^{-1}
d) 27.3 x 10^{-2} L mol^{-1} s^{-1}

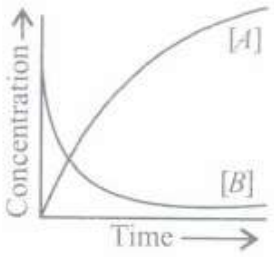
78. Consider the Arrhenius equation given below and mark the correct option.
$k=Ae^{-Ea/RT}$
a)
Rate constant increases exponentially with increasing activation energy and decreasing temperature
b)
Rate constant decreases exponentially with increasing activation energy and decreasing temperature
c)
Rate constant increases exponentially with decreasing activation energy and decreasing temperature
d)
Rate constant increases exponentially with decreasing activation energy and increasing temperature

79. Consider the reaction A $\rightarrow$ B. The concentration of both the reactants and the products varies exponentially with time. Which of the following figures correctly describes the change in concentration of reactants and products with time?

a) 

b) 

c) 

d) 

80. A plot of log (a - x) against time t is a straight line. This indicates that the reaction is of:
a) zero order b) first order c) second order d) third order.

81. For a certain reaction a large fraction of molecules has energy more than the threshold energy, still the rate of reaction is very slow. The possible reason for this could be that
a) the colliding molecules could be large in size
b) the colliding molecules must not be properly oriented for effective collisions
c) the rate of reaction could be independent of the energy
d) one of the reactants could be in excess

82. The experimental data for the reaction 2A + B_2 + 2AB is

Exp.	[A]	[B_2]	Rate (Ms^{-1})
1.	0.50	0.50	1.6×10^{-4}
2.	0.50	1.00	3.2×10^{-4}
3.	1.00	1.00	3.2×10^{-4}

the rate equation for the above data is
a) $\text{rate} = k[B_2]$ b) $\text{rate} = k[B_2]^2$ c) $\text{rate} = k[A]^2[B]^2$ d) $\text{rate} = k[A]^2[B]$

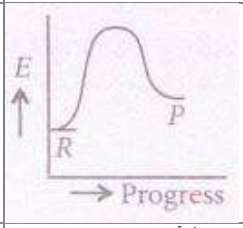
83. Rate of a general reaction A + B ⟶ products can be expressed as follows on the basis of collision theory Rate = $ZAB^{e-E_a/RT}$.
Which of the following statements is not correct for the above expression?
a)
Z is collision frequency and is equal to number of collisions per second per unit volume of the reaction mixture
b) $e^{-E_a/RT}$ is the fraction of molecules with kinetic energy equal to or greater than E_a
c) E_a is activation energy of the reaction
d) All the molecules which collide with one other are effective collisions

84. The correct difference between first and second order reactions is that :
a) A first-order reaction can catalyzed; a second-order reaction cannot be catalyzed.
b)
The half-life of a first-order reaction does not depend on $[A]_0$; the half-life of a second-order reaction does depend on $[A]_0$.

c)
The rate of a first-order reaction does not depend on reactant concentrations; the rate of a second-order reaction does depend on reactant concentrations.

d)
The rate of a first-order reaction does depend on reactant concentrations; the rate of a secondorder reaction does not depend on reactant concentrations.

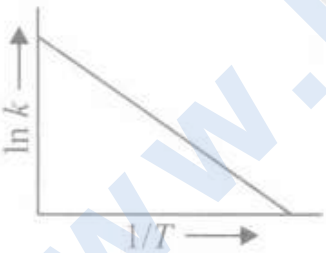
85. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Zero-order	(i)	$\log\frac{k_2}{k_1}=\frac{E_a}{2.303R}\left[\frac{T_2-T_1}{T_1T_2}\right]$
(B)	First-order	(ii)	
(C)	Endothermic reaction	(iii)	$k=\frac{2.303}{t}log\frac{[A]_0}{[A]}$
(D)	Activation energy	(iv)	$k=\frac{1}{t}([A]_0-[A]$

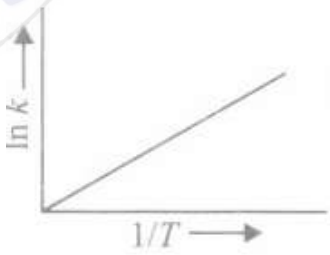
a) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)
b) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv)
c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i)
d) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii)

86. For an endothermic reaction, H represents the enthalpy of the reaction in kJ mol I. The minimum amount of activation energy will be:
a) less than zero b) equal to △H c) less than △H d) more than △H.

87. According to Arrhenius equation rate constant k is equal to Ae-EaIRT. Which of the following options represents the graph of In k vs 1/T?

a) 

b)

c) 

d)

88. In the reaction $BrO^-_{3(aq)} + 5Br^-_{(aq)} + 6H^+ \longrightarrow 3Br_2 + 3H_2O_{(l)}$ the rate of appearance of bromine (Br_2)is related to rate of disappearance of bromide ions as following:
a) $\frac{d[Br_2]}{dt}=-\frac{3}{5}\frac{d[Br^-]}{dt}$ b) $\frac{d[Br_2]}{dt}=-\frac{5}{3}\frac{d[Br^-]}{dt}$ c) $\frac{d[Br_2]}{dt}=\frac{5}{3}\frac{d[Br^-]}{dt}$ d) $\frac{d[Br_2]}{dt}=\frac{3}{5}\frac{d[Br^-]}{dt}$

89. Consider the reaction, $2N_2O_5 \longrightarrow 4NO_2+O_2$ In the reaction NO_2 is being formed at the rate of 0.0125 mol L^{-1} s^{-1}. What is the rate of reaction at this time?

a) 0.0018 mol L^{-1} s^{-1} b) 0.0031 mol L^{-1} s^{-1} c) 0.0041 mol L^{-1} s^{-1} d) 0.050 mol L^{-1} s^{-1}

90. In a reaction, 2X ⟶ Y, the concentration of X decreases from 0.50 M to 0.38 M in 10 min. What is the rate of reaction in M s^{-1} during this interval?
a) 2 x 10^{-4} b) 4 x 10^{-2} c) 2 x 10^{-2} d) 1 x 10^{-2}

91. A first order reaction is 50% complete in 30 minutes at 27°C and in 10 minutes at 47°C. The reaction rate constant at 27°C and the energy of activation of the reaction are respectively:
a) k = 0.0231 min^{-1}, Ea = 43.848 k] mol^{-1} b) k = 0.017 min^{-1}, Ea = 52.54 kJ $morl^{-1}$
c) k = 0.0693 min^{-1}, Ea = 43.848 k] $morl^{-1}$ d) k = 0.0231 min^{-1}, Ea = 28.92 k] mol^{-1}

92. The rate constant for a first order reaction is 4.606 x $10^{-3}s^{-1}$. The time required to reduce 2.0 g of the reactant to 0.2 g is:
a) 1000 s b) 100 s c) 200 s d) 500 s

93. The experimental data for the reaction 2A + B_2 ⟶ 2AB is :

Exp.	[A]	[B]	Rate (Ms^{-1})
1.	0.50	0.50	1.6 x 10^{-4}
2.	0.50	1.00	3.2 x 10^{-4}
3.	1.00	1.00	3.2 x 10^{-4}

The rate equation for the above data is :
a) rate = k[B_2] b) rate = k[B_2]^2 c) rate = k[A]^2[B]^2 d) rate = k[A]^2[B]

94. The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at a constant volume.
$SO_2Cl_2(g) \longrightarrow SO_2(g) + Cl_2(g)$

Experiment	Time/s-1	Total pressure/atm
1	0	0.5
2	100	0.6

What is the rate of reaction when total pressure is 0.65 atm?
a) 0.35 atm s^{-1} b) 2.235 x 10^{-3} atm s^{-1} c) 7.8 x 10^{-4} atm s^{-1} d) 1.55 x 10^{-4} atm s^{-1}

95. The activation energy for a simple chemical reaction A + B is E_a in forward direction. The activation energy for reverse reaction
a) Is always double of E_a b) Is negative of E_a c) Is always less than E_a
d) Canbe less than or more than E_a

96. Consider the reaction
$$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$$
The equality relationship between $\frac{d[NH_3]}{dt}$ and $-\frac{d[H_2]}{dt}$ is
a) $+\frac{d[NH_3]}{dt} = -\frac{2}{3}\frac{d[H_2]}{dt}$ b) $+\frac{d[NH_3]}{dt} = -\frac{3}{2}\frac{d[H_2]}{dt}$ c) $\frac{d[NH_3]}{dt} = -\frac{d[H_2]}{dt}$
d) $\frac{d[NH_3]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt}$

97. Assertion: For a first order reaction, $t_{1/2}$ is independent of rate constant.
Reason: For a first order reaction, $t_{1/2} \propto [R]_0$.

a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

98. Half-life of a first order reaction is 4 s and the initial concentration of the reactants is 0.12 M. The concentration of the reactant left after 16 s is:
a) 0.0075 M b) 0.06 M c) 0.03 M d) 0.015 M

99. Which one of the following statements for the order of a reaction is incorrect?
a) Order can be determined only experimentally.
b) Order is not influenced by stoichiometric coefficient of the reactants.
c)
Order of reaction is sum of power to the concentration terms of reactants to express the rate of reaction.
d) Order of reaction is always whole number.

100. For a reaction, $I^- + OCl^- \longrightarrow IO^- + Cl^-$ in an aqueous medium, the rate of reaction is given by $\frac{d[IO^-]}{dt} = k\frac{[I^-][OCI^-]}{[OH^-]}$. The overall order of reaction is:
a) -1 b) 0 c) 1 d) 2

101. The temperature dependence of rate constant (k) of a chemical reaction is written in terms of Arrhenius equation, $k = Ae^{-Ea^*/RT}$. Activation energy (E*) of the reaction can be calculated by plotting :
a) log k vs $\frac{1}{T}$ b) log k vs $\frac{1}{log\,T}$ c) k vs T d) k vs $\frac{1}{log\,T}$

102. Consider the reaction: $2N_2O_4 \rightleftharpoons 4NO_2$ if $-\frac{d[N_2O_4]}{dt}$=k and $\frac{d[NO_2]}{dt}$=k' then
a) 2k'=k b) k'=2k c) k'=k d) k=$\frac{1}{4}$k'

103. The half-life for radioactive decay of C-14 is 5730 years. An archaeological artifact containing wood had only 80% of the C-14 found in a living tree. The age of the sample is
a) 1485 years b) 1845 years c) 530 years d) 4767 years

104. The decomposition of dinitrogen pentoxide (N_2O_5) follows first order rate law. What will be the rate constant from the given data?
At t = 800 s, $[N_2O_5] = 1.45$ mol L^{-1}
At t = 1600 s, $[N_2O_5] = 0.88$ mol L^{-1}
a) 3.12×10^{-4} s^{-1} b) 6.24×10^{-4} s^{-1} c) 2.84×10^{-4} s^{-1} d) 8.14×10^{-4} s^{-1}

105. When initial concentration of the reactant is doubled, the half-life period of a zero-order reaction :
a) Is tripled b) Is doubled c) Is halved d) Remains unchanged

106. The overall rate of a reaction is governed by
a) the rate of fastest intermediate step b) the sum of the rates of all intermediate steps
c) the average of the rates of all the intermediate steps

d) the rate of slowest intermediate step

107. A reaction having equal energies of activation for forward and reverse reaction has:
a) $\Delta G = 0$ b) $\Delta H = 0$ c) $\Delta H = \Delta G = \Delta S = 0$ d) $\Delta S = 0$

108. For a reaction $A_2 + B_2 \sim 2AB$ the figure shows the path of the reaction in absence and presence of acatalyst. What will be the energy of activation for forward (E_f) and backward (E_b) reaction in presence of a catalyst and i1H for the reaction? The dotted curve is the path of reaction in presence of a catalyst.
a) E_f= 60 kJ/mol, E_b = 70 kJ/mol, △H = 20 kJ/rnol
b) E_f= 20 kJ/mol, E_b = 20 kJ/mol,△H = 50 kJ/mol
c) E_f= 70 kJ/rnol, E_b = 20 kJ/mol, △H = 10 kJ/mol
d) E_f= 10 kJ/rnol, E_b = 20 kJ/mol, △H = -10 kJ/mol

109. Consider the reaction, $N_{2(g)} + 3H_{2(g)} \longrightarrow 2NH_{3(g)}$ The equality relationship between $\frac{d[NH_3]}{dt}$ and $-\frac{d[NH_2]}{dt}$ is :
a) $\frac{d[NH_3]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt}$ b) $+\frac{d[NH_3]}{dt} = -\frac{2}{3}\frac{d[H_2]}{dt}$ c) $+\frac{d[NH_3]}{dt} = -\frac{3}{2}\frac{d[H_2]}{dt}$ d) $\frac{d[NH_3]}{dt} = -\frac{d[H_2]}{dt}$

110. For a reaction, $2NO + 2H_2 \longrightarrow N_2 + 2H_2O$, the possible mechanism is
$2NO \rightleftharpoons N_2O_2$
$N_2O_2 + H_2 \xrightarrow{slow} N_2O + H_2O$
$N_2O + H_2O \xrightarrow{fast} N_2 + H_2O$
What is the rate law and order of the reaction?
a) Rate = $[N_2O_2]$, order = 1 b) Rate = $[N_2O_2][H_2]$, order = 2
c) Rate = $[N_2O_2]^2$, order = 2 d) Rate = $[N_2O_2]^2[H_2]$, order = 3

111. If hydrogen and oxygen are mixed and kept in the same vessel at room temperature, the reaction does not take place to form water because
a) activation energy for the reaction is very high at room temperature
b) molecules have no proper orientation to react to form water
c) the frequency of collisions is not high enough for the reaction to take place
d) no catalyst is present in the reaction mixture

112. Activation energy of a chemical reaction can be determined by_____.
a) determining the rate constant at standard temperature
b) determining the rate constants at two temperatures
c) determining probability of collision d) using catalyst

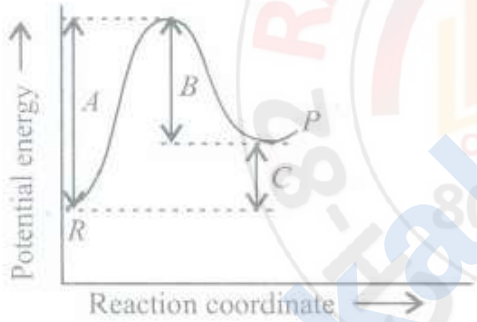
113. Assertion: Order of a reaction with respect to any reactant can be zero, positive, negative or fractional.
Reason: Rate of a reaction cannot decrease with increase in concentration of a reactant or a product.
a) If assertion is true but reason is false b) If both assertion and reason are false
c)
If both assertion and reason are true and reason is the correct explanation of assertion

d)
If both assertion and reason are true but reason is not the correct explanation of assertion

114. The activation energy in a chemical reaction is defined as
a) the difference in energies of reactants and products
b) the sum of energies of reactants and products
c)
the difference in energy of intermediate complex with the average energy of reactants and products
d) the difference in energy of intermediate complex and the average energy of reactants

115. The rate of the reaction $2\ N_2O_5 \rightarrow 4NO_2 + O_2$ can be written in three ways:
$\frac{-d[\ N_2O_5]}{dt} = k\ [\ N_2O_5]$
$\frac{d[NO_2]}{dt} = k'\ [N_2O_5]$
$\frac{d[O_5]}{dt} = k''\ [N_2O_5]$
The relationship between k and k' and between k and k" are:
a) $k' = 2k; k'' = k$ b) $k' = 2k; k'' = k/2$ c) $k' = 2k; k'' = 2k$ d) $k' = k; k'' = k$

116. The potential energy diagram for a reaction X ~ Y is given. A and C in the graph corresponding to



a) A → activation energy, C → △H°
b) A → energy of reactants, C→ energy of products
c) A → △H°, C →activation energy d) A → activation energy, C→threshold energy

117. The rate law for a reaction, A + B ⟶ C + D is given by the expression k[A]. The rate of reaction will be
a) doubled on doubling the concentration of B
b) halved on reducing the concentration of A to half
c) decreased on increasing the temperature of the reaction
d) unaffected by any change in concentration or temperature

118. Consider the graph given in Q. 9. Which of the following options does not show instantaneous rate of reaction at 40th second?
a) $\frac{V_5-V_2}{50-30}$ b) $\frac{V_4-V_2}{50-30}$ c) $\frac{V_3-V_2}{40-30}$ d) $\frac{V_3-V_1}{40-20}$

119. In a pseudo first order hydrolysis of ester in water, the following results were obtained.

t/s	0	30	60	90
Ester/mol L^{-1}	0.55	0.31	0.17	0.085

What will be the average rate of reaction between the time interval 30 to 60 seconds?

a) 1.91 x 10^{-2} s^{-1} b) 4.67 x 10^{-3} mol L^{-1} s^{-1} c) 1.98 x 10^{-3} s^{-1} d) 2.07 x 10^{-2} s^{-1}

120. The temperature dependence of the rate of a chemical reaction is given by Arrhenius equation, $k = Ae^{-E_a/RT}$. Which of the following graphs will be a straight line?

a) ln A vs 1/T b) ln A vs E_a c) ln k vs 1/T d) ln k vs $-E_a/R$

121. The reaction of hydrogen and iodine monochloride is given as: $H_{2(g)} + 2ICl_{(g)} \longrightarrow 2HCl_{(g)} + I_{2(g)}$ This reaction is of first order with respect to $H_{2(g)}$ and $ICl_{(g)}$, following mechanisms were proposed.

Mechanism A

$H_{2(g)} + 2ICl_{(g)} \longrightarrow 2HCl_{(g)} + I_{2(g)}$

Mechanism B

$H_{2(g)} + ICl_{(g)} \longrightarrow HCl_{(g)} + HI_{(g)}$, slow

$HI_{(g)} + ICl_{(g)} \longrightarrow HCl_{(g)} + I_{2(g)}$, fast

When of the above mechanism(s) can be consistent with the given information about the reaction?

a) Only B b) Both A and B c) Neither A nor B d) Only A

122. In a first-order reaction A + B, if k is rate constant and initial concentration of the reactant A is 0.5M, then the half-life is

a) $\frac{\log 2}{k}$ b) $\frac{\log 2}{k\sqrt{0.5}}$ c) $\frac{\ln 2}{k}$ d) $\frac{0.693}{0.5k}$

123. Assertion: The rate of reaction is the rate of change of concentration of a reactant or a product.

Reason: Rate of reaction remains constant during the complete reaction.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

124. Radioactive disintegration is an example of

a) zero order reaction b) first order reaction c) second order reaction

d) third order reaction

125. In a reversible reaction, the energy of activation of the forward reaction is 50 kcal. The energy of activation for the reverse reaction will be :

a) < 50 kcal b) 50 kcal c) either greater than or less than 50 kcal d) > 50 kcal

126. The rate of disappearance of SO_2 in the reaction, $2SO_2 + O_2 \longrightarrow 2SO_3$ is 1.28 X 10^{-5} M s^{-1}. The rate of appearance of SO_3 is

a) 0.64 x 10^{-5} M s^{-1} b) 0.32 x 10^{-5} M s^{-1} c) 2.56 x 10^{-5} M s^{-1} d) 1.28 x 10^{-5} M s^{-1}

127. For the reaction, $H_{2(g)} + Br_{2(g)} \longrightarrow 2HBr_{(g)}$, the reaction rate $=k[H_2][Br_2]^{1/2}$. Which statement is true about this reaction?

a) The reaction is of second order b) Molecularity of the reaction is 3/2.
c) The unit of k is sec^{-1} d) Molecularity of the reaction is 2

128. The hydrolysis of ethyl acetate,
$CH_3COOC_2H_5 + H_2O \xrightarrow{H^+} CH_3COOH + C_2H_5OH$ is a reaction of
a) zero order b) pseudo first order c) second order d) third order

129. The unit of rate and rate constant are same for a
a) zero order reaction b) first order reaction c) second order reaction
d) third order reaction

130. Fill in the blanks by choosing the correct option. Order of the reaction is the X of the powers to which concentration terms are raised in experimentally determined rate equation. The unit of first order rate constant is Y The unit of first order rate constant when concentration is measured in terms of pressure and time in minutes is Z.
a) X ⟶ product, Y ⟶ mol L^{-1} $time^{-1}$, Z ⟶ atm min^{-1}
b) X ⟶ sum, Y ⟶ L mol^{-1} $time^{-1}$, Z ⟶ atm min^{-1}
c) X ⟶ product, Y ⟶ L mol^{-1}, Z ⟶ atm min^{-1} d) X ⟶ sum, Y ⟶ $time^{-1}$, Z ⟶ min^{-1}

131. For the reaction $2\ N_2O_5 \rightarrow 4NO_2 + O_2$ rate and rate constant are $1.02 \times 10^{-4}\ mol\ lit^{-1} sec^{-1}$ and $3.4 \times 10^{-5} sec^{-1}$ respectively, then concentration of N_2O_5 at that time will be:
a) 1.732 M b) 3 M c) 3.4 x 10^5 M d) 1.02 x 10^{-4} M

132. The expression to calculate time required for: completion of zero order reaction is
a) $t=\frac{[R_0]}{k}$ b) t=[R]-[R_0] c) $t=\frac{k}{[R_0]}$ d) $t=\frac{[R_0]-[R]}{[R_0]}$

133. A first order reaction has a specific reaction rate of 10^{-2} sec^{-1}. How much time will it take for 20 g of the reactant to reduce to 59?
a) 138.6 sec b) 346.5 sec c) 693.0 sec d) 238.6 sec

134. For a reaction R ⟶ P, the concentration of a reactant changes from 0.05 M to 0.04 M in 30 minutes. What will be the average rate of reaction in minutes?
a) 4 x 10^{-4} M min^{-1} b) 8 x 10^{-4} M min^{-1} c) 3.3 x 10^{-4} M min^{-1} d) 2.2 x 10^{-4} M min^{-1}

135. When a catalyst is used in an equilibrium process,
a) it increases the rate of forward reaction
b) it decreases the rate of backward reaction
c)
it decreases activation energy of forward process and decreases activation energy of backward process
d) it fastens the attainment of equilibrium by lowering activation energy

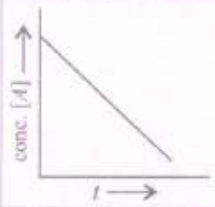
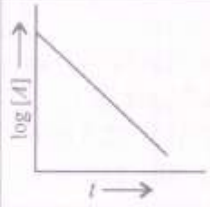
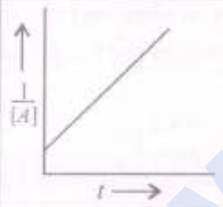
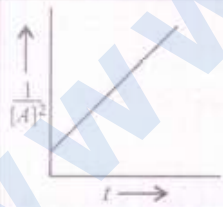
136. Assertion: Precipitation of silver chloride occurs instantaneously by mixing of aqueous solutions of silver nitrate and sodium chloride.
Reason: Ionic reactions occur very fast.

a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

137. A substance I decomposes by a first order reaction starting initially with [A] = 2.00 m and after 200 min, [A] becomes 0.15 m. For this reaction t1/2 is:
a) 53.49 min b) 50.49 min c) 48.45 min d) 46.45 min

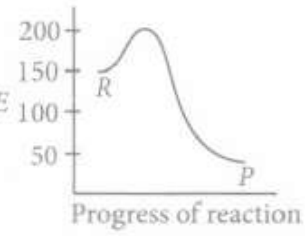
138. What will be the rate equation for the reaction 2X + Y ⟶ Z, if the order of the reaction is zero?
a) Rate=k[X][Y] b) Rate=k c) Rate = k[X]°[Y] d) Rate = k[X][Y]°

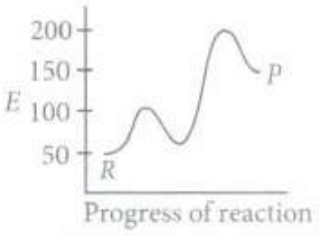
139. Match the graphs given in column Iwith the order given in column IIand mark the appropriate choice.

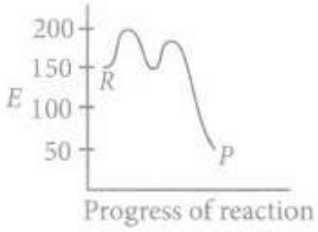
Column I		Column II	
(A)		(i)	Third order
(B)		(ii)	First order
(C)		(iii)	Zero order
(D)		(iv)	Second order

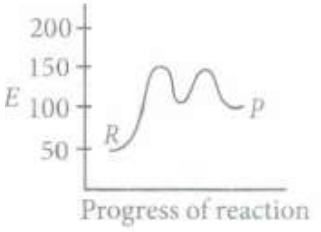
a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv)
b) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (i)
c) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (iv)
d) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶ (ii)

140. An exothermic chemical reaction proceeds by two stages. Reactants stage Intermediate stage Products The activation energy of state 1 is 50 kJ mol^{-1}. Theoverall enthalpy change for the reaction is-100 kJ mol. Which diagram could represent the energy level diagram for the reaction?

a) 

b) 

c) 

d) 

141. A reaction is 50% completed in 2 hours and 75% completed in 4 hours. The order of reaction is
a) 0 b) 1 c) 2 d) 3

142. The addition of a catalyst during chemical reaction alters which of the following quantities?
a) Enthalpy b) Activation energy c) Entropy d) Internal energy

143. The rate constant for a first order reaction is 2×10^{-2} min^{-1}. The half-life period of reaction is
a) 69.3 min. b) 34.65 min. c) 17.37 min. d) 3.46 min.

144. Which of the following statements is incorrect about the collison theory of chemical reaction?
a)
It considers reacting molecules or atoms to be hard spheres and ignores their structural features
b) Number of effective collisions determines the rate of reaction
c)
Collision of atoms or molecules possessing sufficient threshold energy results into the product formation
d)
Molecules should collide with sufficient threshold energy and proper orientation for the collision to be effective

145. When a biochemical reaction is carried out in laboratory in the absence of enzyme then rate of reaction obtained is 10^{-6} times, then activation energy of reaction in the presence of enzyme is:
a) $\frac{6}{RT}$ b) Different from E_a obtained in laboratory c) P is required
d) Can't say anything

146. The rate constant for a first order reaction at 300°C for which E_a is 35 kcal mol^{-1} and frequency constant is 1.45×10^{11} s^{-1} is
a) 10×10^{-2} s^{-1} b) 5.37×10^{10} s^{-1} c) 5×10^{-4} s^{-1} d) 7.94×10^{-3} s^{-1}

147. During the kinetic study of the reaction , $2\ A + B \rightarrow C + D$ following results were obtained

I $0.10.16.0 \times 10^{-1}$

II $0.30.27.2 \times 10^{-1}$

III $0.30.42.88 \times 10^{-1}$

IV $0.40.12.40 \times 10^{-1}$

Based on the above data which one of the following is correct?

a) rate = $k[A]^2[B]$ b) rate = $k[A][B]$ c) rate = $k[A]^2[B]^2$ d) rate = $k[A][B]^2$

148. For an endothermic reaction, energy of activation is E_a and enthalpy of reaction is ΔH (both of these in kJ/mol). Minimum value of E_a will be :

a) less than ΔH b) equal to ΔH c) more than ΔH d) equal to zero

149. 3A ⟶ B + C. It would be a zero order reaction, when :

a) the rate of reaction is proportional to square of concentration of A

b) the rate of reaction remains same at any concentration of A

c) the rate remains unchanged at any concentration of B and C

d) the rate of reaction doubles if concentration of B is increased to double

150. What is the activation energy for a reaction if its rate doubles when the temperature is raised from 20^0C to 35^0C?

(H = 8.314 J mol^{-1} K^{-1})

a) 342 kJ mol^{-1} b) 269 kJ mol^{-1} c) 34.7 kJ mol^{-1} d) 15.1 kJ mol^{-1}

151. Assertion: E_a of the forward reaction is higher than that of backward reaction in a reversible endothermic reaction.

Reason: Increasing the temperature of the substance increases the fraction of molecules which collide with energies greater than E_a.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

152. When initial concentration of a reaction is doubled in a reaction, its half-life period is not affected. The order of the reaction is :

a) zero b) second c) first d) more than zero but less than first

153. The unit of rate constant for the reaction,

$2H_2 + 2NO \rightarrow 2H_2O + N_2$

which has rate = $k[H_2][NO]^2$, is

a) mol L^{-1} s^{-1} b) s^{-1} c) mol^{-2} L^2 s^{-1} d) mol L^{-1}

154. A reaction in which reactants (R) are converted into products (P) follows second order kinetics. If concentration of R is increased by four times, what will be the increase in the rate of formation of P?

a) 9 times b) 4 times c) 16 times d) 8 times

155. The rate of a first order reaction is 1.5×10^{-2} mol L^{-1} min^{-1} at 0.5 M concentration of the reactant. The half-life of the reaction is:
a) 0.383 min b) 23.1 min c) 8.73 min d) 7.53 min

156. For the reaction, $2N_2O_5 \longrightarrow 4NO_2 + O_2$ rate and rate constant are 1.02×10^{-4} mol L^{-1} s^{-1} and 3.4×10^{-5} s^{-1} respectively. The concentration of N_2O_5 in mol L^{-1} will be:
a) 3.4×10^{-4} b) 3.0 c) 5.2 d) 3.2×10^{-5}

157. During the kinetic study of the reaction, 2A + B ⟶ C + D, following results were obtained :

Run	A/mol L^{-1}	B/mol L^{-1}	Initial rate of formation of d/mol $L^{-1}min^{-1}$
I	0.1	0.1	6.0×10^{-3}
II	0.3	0.2	7.2×10^{-2}
III	0.3	0.4	2.88×10^{-1}
IV	0.4	0.1	2.40×10^{-2}

Based on the above data which one of the followmg is correct?
a) Rate = k $[A]^2[B]$ b) Rate = k [A][B] c) Rate = k $[A]^2[B]^2$ d) Rate = k $[A][B]^2$

158. The rate constant is given by the equation $k = P \cdot Ze^{-E_a/RT}$. Which factor should register a decrease for the reaction to proceed more rapidly?
a) T b) Z c) E d) P

159. Assertion: For a chemical reaction with rise in temperature by 10° the rate constant is nearly doubled.
Reason: At t + 10, the fraction of molecules having energy equal to or greater than activation energy gets doubled.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

160. The rate of the reaction, A+B+C ⟶ P is given by: $r = -\frac{d[A]}{dt} = k[A]^{1/2}[B]^{1/2}[C]^{1/4}$. The order of the reaction is
a) 1 b) 2 c) 1/2 d) 5/4

161. For a first order reaction, the ratio of the time taken for $7/8^{th}$ of the reaction to complete to that of half of the reaction to complete is
a) 3:1 b) 1:3 c) 2:3 d) 3:2

162. In a reaction, A + B ⟶ Product, rate is doubled when the concentration of B is doubled and rate increases by a factor of 8 when the concentrations of both the reactants (A and B) are doubled. Rate law for the reaction can be written as :
a) rate = k $[A][B]^2$ b) rate = k $[A]^2$ $[B]^2$ c) rate = k [A][B] d) rate = k $[A]^2$ [B]

163. The unit of rate constant for a zero order reaction is:
a) $\text{mol L}^{-1}\text{ s}^{-1}$ b) $\text{L mol}^{-1}\text{ s}^{-1}$ c) $\text{L}^2\text{ mol}^{-2}\text{ s}^{-1}$ d) s^{-1}

164. The minus sign in rate =-$\frac{d[A]}{dtt}$ indicates the in concentration of the _____ with time. The rate of a reaction is always _____ quantity. The rate of reaction increases with _____ in concentration of reactants. The blanks in the question corresponds to
a) decrease, products, positive, increase b) increase, reactants, negative, decrease
c) decrease, reactants, positive, increase d) increase, products, positive, increase

165. If 60% of a first order reaction was completed in 60 min, 50% of the same reaction would be completed in approximately: (log 4 = 0.60, log 5 = 0.69)
a) 50 min b) 45 min c) 60 min d) 40 min

166. For the reaction, $2N_2O_5 \longrightarrow 4NO_2 + O_2$, the rate of reaction can be expressed in terms of time and concentration by the expression:
a) Rate = $-\frac{d[N_2O_5]}{dt} = -\frac{1}{4}\frac{d[NO_2]}{dt} = \frac{1}{2}\frac{d[O_2]}{dt}$ b) Rate = $-\frac{1}{2}\frac{d[N_2O_5]}{dt} = \frac{1}{4}\frac{d[NO_2]}{dt} = \frac{d[O_2]}{dt}$
c) Rate = $-\frac{1}{4}\frac{d[N_2O_5]}{dt} = \frac{1}{2}\frac{d[NO_2]}{dt} = \frac{d[O_2]}{dt}$ d) Rate = $-\frac{1}{2}\frac{d[N_2O_5]}{dt} = \frac{1}{2}\frac{d[NO_2]}{dt} = \frac{1}{2}\frac{d[O_2]}{dt}$

167. The rate constant of the reaction A $\longrightarrow$ B is 0.6 x 10^{-3} mole per second. If the concentration of A is 5M then concentration of B after 20 min is :
a) 1.08 M b) 3.60 M c) 0.36 M d) 0.72 M

168. The rate of first order reaction is 1.5 X 10^{-2} mol L^{-1} min^{-1} at 0.5 M concentration of the reactant. The half-life of the reaction is :
a) 0.383 min b) 23.1 min c) 8.73 min d) 7.53 min

169. If the rate constant for a first order reaction is k, the time (l) required for the cornpletion of 99% of the reaction is given by
a) t = 6.909/k b) t = 4.606/k c) t = 2.303/k d) t = 0.693/k

170. The reaction A $\longrightarrow$ B follows first order kinetics. The time taken for 0.8 mole of A to produce 0.6 mole of B is 1 h. What is the time taken for the conversion of 0.9 mole of A to 0.675 mole of B?
a) 0.25 h b) 2 h c) 1 h d) 0.5 h

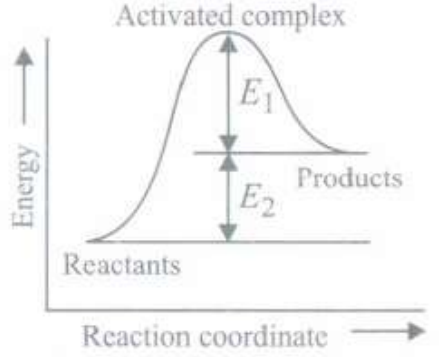
171. Half-life period of a first order reaction is 1386 s. The specific rate constant of the reaction is :
a) 5.0 x 10^{3} s^{-1} b) 0.5 x 10^{3} s^{-1} c) 0.5 x 10^{-3} s^{-1} d) 5.0 x 10^{-3} s^{-1}

172. A first order reaction is 50% completed in 1.26 x 10^{14} S. How much time would it take for 100% completion
a) 1.26 x 10^{15} s b) 2.52 x 10^{14} s c) 2.52 X 10^{28} s d) Infinite

173. A chemical reaction is catalysed by a catalyst X. Hence, X :
a) reduces enthalpy of the reaction b) decreases rate constant of the reaction
c) increases activation energy of the reaction
d) does not affect equilibrium constant of the reaction

174. A first order reaction is 20% complete in 10 minutes. What is the specific rate constant for the reaction?
a) 0.0970 min^{-1} b) 0.009 min^{-1} c) 0.0223 min^{-1} d) 2.223 min^{-1}

175. Consider figure and mark the correct option.



a)

Activation energy of forward reaction is $E_1 + E_2$ and product is less stable than reactant

b)

Activation energy of forward reaction is $E_1 + E_2$ and product is more stable than reactant

c)

Activation energy of both forward and backward reaction is $E_1 + E_2$ and reactant is more stable than product

d)

Activation energy of backward reaction is E_1 and product is more stable than reactant

176. The role of a catalyst is to change _____

a) Gibbs energy of reaction b) enthalpy of reaction c) activation energy of reaction d) equilibrium constant

177. In a reaction 2X ⟶ Y, the concentration of X decreases from 3.0 moles/litre to 2.0 moles/litre in 5 minutes. The rate of reaction is

a) 0.1 mol L^{-1} min^{-1} b) 5 mol L^{-1} min^{-1} c) 1 mol L^{-1} min^{-1} d) 0.5 mol L^{-1} min^{-1}

178. An increase in the concentration of the reactants of a reaction leads to change in:

a) collision frequency b) activation energy c) heat of reaction d) threshold energy

179. For the reaction $N_2 + 3H_2 \rightarrow 2NH_3$

$\frac{d[NH_3]}{dt} = 2 \times 10^{-4}\ mol\ L^{-}s^{-1}$, the value of $\frac{-d[H_2]}{dt}$ would be

a) $4 \times 10^{-4}\ mol\ L^{-1}\ s^{-1}$ b) $6 \times 10^{-4}\ mol\ L^{-1}\ s^{-1}$ c) $1 \times 10^{-4}\ mol\ L^{-1}\ s^{-1}$ d) $3 \times 10^{-4}\ mol\ L^{-1}\ s^{-1}$

180. Assertion: For the reaction

$CHCl_3 + Cl_2 \longrightarrow CCl_4 + HCl$

Rate $= k[CHCl_3][Cl_2]^{1/2}$

Reason: Rate of reaction is always equal to the sum of the stoichiometric coefficients of the reacting species in a balanced chemical equation.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

181. F or the reaction $\left[N_2O_5(g) \rightarrow 2NO_{2(g)} + 1/2O_{2(g)}\right]$ the value of rate of disappearance of N_2O_5 is given 6.25 x 10^{-3} mol $L^{-1}s^{-1}$. The rate of formation of NO_2 and O_2 is given respectively as:
a) $6.25 \times 10^{-3}\ mol\ L^{-1}\ s^{-1}$ *and* $6.25 \times 10^{-3}\ mol\ L^{-1}\ s^{-1}$
b) $1.25 \times 10^{-2}\ mol\ L^{-1}\ s^{-1}$ *and* $3.125 \times 10^{-3}\ mol\ L^{-1}\ s^{-1}$
c) $6.25 \times 10^{-3}\ mol\ L^{-1}\ s^{-1}$ *and* $3.125 \times 10^{-3}\ mol\ L^{-1}\ s^{-1}$
d) $1.25 \times 10^{-2}\ mol\ L^{-1}\ s^{-1}$ *and* $6.25 \times 10^{-3}\ mol\ L^{-1}\ s^{-1}$

182. The value of rate constant of a pseudo first order reaction _____ .
a) depends on the concentration of reactants present in small amount
b) depends on the concentration of reactants present in excess
c) is independent of the concentration of reactants d) depends only on temperature

183. The reaction 2X ⟶ Y + Z would be zero order reaction when
a) rate remains unchanged at any concentration of Y and Z
b) rate of reaction doubles if concentration of Y is doubled
c) rate of reaction remains same at any concentration of X
d) rate of reaction is directly proportional to square of concentration of X

184. In a reaction 2HI ⟶ H_2 + I_2, the concentration of HI decreases from 0.5 mol L^{-1} to 0.4 mol L^{-1} in 10 minutes. What is the rate of reaction during this interval?
a) 5 x 10^{-3} M min^{-1} b) 2.5 x 10^{-3} M min^{-1} c) 5 x 10^{-2} M min^{-1} d) 2.5 x 10^{-2} M min^{-1}

185. Which of the following statements for order of reaction is not correct?
a) Order can be determined experimentally
b)
Order of reaction is equal to the sum of powers of concentration terms in rate law expression
c) Order cannot be fractional
d) Order is not affected by stoichiometric coefficient of the reactants

186. The bromination of acetone that occurs in acid solution is represented by this equation
$CH_3COOH_3(aq) + Br_2(aq) \rightarrow CH_3COCH_2Br(aq) + H^+(aq) + Br^-(aq)$
These kinetic data were obtained for given reaction concentrations.
Initial concentrations, M

$[CH_3COOH_3]$	$[Br_2]$	$[H^+]$
0.30	0.05	0.05
0.30	0.10	0.05
0.30	0.10	0.10
0.40	0.05	0.20

initial rate, disappearance of Br_2, Ms^{-1}
5.7×10^{-5} 5.7×10^{-5}
1.2×10^{-4} 3.1×10^{-4}
Base on these data, the rate equations is:
a) $\text{Rate} = k\left[CH_3COCH_3\right]\left[H^+\right]$ b) $\text{Rate} = k\left[CH = COCH_3\right]\left[Br_2\right]$
c) $\text{Rate} = k\left[CH_3COCH_3\right]\left[Br_2\right]\left[H^+\right]^2$ d) $\text{Rate} = k\left[CH_3COCH_3\right]\left[Br_2\right]\left[H^+\right]$

187. Match the rate law given in column I with the dimensions of rate constants given in column II and mark the appropriate choice.

Column I		Column II	
(A)	RAte=k$[NH_3]^0$	(i)	mol $L^{-1}s^{-1}$
(B)	Rate=k$[H_2O_2][I^-]$	(ii)	L $mol^{-1}s^{-1}$
(C)	Rate=k$[CH_3CHO]^{3/2}$	(iii)	s^{-1}
(D)	Rate=k$[C_2H_5Cl]$	(iv)	$L^{1/2}mol^{-1/2}s^{-1}$

a) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)
b) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv)
c) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (iii)
d) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (iii)

188. Which of the following expressions is correct for the rate of reaction given below?

$$5Br^-_{(aq)} + BrO^-_{3(aq)} + 6H^+_{(aq)} \longrightarrow 3Br_{2(aq)} + 3H_2O_{(l)}$$

a) $\frac{\triangle[Br^-]}{\triangle t} = 5\frac{\triangle[H^+]}{\triangle t}$ b) $\frac{\triangle[Br^-]}{\triangle t} = \frac{6}{5}\frac{\triangle[H^+]}{\triangle t}$ c) $\frac{\triangle[Br^-]}{\triangle t} = \frac{5}{6}\frac{\triangle[H^+]}{\triangle t}$ d) $\frac{\triangle[Br^-]}{\triangle t} = 6\frac{\triangle[H^+]}{\triangle t}$

189. For a reaction X + Y ⟶ Z, rate ∝. [X]. What is (i) molecularity and (ii) order of reaction?
a) (i) 2, (ii) 1 b) (i) 2, (ii) 2 c) (i) 1, (ii) 1 d) (i) 1, (ii) 2

190. For a first-order reaction, the half-life period is independent of :
a) initial concentration b) cube root of initial concentration
c) first power of final concentration d) square root of final concentration

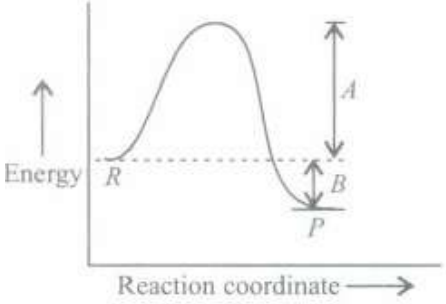
191. For the reaction A + B ⟶ products, what will be the order of reaction with respect to A and B?

Exp,	[A](mol L^{-1})	[A](mol L^{-1})	initial rate (mol L^{-1} s^{-1})
1.	2.5 x 10^{-4}	3 x 10^{-5}	5 x 10^{-4}
2.	5 x 10^{-4}	6 x 10^{-5}	4 x 10^{-3}
3.	1 x 10^{-3}	6 x 10^{-5}	1.6 x 10^{-2}

a) 1 with respect to A and 2 with respect to B
b) 2 with respect to A and 1 with respect to B
c) 1 with respect to A and 1 with respect to B
d) 2 with respect to A and 2 with respect to B

192. What is the activation energy for a reaction if its rate doubles when the temperature is raised frorn 20°C to 35°C? (R:8.314J $mol^{-1}k^{-1}$)
a) 269 kJ mol^{-1} b) 34.7 kJ mol^{-1} c) 15.1 kJ mol^{-1} d) 342 kJ mol^{-1}

193. The energy diagram of a reaction P + Q ⟶ R + S is given. What are A and B in the graph?



a) A → activation energy, B → heat of reaction
b) A → threshold energy, B →heat of reaction
c) A → threshold energy, B → heat of reaction
d) A → potential energy, B → energy of reaction

194. The rate of a gaseous reaction is given by the expression $k[A]^2[B]^3$. The volume of the reaction vessel is reduced to one half of the initial volume. What will be the reaction rate as compared to the original rate a?
a) $\frac{1}{8}$a b) $\frac{1}{2}$a c) 2a d) 32a

195. Assertion: The reaction

$\underset{Cane\ sugar}{C_{12}H_{22}O_{11}} + H_2O \xrightarrow{H^+} \underset{Glucose}{C_6H_{12}O_5} + \underset{Fructose}{C_6H_{12}O_6}$ is a first order reaction.

Reason: Change in concentration of H_2O is negligible.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

196. The rate of first-order reaction is 0.04 mol L^{-1} s^{-1} at 10 seconds and 0.03 mol L^{-1} s^{-1} at 20 seconds after initiation of the reaction. The half-life period of the reaction is :
a) 44.1 s b) 54.1 s c) 24.1 s d) 34.1 s

197. In a first order reaction, the concentration of reactant decreases from 400 mol L^{-1} to 25 mol L^{-1} in 200 seconds. The rate constant for the reaction is
a) 1.01386 s^{-1} b) 2 x 10^{-4} s^{-1} c) 1.386 x 10^{-2} s^{-1} d) 3.4 x 10^{-4} s^{-1}

198. The rate constant of a first order reaction is 15 x 10^{-3} s^{-1}. How long will 5.0 g of this reactant take to reduce to 3.0 g?
a) 10.10 s b) 15 s c) 34.07 s d) 7.57 s

199. If the rate of the reaction is equal to the rate constant, the order of the reaction is
a) 3 b) 0 c) 1 d) 2

200. In a zero-order reaction for every 10° rise of temperature, the rate is doubled. If the temperature is increased from 10^oC to 100^oC, the rate of the reaction will become:
a) 256 times b) 512 times c) 64 times d) 128 times

201. Consider a first order gas phase decomposition reaction given below:
$A_{(g)} \longrightarrow B_{(g)} + C_{(g)}$
The initial pressure of the system before decomposition of A was P_i. After lapse of time 't' total pressure of the system increased by x units and became 'p_t'.
The rate constant k for the reaction is given as _____.
a) $k=\frac{2.303}{t}log\frac{p_i}{p_i-x}$ b) $k=\frac{2.303}{t}log\frac{p_i}{2p_i-p_t}$ c) $k=\frac{2.303}{t}log\frac{p_i}{2p_i+p_t}$ d) $k=\frac{2.303}{t}log\frac{p_i}{p_i+x}$

202. Threshold energy is equal to

a) activation energy b) activation energy - energy of molecules
c) activation energy + energy of molecules d) None of these

203. The activation energy of a reaction can be determined from the slope of which of the following graphs?
a) ln k vs T b) ln k vs $\frac{1}{T}$ c) $\frac{ln\,k}{T}$ vs T d) $\frac{T}{ln\,k} vs \frac{1}{T}$

204. Compounds 'A' and 'B' react according to the following chemical equation.
$A_{(g)} + 2B_{(g)} \longrightarrow 2C_{(g)}$
Concentration of either 'A' or 'B' were changed keeping the concentrations of one of the reactants constant and rates were measured as a function of initial concentration. Following results were obtained. Choose the correct option for the rate equations for this reaction.

Experiment	Initial concentration of [A]mol L^{-1}	Initial concentration of [B] /mol L^{-1}	Initial rate of formation of [C]/mol $L^{-1}s^{-1}$
1.	0.30	0.30	0.10
2.	0.30	0.60	0.40
3.	0.60	0.30	0.20

a) Rate = k $[A]^2$ [B] b) Rate = k [A] $[B]^2$ c) Rate = k [A] [B] d) Rate = k [A] $[B]^0$

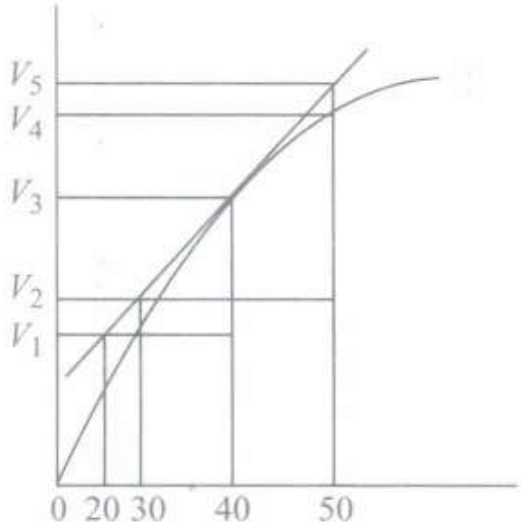
205. In a hypothetical reaction X ~ Y, the activation energy for the forward and backward reactions are 15 and 9 kJ mol^{-1} respectively. The potential energy of X is 10 kJ mol^{-1}. Which of the following statements is/are correct?
(i) The threshold energy of the reaction is 25 kJ mol^{-1}
(ii) The potential energy of Y is 16 kJ mol^{-1}
(iii) Heat of reaction is 6 kJ mol^{-1}
(iv) The reaction is endothermic.

a) Only (i) b) Only (i) and (ii) c) Only (ii) and (iii) d) All are correct.

206. In the presence of a catalyst, the heat evolved or absorbed during the reaction _____
a) increases b) decreases c) remains unchanged d) may increase or decrease

207. In a first order reaction, the concentration of reactant is reduced to 1/8 of the initial concentration in 75 minutes at 298 K. What is the half-life period of the reaction in minutes?
a) 50 min. b) 15 min. c) 30 min. d) 25 min.

208. A graph of volume of hydrogen released vs time for the reaction between zinc and dil. HCl is given in figure. On the basis of this mark the correct option.



a) Average rate upto 40 seconds is $\frac{V_3-V_2}{40}$ b) Average rate upto 40 seconds is $\frac{V_3-V_2}{40-30}$

c) Average rate upto 40 seconds is $\frac{V_3}{40}$ d) Average rate upto 40 seconds is $\frac{V_3-V_1}{40-20}$

209. Under what conditions a bimolecular reaction may be of first order?

a) When both reactants have same concentration

b) When one of the reacting species is in large excess

c) When the reaction is at equilibrium d) When the activation energy of reaction is less

210. For a reaction between A and B the order with respect to A is 2 and the order with respect to B is 3. The concentrations of both A and B are doubled, the rate will increase by a factor of :

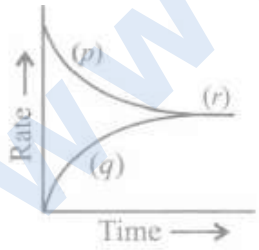
a) 10 b) 12 c) 16 d) 32

211. For the reaction,

$2N_2O_5 \longrightarrow 4NO_2 + O_2$, rate and rate constant are 1.02×10^{-4} and $3.4 \times 10^{-5}\ s^{-1}$ respectively, then concentration of N205 at that time will be :

a) 1.732 b) 3 c) 1.02×10^{-4} d) 3.4×10^{5}

212. For a reversible reaction, $A + B \rightleftharpoons C + D$, the graph for rate of reaction with time is given below. Mark the terms (P), (q) and (r).



a) (p)-rate of backward reaction, (q)-rate of forward reaction, (r)-equilibrium

b) (p)-rate of forward reaction, (q)-rate of backward reaction, (r)-equilibrium

c) (p)-concentration of products, (q)- concentration of reactants, (r)-rate of reaction

d) (p)-instantaneous rate of reaction, (q)-variation of rate, (r)-average rate of reaction

213. Which of the following statements about the catalyst is true?

a) A catalyst makes the reaction feasible by making ΔG more negative

b) A catalyst makes equilibrium constant more favourable for forward reaction

c) A catalyst accelerate rate of reaction by bringing down the activation energy

d) A catalyst always increases the rate of reaction

214. The bromination of acetone that occurs in acid solution is represented by this equation

$CH_3COCH_{3(aq)} + Br_{2(aq)} \longrightarrow CH_3COCH_2Br_{(aq)} + H^+_{(aq)} + Br^-_{(aq)}$

These kinetic data were obtained for given reaction concentrations.

Initial concentrations, M

$[CH_3COCH_3]$	$[Br_2]$	$[H^+]$
0.30	0.05	0.05
0.30	0.10	0.05
0.30	0.10	0.10
0.40	0.05	0.20

Initial rate, disappearance of Br_2,Ms^{-1}

5.7×10^{-5}

5.7×10^{-5}

1.2×10^{-4}

3.1×10^{-4} Based on these data, the rate equation is :

a) rate = $k[CH_3COCH_3][H^+]$ b) rate = $k[CH_3COCH_3]\ [Br_2]$

c) rate = $k[CH_3COCH_3][Br_2][H^+]^2$ d) rate = $k[CH_3COCH_3][Br_2][H^+]$

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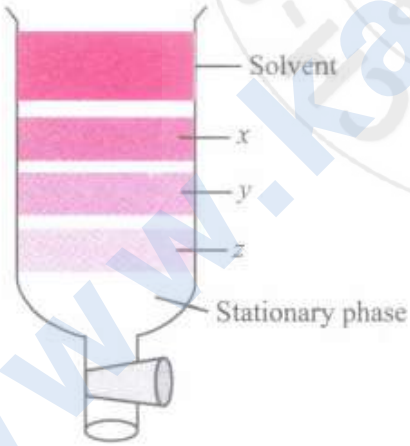
Time : 1 Mins **GENERAL PRINCIPLES AND PROCESS OF ISOLATION OF ELEMENTS 1** **Marks : 668**

1. The significance of leaching in the extraction of aluminium is:
   a) it helps removing the impurities like SiO_2, Fe_2O_3, etc from the bauxite ore
   b) it converts the ore into oxide c) it reduces melting point of the ore
   d) it eliminates water from bauxite.
2. Heating pyrites to remove sulphur is called
   a) smelting b) calcination c) liquation d) roasting.
3. Sulphide ores of metals are usually concentrated by froth floatation process. Which one of the following sulphide ores offers an exception and is concentration by chemical leaching?
   a) Argentite b) Galena c) Copper pyrite d) Sphalerite
4. Column chromatography involves separation of a mixture over a column of adsorbent (stationary phase) packed in a glass tube. Depending upon the degree of adsorption complete separation takes place. In the given column, three coloured bands x, y, z are formed. Identify the correct statement.



   a) x, y and z are adsorbed to the same extent.
   b) The most readily adsorbed component is retained near the top (x).
   c) The most readily adsorbed component comes down (z).
   d)
   x, y, z layers are formed according to the wavelengths of the colours not on the basis of adsorption.
5. Which of the following are main requirements for vapour phase refining?
   (i) Metal should form a volatile compound with the reagent.
   (ii) The volatile compound should be easily decomposable to give back pure metal.

(iii) Metal should be very reactive and form a stable compound with the reagent
a) (i), (ii) and (iii) b) (i) and (ii) c) (ii) and (iii) d) (i) and (iii)

6. Which of the following ores is concentrated by chemical leaching method?
a) Cinnabar b) Argentite c) Copper pyrites d) Galena

7. One mole of acidified $K_2Cr_2O_7$ on reaction with excess KI will liberate mole(s) of L;
a) 3 b) 1 c) 7 d) 2

8. How do we separate two sulphide ores by froth floatation method?
a) By using excess of pine oil
b) By adjusting proportion of oil to water or using depressant
c) By using collectors and froth stabilisers like xanthates.
d) By using some solvent in which one of the sulphides is soluble.

9. In electrometallurgy of aluminium, what will happen if graphite rods are not used as anode and are replaced by some other metal
a) Ozliberated at anode will react with aluminium to give back Al_2O_3
b) F_2 will be liberated at anode instead of O_2
c) The process of electrometallurgy will become non -spontaneous
d) Aluminium oxide splits into Al^{3+} and O^{2-} ions only in presence of graphite.

10. At 1000°C,
$Zn_{(s)} + \frac{1}{2}O_{2(g)} \rightarrow ZnO_{(s)}; \triangle GO^o - 360KJmol^{-1}$
$C_{(s)} + \frac{1}{2}O_{2(g)} \rightarrow CO_{(g)}; \triangle GO^o - 460KJmol^{-1}$
The correct statement is
a) zinc can be oxidised by carbon monoxide.
b) zinc blend is produced during the reaction .
c) zinc oxide can be reduced by graphite d) zinc can be oxidised by graphite

11. In blast furnace iron oxide is reduced by
a) silica b) carbon monoxide c) carbon d) lime stone

12. Sulphide ores of metals are usually concentrated by froth flotation process. Which one of the following sulphide ores offer an exception and concentrated by chemical leaching
a) Galena b) Copper pyrite c) Sphalerite d) Argentite

13. Magnesium oxide is used for the lining in steel making furnace because
a) MgO acts as an acidic flux to remove impurities of Si, P and S
b) MgO acts as a basic flux to remove impurities of Si, P and S
c) MgO acts as an oxidising agent to remove impurities of oxides
d) MgO does not react with any type of impurities.

14. Brine is electrolysed by using inert electrodes. The reaction at anode is_____
a) $Cl^-_{(aq)} \rightarrow \frac{1}{2}Cl_{2(g)} + e^-; E^o_{cell} = 1.36V$ b) $2H_2O_{(l)} \rightarrow O_{2(g)} + 4H^+ + 4e^-; E^o_{cell} = 1.23V$
c) $Na^+_{(aq)} + e^- \rightarrow Na_{(s)}; E^o_{cell} = 2.71V$ d) $H^+_{(aq)} + e^- \rightarrow \frac{1}{2}H_{2(g)}; E^o_{cell} = 0.00V$

15. Assertion: Gold and silver are extracted from their native ores by leaching.
Reason: Both silver and gold particles dissolve in dilute solution of sodium cyanide in presence of oxygen.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

16. Electrolytic refining is used to purify which of the; following metals?
a) Cu and Zn b) Ge and Si c) Zr and Ti d) Zn and Hg

17. Match the column I with column II and mark the appropriate choice.

Column-I		Column-II	
A)	Electrical industry	(i)	Zinc
B)	Batteries	(ii)	Steel
C)	Gutter pipes	(iii)	Copper
D)	Gas stoves	(iv)	Cast iron

a) (A) →(i), (B) →(ii), (C) →(iii), (D) →(iv) b) (A) →(ii), (B) →(iii), (C) →(iv), (D) →(i)
c) (A) →(iv), (B) →(iii), (C) →(ii), (D) →(i) d) (A) →(iii), (B) →(i), (C) →(iv),(D) →(ii)

18. Roasting of copper pyrite ores is for the following purpose
a)
to burn off sulphur, arsenic, antimony etc. as oxides and convert all the iron and copper to their oxides
b)
to burn off arsenic, antimony etc. as oxides and burn off sulphur so that enough of it remains to combine with all the copper
c)
to burn off sulphur partially, in order to leave enough of sulphur to combine with arsenic, antimony etc. and to convert all the iron and copper to oxides
d)
to melt arsenic and antimony sulphides etc. and remove them by liquation and to burn off sulphur partially to leave enough to combine with copper and iron.

19. Which of the following is used as a method of purification for silicon?
a) Electrolytic refining b) Liquation c) Zone refining d) Distillation

20. Match items of Column I with the items of Column II and assign the correct code:

Column I	Column II
(A) Cyanide process	(i) Ultrapure Ge
(B) Froth floatation process	(ii) Dressing of ZnS
(C) Electrolytic reduction	(iii) Extraction of Al
(D) Zone refining	(iv) Extraction of Au
	(v) Purification of Ni

a)

A	B	C	D
(i)	(ii)	(iii)	(iv)

b)

A	B	C	D
(iii)	(iv)	(v)	(i)

c)

A	B	C	D
(iv)	(ii)	(iii)	(i)

d)

A	B	C	D
(ii)	(iii)	(i)	(v)

21. Match the column I with column II and mark the appropriate choice

Column-I		Column-II	
A	Calcination	(i)	$Cr2O_3 + 2Al \rightarrow 2Cr + Al2O_3$
B	Roasting	(ii)	$FeCO_3 \longrightarrow FeO + CO_2$
C	Smelting	(iii)	$2ZnS + 3O_2 \longrightarrow ZnO + 2SO_2$
D	Aluminothermy	(iv)	$PbO + C \longrightarrow Pb + CO$

a) (A)⟶ (i), (B)⟶ (ii), (C)⟶ (iii), (D)⟶ (iv)
b) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)
c) (A) ⟶(iii), (B) ⟶(ii), (C) ⟶(i), (D) ⟶(iv) d) (A)⟶ (ii), (B)⟶ (iii), (C)⟶ (iv), CD)⟶ (i)

22. Which of the following metals is not extracted by leaching?
a) Aluminium b) Mercury c) Silver d) Gold

23. _____being highly reactive is used in the extraction of chromium and manganese.
a) Al b) Zn c) Cu d) Mg

24. Which of the following ores cannot be concentrated by magnetic separation?
a) Haematite b) Malachite c) Magnetite d) Siderite

25. Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true?
a) The ΔG_f^0 of the sulphide is greater than those for CS_2 and H_2S.
b) The ΔG_f^0 is negative for roasting of sulphide ore to oxide.
c) Roasting of the sulphide to the oxide is thermodynamically feasible
d) Carbon and hydrogen are suitable reducing agents for metal sulphides

26. During a column chromatography through Al_2O_3 column, a mixture of components A, B and C is passed through the column. On adding eluant, compound 'A' is eluted first then 'B' and in the end 'CO Which of the following statements regarding the components is correct.
a) The order of adsorption of A, B and C is C>B>A.
b) The order of adsorption of A, B and C is A>B>C.
c) The order of adsorption of A, B and C is B>A>C.
d) The order of adsorption of A, B and C is B>C>A.

27. Which of the following sulphides when heated strongly in air gives the corresponding metal without undergoing separate reduction of oxide?
a) Cu_2S b) FeS c) HgS d) ZnS

28. Assertion: Reduction of a metal oxide is easier if the metal formed is in liquid state at the temperature of reduction.
Reason : The entropy is higher if the metal is in liquid state.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

29. Which of the following is not an oxide ore?
a) Corundum b) Zincite c) Calamine d) Chromite

30. Match the column I with column II and mark the appropriate choice

Column-I		Column-II	
A	Calamine	(i)	Calcium
B	Barytes	(ii)	Barium
C	Cinnabar	(iii)	Zinc
D	Limestone	(iv)	Mercury

a) (A)→ (iv), (B)→ (iii), (C)→ (i), (D)→ (ii) b) (A) → (iii), (B) → (ii), (C) → (iv), (D) → (i)
c) (A) → (i), (B) → (iv), (C) → (ii), (D) → (iii) d) (A) → (ii), (B) → (i), (C) → (iii), (D) → (iv)

31. Which of the following compounds is used as the starting material for the preparation of potassium dichromate?
a) $K_2SO_4.Cr_2(SO_4)_3.24H_2O$ (Chrome alum) b) $PbCrO_4$ (Chromite yellow)
c) $FeCr_2O_4$ (Chromite) d) $PbCrO_4.PbO$ (Chrome red)

32. Which of the following is not a carbonate ore?
a) Dolomite b) Calamine c) Siderite d) Zincite

33. "Metals are usually not found as nitrates in their ores." Out of the following two (I and II) reasons which is/are true for the above observation?
I. Metal nitrates are highly unstable
II. Metal nitrates are highly soluble in water.
a) I and II are true b) I and II are false c) I is false but II is true
d) I is true but II is false

34. Identify the correct statement from following
a) Pig iron can be moulded into variety of shapes
b) Wrought iron is impure iron with 4% carbon
c) Blister copper has blistered appearance due to evolution of CO_2.
d) Vapour phase refining is carried out for Nickel by VanArkel method.

35. Why is partial roasting of sulphide ore done in metallurgy of copper?
a) Auto-reduction of Cu-O formed is carried out by remaining CU_2S in the reaction.
b) Cu is separated out by partial reduction due to sedimentation.
c) Due to difference in gravity Cu_2O and CU_2S are separated.
d) Complete roasting cannot be done in one step hence partial roasting is done

36. For which of the following ores froth floatation method is used for concentration?
a) Haematite b) Zinc blende c) Magnetite d) Carnallite

37. Which one of the following is not a sulphide ore?
a) Galena b) Iron pyrites c) Magnetite d) Copper glance

38. Which of the following reactions is an example of autoreduction?
a) $Fe_3O_4 + 4CO \rightarrow 3Fe + 4CO_2$ b) $Cu_2O+C \rightarrow 2Cu+CO$
c) $Cu^{2+}_{(aq)} + Fe_{(s)} \rightarrow Cu_{(s)} + Fe^{2+}_{(aq)}$ d) $Cu_2O + \frac{1}{2}Cu_2S \rightarrow 3Cu + \frac{1}{2}SO_2$

39. Match the column I with column II and mark the appropriate choice

Column-I		Column-II	
A)	Impure metal to volatile complex	(i)	Blistered copper
B)	$2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$	(ii)	Mond process
C)	Purification of mercury	(iii)	van Arkel process
D)	Purification of zirconium	(iv)	Liquation

a) (A) → (iv), (B) → (iii), (C) → (i), (D) → (ii)
b) (A) → (ii), (B) → (i), (C) → (iv), (D) → (iii)
c) (A) → (i), (B) → (ii), (C) → (iv), (D) → (iii)
d) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

40. Which of the following reactions is not taking place in Blast furnace during metallurgy of iron between the temperature range of 500-800 K?
a) $FeO + CO \rightarrow Fe + CO_2$ b) $3Fe_2O_3 + CO \rightarrow 2Fe_3O_4 + 4CO_2$
c) $Fe_3O_4 + 4CO \rightarrow 3Fe + 4CO_2$ d) $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$

41. Fill in the blanks with the correct choice.
The undesired impurities present in the ores are called (i). To remove the volatile impurities from the ore, the (ii) process is carried out.Flux combines with non-fusible impurities to form iii CaO acts as a (iv) flux.

a)

(i)	(ii)	(iii)	(iv)
gangue	roasting	slag	acidic

b)

(i)	(ii)	(iii)	(iv)
gangue	calcination	slag	basic

c)

(i)	(ii)	(iii)	(iv)
anode mud	leaching	matrix	acidic

d)

(i)	(ii)	(iii)	(iv)
gangue	roasting	solution	acidic

42. Removal of the unwanted materials like sand, clays etc. from the ore is known as _____, _____,or_____.
a) concentration, dressing, benefaction b) separation, refining, gangue
c) magnetic separation, purification, gangue d) washing, refining, amalgamation

43. The method of zone refining of metals is based on the principle of:
a) greater noble character of the solid metal than that of the impurity
b) greater solubility of the impurity in the molten state than in the solid
c) greater mobility of the pure metal than that of impurity
d) higher melting point of the impurity than that of the pure metal

44. Assertion: Zone refining method is used to prodllce pure metals which are used as semiconductors.
Reason : Semiconductors are used in highly Pure form
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

45. Elemental silicon to be used as a semiconductor is purified by
a) heating under vacuum b) floatation c) zone refining d) electrolysis

46. Match the column I with column II and mark the appropriate choice.

Column-I		**Column-II**	
A	Highly electropositive metals	(i)	Carbon reduction
B	Copper	(ii)	CO reduction
C	Iron	(iii)	Self reduction
D	Zinc	(iv)	Electrolysis

a) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i) b) (A) →(iii), (B) →(ii), (C) →(i), (D) →(iv)
c) (A)→ (ii), (B)→ (i), (C)→ (iii), (D)→ (iv) d) (A) →(i), (B) →(ii), (C) →(iii), (D) →(iv)

47. Given below are the different temperature reactions and products during extraction of iron in blast furnace.

P	900K	1.	$Fe_2O_3+3C \rightarrow 2Fe+3CO$
Q	1200K	2.	$CaCO_3 \rightarrow CaO+CO_2$
R	1500K	3.	$2C+O_2 \rightarrow 2CO$
S	2000K	4.	$Fe_2O_3+3CO \rightarrow 2Fe+3CO_2$

Find the correct match
a) P-4, Q-2, R-3, S-1 b) P-4, Q-3, R-2, S-1 c) P-3, Q-4, R-1, S-2
d) P-4, Q-2, R-1, S-3

48. Which of the following statements is correct about the role of collectors added during froth floatation process?
a) Collectors enhance the non-wettability of ore particles.
b) Collectors enhance the wettability of gangue particles.
c) Collectors help in separating two sulphide ores present in the mixture
d) Collectors help ore particles to settle down below the froth

49. Which of the following slags is produced during extraction of iron?
a) $CaSiO_3$ b) $FeSiO_3$ c) $MgSiO_3$ d) $ZnSiO_3$

50. Wrought iron is manufactured from cast iron by heating it with:
a) C b) $CaCO_3$ c) Fe_2O_3 d) SiO_2

51. Sulphide ore of zinc/copper is concentrated by
a) floatation process b) electromagnetic process c) gravity separation
d) distillation.

52. Which of the following reactions takes place at higher temperature range (900 K-IS00 K) in blast furnace?
a) $3Fe_2O_3 + CO \rightarrow 2Fe_3O_4 + CO_2$ b) $FeO + CO \rightarrow Fe + CO_2$
c) $Fe_3O_4 + 4CO \rightarrow 3Fe + 4CO_2$ d) $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$

53. Which of the following is not correct observation based on Ellingham diagram?

a) A metal can reduce the oxide of other metal which lies above it in Ellingham diagram
b) CO is more effective than C as a reducing agent below 710°C
c)
ΔG^o of metal oxides is higher than that of CO_2 hence oxidation of metal sulphides to oxides is not favourable
d)
Need for conversion of metal sulphide to metal oxide before reduction can be explained thermodynamically.

54. Which of the following elements is present as the impurity to the maximum extent in the pig iron?
a) Carbon b) Silicon c) Phosphorus d) Manganese

55. Potassium dichromate is prepared from
a)
chromate obtained by the fusion of chromite ore with sodium carbonate in free access of air
b) pyrolusite which is fused with potassium hydroxide in the presence of air
c) iron pyrites by the fusion with potassium carbonate in presence of moisture
d) none of these.

56. During the formation of the slag by the reaction of flux and impurities which of the following is an example of acidic and basic flux?
$FeO + SiO_2 \rightarrow FeSiO_3$
$SiO_2 + MgO \rightarrow MgSiO_3$
a) (i) SiO_2 - Acidic flux (ii) MgO - Basic flux b) (i) SiO_2 - Basic flux (ii) MgO - Acidic flux
c) (i) SiO_2 - Basic flux (ii) MgO - Basic flux d) (i) SiO_2 - Acidic flux (ii) MgO - Acidic flux

57. Which of the following metals cannot be obtained by electrolysis
a) Cr b) Na c) Ca d) Mg

58. The powdered ore is agitated with water or washed with running stream of water. The heavy ore particles and lighter impurities are separated. This method of concentration is known as
a) metallurgy b) leaching c) gravity separation d) froth floatation process

59. The metal oxide which cannot be reduced to metal by carbon is?
a) Fe_2O_3 b) Al_2O_3 c) PbO d) ZnO

60. Which one of the following elements constitutes a major impurity in pig iron?
a) Silicon b) Oxygen c) Sulphur d) Graphite

61. Assertion: In the metallurgy of aluminium, purified Al_2O_3 is mixed with Na_3AlF_6 or CaF_2
Reason: Na_3AlF_6 or CaF_2 lowers the melting point of mixture and increase its conductivity.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

62. Which of the following statements are incorrect?
I. Zinc can be extracted by self-reduction.
II. A depressant prevents certain type of particles to come to the froth.
III. Copper matte contains ZnS and Cu_2S,
IV. The solidified copper obtained from reverberatory furnace has blistered appearance due to evolution of SO_2 during the extraction
a) I and II b) II and III c) I and III d) II and IV

63. Below point 'A' FeO can_____ .
a) be reduced by carbon monoxide only
b) be reduced by both carbon monoxide and carbon c) be reduced by carbon only
d) not be reduced by both carbon and carbon monoxide

64. Assertion: van Arkel method is used for refining of zinc.
Reason: In this method impure metal is evaporated to obtain the pure metal as distillate.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

65. Which of the following metals is extracted using a silica lined convertor?
a) Mg b) Al c) Cu d) Zn

66. Which of the following examples is not correctly matched?
a) Two most abundant elements - Fe, Al.
b) Two metals which occur in native state - Au, Pt
c) Two metals which can occur in combined and native state both - Zn, Fe.
d) None of these

67. Yellow coloured aqueous solution of sodium chromate changes to orange when acidified with sulphuric acid because
a) H^+ ions convert chromate ions to dichromate ions
b) H^+ ions react with sodium chromate to give sodium ions which turn solution orange
c) Cr^{3+} ions are liberated in the solution which turn the solution orange
d)
sodium hydroxide is formed during the reaction which imparts orange colour to the solution

68. Which process of purification is represented by the following reaction?

$$\underset{Impure}{Ti} + 2I_2 \xrightarrow{250^oC} TiI_4 \xrightarrow{1400^oC} \underset{pure}{Ti} + 2I_2$$

a) Zone refining b) Monds process c) Cupellation d) van Arkel process

69. Which of the following is not a method of refining of metals?

a) Electrolysis b) Smelting c) Poling d) Liquation

70. In the extraction of chlorine by electrolysis of brine _____

a) oxidation of Cl^- ion to chlorine gas occurs

b) reduction of Cl^- ion to chlorine gas occurs

c) for overall reaction ΔGO^o has negative value

d) a displacement reaction takes place

71. Which one of the following is true in electrolytic refining?

a) Impure metal is made cathode. b) Impure metal is made anode

c) Impure metal is made cathode and pure metal as anode

d) Both electrodes must be of pure metal

72. Assertion: Sulphide ores are converted to oxides before reduction.

Reason: Oxides are easier to reduce.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

73. For the reduction of FeO with C at the temperature corresponding to (D), which of the following statements is correct?

a) Carbon reduces FeO below the temperature at point (D).

b) ΔG^o value for overall reduction with CO is zero

c) ΔG^o value for the reaction at point (D) is positive.

d) Below point (D), for the metal exists in molten state

74. Assertion: Minerals are naturally occurring chemical substances in the earth's crust obtainable by mining.

Reason: Minerals are also known as ores.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false.

d)

If both assertion and reason are false Only those minerals which are viable to be used as sources of metal are known as ores.

75. Match the column I with column II and mark the appropriate choice

Column-I		Column-II	
A)	Metals used as semiconductors	(i)	Aluminium
B)	Electrolytic reduction	(ii)	Zone refining
C)	Cyanide process	(iii)	Dressing of ZnS
D)	Froth floatation process	(iv)	Extraction of Ag

a) (A)→ (i), (B)→ (iii), (C)→ (ii), (D)→ (iv) b) (A)→ (iii), (B)→ (iv), (C)→ (ii), (D)→ (i)
c) (A)→ (iv), (B)→ (ii), (C)→ (iii), (D)→ (i) d) (A)→ (ii), (B)→ (i), (C)→ (iv), (D)→ (iii)

76. Blister copper obtained during extraction from cuprous oxide is called so because
a) it has blister like eruptions due to evolution gas.
b) it has a shining surface like blister c) it is the most impure form of copper
d) its surface is uneven due to different thickness at different places

77. Following reactions take place during extraction of gold.
$4Au + 8CN^- + 2H_2O + O_2 \longrightarrow 4[Au(CN)_2]^- + 4OH^-$ $2[Au(CN)_2]^- + Zn \rightarrow 2Au + [Zn(CN)_4]^{2-}$
Zinc in the extraction of gold acts as a/an
a) oxidising agent b) flux c) reducing agent d) decomposing agent

78. Assertion: Roasting is a process in which the ore is heated strongly in absence of air.
Reason: Concentration of sulphide ore is done by calcination.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

79. Considering Ellingham diagram, which of the following metals can be used to reduce alumina?
a) Mg b) Zn c) Fe d) Cu

80. The name of the metal which is extracted from the ore is given below. Mark the example which is not correct.
a) Malachite - Cu b) Calamine - Zn c) Chromite - Cr d) Dolomite - Al

81. _____ and _____ are alloys of copper
a) Brass and bronze b) Brass and alloy steel c) Copper pyrites and malachite
d) Copper glance and cuprite

82. Assertion: In electrolytic refining of metal, impur, metal is made cathode while a strip of pure metal is used as anode.
Reason: The pure metal gets deposited at anode is anode mud
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

83. When copper ore is mixed with silica, in a reverberatory furnace copper matte is produced. The copper matte contains
a) sulphides of copper (II) and iron (II) b) sulphides of copper (II) and iron (III)
c) sulphides of copper (I) and iron (II) d) sulphides of copper (I) and iron (III).

84. Arrange the oxides of manganese according to increasing acidic strength.
a) $MnO < Mn_3O_4 < Mn_2O_3 < MnO_2 < Mn_2O_7$
b) $Mn_2O_7 < MnOz < Mn_2O_3 < Mn_3O_4 < MnO$
c) $MnO_2 < Mn_2O_7 < Mn_3O_4 < Mn_2O_3 < MnO$
d) $Mn_3O_4 < Mn_2O_3 < Mn_2O_7 < MnO_2 < MnO$

85. The mineral carnallite contains _(i)_ and __(ii)_ metals_(iii)_ is purified by cupellation and _(iv)_ is purified by distillation

a)

(i)	(ii)	(iii)	(iv)
calcium	zinc	mercury	tin

b)

(i)	(ii)	(iii)	(iv)
calcium	magnesium	zinc	lead

c)

(i)	(ii)	(iii)	(iv)
potassium	calcium	copper	mercury

d)

(i)	(ii)	(iii)	(iv)
magnesium	potassium	silver	mercury

86. Match the column I with column II and mark the appropriate choice.

Column-I		**Column-II**	
A)	van Arkel method	(i)	Ni
B)	Zone refining	(ii)	Ti
C)	Mond process	(iii)	Ag
D)	Cupellation	(iv)	Ge

a) (A)→ (i), (B)→ (ii), (C)→ (iii), (D)→ (iv) b) (A)→ (iii), (B)→ (i), (C)→ (ii), (D)→ (iv)
c) (A)→ (ii), (B)→ (iv), (C)→ (i), (D) → (iii) d) (A)→ (iv), (B)→ (iii), (C)→ (i), (D)→ (ii)

87. Which of the following metal evolves hydrogen on reacting with cold dilute HNO_3?
a) Mg b) Al c) Fe d) Cu

88. Most electropositive metals are obtained from their ores by
a) autoreduction b) smelting with carbon c) electrolysis of fused salts
d) thermal decomposition

89. During the process of electrolytic refining of copper, some metals present as impurity settle as anode mud: These are:
a) Sn and Ag b) Pb and Zn c) Ag and Au d) Fe and Ni

90. Extraction of gold and silver involves leaching the metal with CN^- ion. The metal is recovered by_____
a) displacement of metal by some other metal from the complex ion
b) roasting of metal complex c) calcination followed by roasting
d) thermal decomposition of metal complex

91. Identify the alloy containing a non-metal as a constituent in it.

a) Invar b) Steel c) Bell Metal d) Bronze

92. During extraction of aluminium from bauxite,
a) the concentration of ore is done by gravity separation method
b) molten mixture of aluminium oxide, cryolite or fluorspar is electrolysed
c) impure aluminium is refined by liquation
d) molten aluminium is obtained at cathode while fluorine is liberated at anode.

93. Which of the following is a halide ore?
a) Cassiterite b) Anglesite c) Siderite d) Carnallite

94. Zone refining is based on the principle that_____
a) impurities of low boiling metals can be separated by distillation
b) impurities are more soluble in molten metal than in solid metal
c) different components of a mixture are differently adsorbed on an adosrbent
d) vapours of volatile compound can be decomposed in pure metal

95. Assertion: Chromatography in general involves a mobile phase (a gas, a liquid or a supercritical fluid) and a stationary phase (like Al_2O_3 column).
Reason : A component which is less soluble in stationary phase takes longer time to travel through it than the component which is more soluble in stationary phase
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

96. Chromatography is a useful method for purification of elements which are
a) very reactive b) available in minute quantities c) present in abundance
d) highly electropositive

97. What happens when potassium iodide reacts withacidic solution of potassium dichromate?
a) It liberates iodine b) Potassium sulphate is formed
c) Chromium sulphate is formed d) All the above products are formed

98. In a thermite process_____ is used as reducing agent.
a) Zn b) Al c) Mn d) Fe

99. Which of the following pairs of metal is purified by van Arkel method?
a) Ga and In b) Zr and Ti c) Ag and Au d) Ni and Fe

100. Mark the incorrect statement
a) Copper is extracted by smelting in a reverberatory furnace
b) Zinc is extracted by reduction of oxide with aluminium
c) Aluminium is extracted by electrolysis of its oxide
d) Iron is extracted by reduction of its oxide in blast furnace

101. Common impurities present in bauxite are

a) CuO b) ZnO c) CaO d) SiO_2

102. Which of the following statements is not correct?
a) Zinc can be extracted from its ore by roasting followed by reduction with coke
b) In reverberatory furnace, both oxidation and reduction processes can be carried out
c) Silver is purified by distillation or liquation process.
d) Highly pure metals are obtained by zone refining.

103. Which of the following is not an example of roasting?
a) $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$ b) $2PbS + 3O_2 \rightarrow 2PbO + 2SO_2$
c) $2Cu_2S + 3O_2 \rightarrow 2Cu_2O + 2SO_2$ d) $2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$

104. Which of the following changes take place during roasting?
(i) Impurities are removed as their volatile oxides.
(ii) Ore is converted into its oxide.
(iii) Changes like oxidation, chlorination, etc. take place.
a) (i) and (ii) b) (ii) and (iii) c) (i) and (iii) d) (i), (ii) and (iii)

105. Which of the following is not the correct name of the formula of the ore given with it?

a)

$MgSO_4 \cdot 7H_2O$	Epsom salt

b)

$CuCO_3 \cdot Cu(OH)_2$	Malachite

c)

$KAlSi_3O_8$	Feldspar

d)

$KCl \cdot MgCl_2 \cdot 6H_2O$	Dolomite

106. Carnallite on electrolysis gives
a) Mg and Cl_2 b) Ca and Cl_2 c) K and Cl_2 d) Al and Cl_2

107. Which of the following metals is obtained by electrolytic reduction process
a) Fe b) Cu c) Ag d) Al

108. A number of elements are available in earth's crust but most abundant elements are_____
a) Al and Fe b) Al and Cu c) Fe and Cu d) Cu and Ag

109. The following reactions take place in the blast furnace in the preparation of impure iron. Identify the reaction pertaining to formation of the slag:
a) $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(l) + 3CO_2(g)$
b) $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$ c) $CaO(s) + SiO_2(s) \rightarrow CaSiO_3(s)$
d) $2C(s) + O_2(g) \rightarrow 2CO(g)$

110. The metal oxide reacts with a _____ The oxide is _____ to metal and reducing agent is _____Net Gibbs energy change is_____
a) reducing agent, oxidised, reduced, negative
b) reducing agent, reduced, oxidised, negative
c) oxidising agent, reduced, oxidised, positive
d) reducing agent, reduced, oxidised, positive

111. Silica is added to the sulphide ore of coppe in reverberatory furnace because
a) sulphide ore of copper contains iron as impurity which is removed as iron slag
b) silica reacts with Cu-O to form slag c) silica helps in reduction of Cu_2O to Cu

d) sulphide ore of copper is separated from iron' by reacting with silica

112. Roasting of sulphides gives the gas X as a by-product. This is a colourless gas with chocking smell of burnt sulphur and causes great damage to respiratory organs as a result of acid rain. Its aqueous solution is acidic, acts as a reducing agent and its acid has never been insolated. The gas X is:
a) H_2S b) SO_2 c) CO_2 d) SO_3

113. In the metallurgy of aluminium
a) $Al^{3+}$is oxidised to $Al_{(s)}$
b) graphite anode is oxidised to carbon monoxide and carbon dioxide
c) oxidation state of oxygen changes in the reaction at anode
d) oxidation state of oxygen changes in the overall I reaction involved in the process.

114. Impure Ni+4CO $\xrightarrow{60-80^oC}$ Ni(CO_4) $\xrightarrow{180^oC}$Ni + 4CO The above process of purification of the metal is known as
a) van Arkel process b) pyrometallurgy c) Mond process d) zone refining.

115. Assertion: In froth floatation method, collectors such as pine oil or xanthates are added to the suspension of powdered ore.
Reason: Collectors stabilise the froth
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

116. In metallurgical process, aluminium acts as
a) an oxidising agent b) a reducing agent c) acidic flux d) basic flux.

117. Which of the following statements is correct according to the basic concepts of thermodynamics which govern the feasibility of a metallurgical process?
a)
When the value of i1G is positive for the equation $\Delta G = \Delta H - T\Delta S$, the reaction will proceed
b)
If reactants and products of two reactions are put together and net ΔG is -ve, the overall reaction will occur
c) On increasing the temperature, the value of ΔG becomes +ve.
d)
Feasibility of thermal oxidation of an ore can be established by Ellingham diagram in which a straight line shows the reduction reaction will proceed.

118. Froth floatation process of concentration is based on the
a) preferential wetting properties with the frothing agent and water
b) difference in the specific gravities of gangue and ore particles

c) difference in solubility of gangue and ore particles in frothing agent and water
d) difference in reactivity of gangue and ore particles with water and frothing agent

119. Sometimes it is possible to separate two sulphide ores by adjusting the proportion of oil to water or by using depressants. When a depressant NaCN is added to an ore containing ZnS and PbS, what is the correct observation?
a) NaCN prevents PbS from coming to the froth but allows ZnS to come with froth.
b) NaCN prevents ZnS from coming to the froth but allows PbS to come with froth
c) NaCN prevents frothing of both ZnS and PbS, hence no froth is formed.
d) NaCN does not act as depressant hence a mixture of PbS and ZnS is found in froth

120. Assertion: Magnesium metal is not used for the reduction of alumina in the metallurgy of aluminium.
Reason : MgO curve lies above Al_2O_3 curve in Ellingham diagram.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

121. Extraction of chlorine from brine is based on:
a) reduction b) displacement c) oxidation d) evaporation.

122. Which of the following metals cannot be obtained by reduction of its metal oxide by aluminium?
a) Cr b) Mn c) Fe d) Mg

123. At the point of intersection of Al_2O_3 and MgO curves (A), $\triangle G^o$ becomes zero for the reaction,
$\frac{2}{3}Al_2O_3 + 2Mg \longrightarrow 2MgO + \frac{4}{3}Al$
Above this point, magnesium can reduce alumina. Although thermodynamically feasible, Mg is not used for reduction of Al_2O_3 because
a) temperature required is very hjgh b) the yield of metal is very low
c) value of, $\triangle G^O$ becomes positive
d) magnesium is not used as reducing agent for any reaction.

124. An ore of tin containing, $FeCrO_4$ is concentrated by
a) gravity separation b) magnetic separation c) froth floatation d) leaching.

125. Blister copper is
a) impure copper b) obtained in self-reduction process during bessemerisation
c) both are correct d) none is correct

126. Which of the following statements is correct?
(i) Copper is extracted by hydrometallurgy from low grade ores.
(ii) In electrolytic reduction of alumina, graphite is acting as anode and steel vessel with

lining of carbon acts as cathode.

(iii) In Hall-Heroult process, aluminium is obtained at anode and CO and CO_2 are produced at cathode.

a) (i) only b) (i) and (ii) only c) (ii) and (iii) only d) All of these

127. Acidified potassium dichromate reacts with potassium iodide and oxidises it to I_2. What is the oxidation state of chromium in the products of the reaction?

a) +4 b) +6 c) +3 d) +2

128. Assertion: Tin is refined by liquation method.

Reason: Tin has low melting point as compared to impurities.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

129. In this method, a low melting metal like tin can be made to flow on a sloping surface. In this way it is separated from higher melting impurities. The method is known as

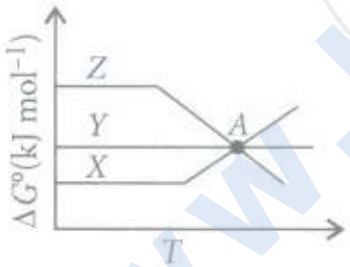
a) distillation b) vapour phase refining c) liquation d) zone refining.

130. What would happen when a solution of potassium chromate is treated with an excess of dilute nitric acid?

a) $Cr_2O_4^{2-}$ is reduced to +3 state of Cr b) $Cr_2O_4^{2-}$ is oxidised to +7 state of Cr.

c) Cr^{3+} and $Cr_2O_7^{2-}$ are formed d) $Cr_2O_7^{2-}$ and H_2O are formed

131. In the following Ellingham diagram, X, Y and Z represent graphs for metal oxides. Select the correct option before point A.



a) Y will reduce oxide of Z. b) Ywill reduce oxide of X. c) Z will reduce oxide of X.

d) Z will reduce oxide of Y

132. Assertion: Limestone added in the blast furnace decomposes to give CaO which forms slag in molten state and separates out from iron.

Reason : The iron obtained from the blast furnace contains about 4% carbon and many impurities like S, P, Si, Mn, etc.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

133. Aluminium is extracted from alumina (Al_2O_3) by electrolysis of a molten mixture of:
a) $Al_2O_3 + HF + NaAlF_4$ b) $Al_2O_3 + CaF_2 + NaAlF_4$ c) $Al_2O_3 + Na_3AlF_6 + CaF_2$
d) $Al_2O_3 + KF + Na_3AlF_6$

134. In the extraction of copper from its sulphide ore, the metal finally obtained by the reduction of cuprous oxide with
a) Iron (ii) sulphide b) Carbon monoxide c) Copper (i) sulphide d) Sulphur dioxide

135. Thereaction $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$ (ΔG^o = - 421 kJ) is thermodynamically feasible due to -ve value of tJ.G. Why does this reaction not take place at room temperature:
a)
Certain amount of activation energy is essential for thermodynamically feasible reactions also
b) Due to high melting point of chromium oxide the reaction does not take place
c) Overall value of ΔG^o for the net reaction becomes positive
d) Molecules of Cr_2O_3 and Al are not oriented properly

136. The main difference between cast iron and pig iron is
a) cast iron is purest form ofiron while pig iron is impure
b)
cast iron has lower carbon content (3%) as compared to pig iron (4%) and is extremely hard and brittle
c)
pig iron contains many impurities like S, P, Si and Mn while cast iron does not contain any impurity and can be casted into any shape
d) cast iron is soft and malleable while pig iron is extremely hard and brittle

137. The oil used as frothing agent in froth floatation process is
a) coconut oil b) castor oil c) palmitic oil d) pine oil

138. From the Ellingham graph between Gibbs energy and temperature, out of C and CO which is a better reducing agent for ZnO?
a) Carbon b) CO c) Both of these d) None of these

139. Mark the correct statements
(i) Mercury can be refined by the process of distillation.
(ii) In poling, the molten impure metal is stirred with green poles of wood.
(iii) In electrolytic refining of metals, impure metal is made as cathode and a thin strip of pure metal is made as anode
a) (i) and (ii) b) (i) and (iii) c) (ii) and (iii) d) (i), (ii) and (iii)

140. A solid compound X on heating gives CO_2 gas and a residue. The residue mixed with water forms Y. On passing an excess of CO_2 through Y in water, a clear solution Z is obtained. On boiling Z, compound X is reformed. The compound X is
a) $Ca(HCO_3)_2$ b) $CaCO_3$ c) $NaZCO_3$ d) K_2CO_3

141. Cassiterite is an ore of:
a) Mn b) Ni c) Sb d) Sn

142. Purification of aluminium by electrolytic refining is known as
a) Hall's process b) Baeyer's process c) Hoope's process d) Serpeck's process

143. What is the process of leaching in case of low grade copper ores?
a) Leaching is carried out with NaOH and O_2 b) Leaching is carried out with NaCN
c) Leaching is carried out with acids in presence of H_2.
d) Leaching is carried out by boiling the ore with water

144. Impurities of sulphur, silicon and phosphorus can be removed from cast iron by adding
a) carbon which reduces the impurities b) water which dissolves the impurities
c) limestone which changes impurities into oxides and pass into slag
d) iron oxide which reacts with impurities by forming slag.

145. During the extraction of haernatite, limestone is added which acts as
a) flux b) slag c) reducing agent d) gangue

146. Assertion : Nickel is purified by reacting it with CO.
Reason : Impurities present, form a volatile complex.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

147. Pyrolusite is
a) a sulphide ore of Mn b) an oxide ore of Mn c) a carbide ore of P
d) a chloride ore of Zn

148. Which of the following reactions do not result in the preparation of potassium dichromate from chromate?
(I) $4FeCr_2O_4 + 8Na_2CO_3 + 7O_2 \rightarrow$
(II) $Na_2CrO_4 + H_2SO_4 \rightarrow$
(III) $Na_2CrzO_7 + 2KCl \rightarrow$
a) (I) and (II) b) (II) and (III) c) (I) and (III) d) (I), (II) and (III)

149. Extraction of gold and silver involves leaching with CN^- ion. Silver is later recovered by
a) Distillation b) Zone Refining c) Displacement with Zn d) Liquation

150. In electro-refining of copper, some gold is deposited as
a) cathode mud b) electrolyte c) anode mud d) cathode.

151. Match the column I with column II to match the method of extraction and mark the appropriate choice

Column-I		Column-II	
A	Cu	(i)	Direct reduction of sulphide by heating
B	Sn	(ii)	Electrolysis of fused chloride and fluoride
C	Hg	(iii)	Partial oxidation of sulphide ore
D	Ca	(iv)	Reduction of oxide with carbon

a) (A) → (iii), (B) → (i), (C) → (ii), (D) → (iv)
b) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii) c) (A)→ (i), (B)→ (iii), (C)→ (ii), (D)→ (iv)
d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

152. Ellingham diagram represents change:
a) ΔG with temperature b) ΔH with temperature c) ΔG with pressure
d) (ΔG - $T\Delta S$) with temperature

153. The materials which can withstand very high temperature without melting or becoming soft are called _____ These are used in making _____ of furnaces.
a) refractory materials, inner lining b) flux, base c) brick materials, outer structure
d) mica, outer lining

154. Four metals and their methods of refinement are given,
(i) Ni, Cu, Zr, Ga
(ii) electrolysis, van Arkel process, zone refining, Mend's process
Choose the right method for each
Ni: Electrolysis, Cu : van Arkel process,
a) Zr : Zone refining, Ga : Mend's process
Ni : Monds process, Cu : Electrolysis,
b) Zr : van Arkel process, Ga : Zone refining
Ni : Monds process, Cu : van Arkel process,
c) Zr : Zone refining, Ga : Electrolysis
Ni: Electrolysis, Cu : Zone refining,
d) Zr: van Arkel process, Ga : Mend's process

155. Which of the following reactions show the process of smelting?
a) $2PbO + PbS \rightarrow 3Pb + SO_2$ b) $2Na[Au(CN)_2] + Zn \rightarrow Na2[Zn(CN)_4] + 2Au$
c) $PbO + C \rightarrow Pb + CO$ d) $2HgS + 3O_2 \rightarrow 2HgO + 2SO_2$

156. Which of the following is magnetite?
a) Fe_2CO_3 b) Fe_2O_3 c) Fe_3O_4 d) $Fe_2O_3 \cdot 3H_2O$

157. Which one of the following is a mineral of iron?
a) Malachite b) Cassiterite c) Pyrolusite d) Magnetite

158. Calcium is obtained by the
a) roasting of limestone b) electrolysis of solution of calcium chloride H_2O
c) electrolysis of molten anhydrous calcium chloride
d) reduction of calcium chloride with carbon

159. Cryolite and fluorspar are mixed with Al_2O_3 during electrolysis for extraction of aluminium to
a) increase the mass of the reaction mixture
b) get other products at anode like fluorine
c) lower the melting point and increase the conductivity of the electrolyte
d) reduce aluminium oxide by cryolite

160. Choose the correct option of temperature at which carbon reduces FeO to iron and produces CO

a) Below temperature at point A
b) Approximately at the temperature corresponding to point A
c) Above temperature at point A but below temperature at point D
d) Above temperature at point A

161. In which of the following the name of the ore is not matched with its formula?
a) Cassiterite - SnO_2 b) Limonite - $Fe_2O_3 \cdot 3H_2O$ c) Siderite - $FeCO_3$
d) Anglesite - $PbCO_3$

162. Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true?
a) Carbon and hydrogen are suitable reducing agents for metal sulphides
b) The $\Delta_f G^0$ of the sulphide is greater than those for CS_2 and H_2S
c) The $\Delta_f G^0$ is negative for roasting of sulphide ore to oxide
d) Roasting of the sulphide to the oxide is thermodynamically feasible

163. In the extraction of copper from its sulphide ore, the metal is formed by the reduction of Cu_2O with_____
a) FeS b) CO c) Cu_2S d) SO_2

164. Sulphides ores are converted to oxides before reduction. This is explained on the basis of which of the following?
a) Sulphides cannot be reduced easily while oxides can be reduced easily
b) Sulphides decompose on reduction hence they are first converted to oxides.
c) Sulphide ores have higher melting points than oxides
d) Oxides are more stable than sulphides hence easy to reduce

165. Find the incorrect match.

a)		b)		c)		d)	
Kaolinite	$[Al_2(OH)_4Si_2O_5]$	Siderite	Fe_2O_3	Sphalerite	ZnS	Magnetite	Fe_3O_4

166. Which of the following reactions does not take place during leaching for concentration of bauxite?
a) $Al_2O_3 + 2NaOH + 3H^2O \longrightarrow 2Na[Al(OH)_4]$
b) $Al_2O_3 + 2NaOH + 3H^2O \longrightarrow 2Na[Al(OH)_4]$ c) $Al_2O_3 \cdot 2H_2O \xrightarrow{\triangle} Al_2O_3 + 2H_2O$
d) $Al_2O_3 \cdot xH_2O \xrightarrow{\triangle} Al_2O_3 + xH_2O$

167. The reaction of H_2O_2 with hydrogen sulphide is an example of reaction:
a) addition b) oxidation c) reduction d) acidic

Ravi Maths Tuition Centre

Time : 1 Mins **HYDROGEN HYDROCARBONS' 1** **Marks : 925**

1. Which of the following is not a process of preparation of hydrogen peroxide?
   a) Auto-oxidation of 2-ethylanthraquinol. b) By passing oxygen through boiling water.
   c) By oxidation of isopropyl alcohol. d) Byreaction of barium peroxide with dil. H_2SO_4.
2. Which of the following hydrides is electron deficient?
   a) NaH b) CaH_2 c) CH_4 d) B_2H_6
3. Which of the following act as a stabiliser for the storage of H_2O_2?
   a) Alkali b) Dust c) Urea d) None of these.
4. A commercial sample of hydrogen peroxide is labelled as 10 volume. Its percentage strength is nearly:
   a) 3% b) 1% c) 90% d) 10%
5. In which of the following reaction H_2O acts as a Bromsted acid?
   a) $H_2O(l) + NH_3(aq) \rightleftharpoons OH(aq) + NH^+4(aq)$ b) $H_2O_{(l)} + H_2S_{(aq)} \rightleftharpoons H_3O^+_{(aq)} + HS^-_{(aq)}$
   c) $H_20_{(l)} + H_{2O(l)} \rightleftharpoons H_3O^+_{(aq)} + OH^-_{(aq)}$ d) $H+_{(aq)} + OH^-(aq) \rightleftharpoons H_2O_{(l)}$
6. The oxide that gives H_2O_2 on treatment with dilute H_2SO_4 is
   a) PbO_2 b) $BaO_2.8H_2O$ c) MnO_2 d) TiO_2
7. Some of the major uses of heavy water are given below. Which one is not correct?
   a) It is used as a moderator in nuclear reactors.
   b) It is used as a tracer compound for studying reaction mechanism.
   c) High concentration of heavy water accelerates the growth of plants.
   d) It is used in preparing deuterium.
8. Which of the following is an atom of tritium?

   a)

   b)

   c)

   d)

9. HI can be prepared by all the following methods except
   a) $PI_3 + H_2O$ b) $KI + H_2SO_4$ c) $H_2 + I_2 \xrightarrow{Pt}$ d) $I_2 + H_2S$
10. Which of the following equations depict the oxidising nature of H_2O_2?
    a) $2MnO_4^- + 6H^+ + 5H_2O_2 \rightarrow 2Mn^{2+} + 8H_2O + 5O_2$
    b) $2Fe^{3+} + 2H^+ + H_2O_2 \rightarrow 2Fe^{2+} + 2H_2O + O_2$ c) $2HI + H_2O_2 \rightarrow I_2 + 2H_2O$
    d) $KIO_4 + H_2O_2 \rightarrow KIO_3 + H_2O + O_2$

11. Statues and paintings coated with white lead turn black on long exposure to atmosphere. The original colour can be restored by treating them with H_2O_2. The reason behind this is:
a)
blackened statues get coated with PbS which on reaction with H_2O_2 is oxidised to white $PbSO_4$
b) H_2O_2 dissolves the coating of white lead and exposes the inner surface.
c) white lead reacts with H_2O_2 to form white $PbSO_4$
d) blackened statues get coated with lead sulphate which reacts with H_2O_2 to give PbS.

12. Some statements about heavy water are given below:
(i) Heavy water is used as a moderator in nuclear reactors.
(ii) Heavy water is more associated than ordinary water.
(iii) Heavy water is more effective solvent than ordinary water.
Choose the correct answer:
a) (i) and (ii) b) (i), (ii) and (iii) c) (ii) and (iii) d) (i) and (iii)

13. The production of dihydrogen obtained from coal gasification can be increased by reacting carbon monoxide of syngas mixture with steam in presence of a catalyst iron chromate. What is this process called?
a) Hydrogen reaction b) Water-gas shift reaction c) Coal-gas shift reaction
d) Syn gasification

14. What is heavy water?
a) H_2O^{18} b) D_2O c) H_2O17 d) H_2O

15. **Assertion:** All the three isotopes of hydrogen have almost the same chemical properties.
Reason: Isotopes differ from one another in respect of the presence of neutrons.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

16. Phosphorus cannot form PH_5 with its outer electronic configuration as $3s^23p^3$ because
a) phosphorus cannot show +5 oxidation state b) PH_5 is not a stable compound
c)
$\triangle_a H$ value of dihydrogen and $\triangle_{eg} H$ value of hydrogen do not favour higher oxidation state of phosphorus
d) phosphorus is not very reactive hence does not form PH_5.

17. **Assertion:** $CuSO_4.5H_2O$ has one hydrogen-bonded molecule of water.
Reason: The four molecules of water are coordinated in $CuSO_4.5H_2O$.
a) If assertion is true but reason is false. b) If both assertion and reason are false.
c)
If both assertion and reason are true and reason is the correct explanation of assertion.

d)

If both assertion and reason are true but reason is not the correct explanation of assertion.

18. Match the column I with column II and mark the appropriate choice.

Column I		Column - II	
(A)	NaH	(i)	Interstitial hydride
(B)	CH_4	(ii)	Molecular hydride
(C)	$VH_{O.56}$	(iii)	Ionic hydride
(D)	B_2H_6	(iv)	Electron -deficient hydride

a) (A)→ (iii), (B)→(iv), (C)→ (ii) (D)→ (i) b) (A)→(ii), (B)→(iv), (C)→(iii), (D)→(i)

c) (A)→(i), (B)→(ii) , (C)→(iv), (D)→(iii) d) (A)→(iii), (B)→(ii), (C)→(i), (D)→(iv)

19. The boiling point of heavy water is:

a) 100°C b) 101.4°C c) 99°C d) 110°C

20. Alkenes combine with carbon monoxide and hydrogen in presence of octacarbonyldicobalt as catalyst under high temperature and pressure to form

a) aldehydes which can be further reduced to alcohols by hydrogen

b) alkanes which are formed by addition of hydrogen

c) alcohols formed by reaction of CO and hydrogen

d) ketones which can be further reduced to aldehydes by hydrogen.

21. In what respect electronic configuration of hydrogen and halogens are similar?

a) Hydrogen and halogens have one electron in their outermost shell.

b) Hydrogen and halogens have one electron less than the noble gas configuration.

c) Hydrogen and halogens can lose one electron to form positive ions.

d) Hydrogen and halogens show noble gas configuration.

22. Which of the following metals does not liberate hydrogen from acids?

a) Fe b) Cu c) Mg d) Zn

23. Which of the following metals directly combine with hydrogen gas to give a hydride?

a) Au b) Ni c) Ca d) Cu

24. What happens when an alkaline solution of potassium ferricyanide is reacted with H_2O_2?

a) Potassium ferricyanide is oxidised to potassium ferrocyanide and H_2O_2 is oxidised.

b) Potassium ferricyanide becomes colourless and H_2O_2 is oxidised to O_2

c) Potassium ferricyanide is reduced to ferric hydroxide and H_2O_2 is oxidised to H_2O.

d)

Potassium ferricyanide is reduced to potassium ferrocyanide and H_2O_2 is oxidised to O_2

25. Fluorine decomposes cold water to give

a) $4H^+ + 4F^-$ and O_2 b) HF and H_2 c) HF only d) H_2F_2 and HFO_4.

26. Some statements about heavy water are given below:

(a) Heavy water is used as a moderator in nuclear reactors.

(b) Heavy water is more associated than ordinary water.

(c) Heavy water is more effective solvent than ordinary water.
Which of the above statements are correct?
a) (a) and (c) b) (a) and (b) c) (a), (b) and (c) d) (b) and (c)

27. Last traces of water is removed from H_2O_2 by
a) electrolysis b) crystallisation c) condensation d) evaporation.

28. Which of the following metals will react with NaOH and KOH to liberate hydrogen gas?
a) Zn, Al, Fe and Mg b) Al, Fe, Mg and Sn c) Zn, Sn and Al d) Fe, Mg and Al

29. Non-stoichiometric hydrides are produced by
a) palladium, vanadium b) manganese, lithium c) nitrogen, fluorine
d) carbon, nickel

30. Which of the following hydrides is electron-precise hydride?
a) B_2H_6 b) NH_3 c) H_2O d) CH_4

31. A deuterium is
a) an electron with a positive charge b) a nucleus having two protons
c) a nucleus containing a neutron and two protons
d) a nucleus containing a neutron and a proton.

32. Choose the correct option as directed.
a) CsH > KH > NaH < LiH (Order of stability)
b) $H_2O < NH_3 < CH_4$ (Order of dipole moment)
c) $PH_3 < AsH_3 < NH_3 < SbH_3$ (Order of boiling point)
d) X ..... H - X,X = O > F > N > S > Cl (Order of strength of H-bonding)

33. Match the column I with column II and mark the appropriate choice.

Column - I		**Column - II**	
(A)	Clark's method	(i)	$Na_6P_6O_{18}$
(B)	Calgon's method	(ii)	$NaAlSiO_4$
(C)	Ion- exchange method	(iii)	RSO_3H
(D)	Synthetic resins method	(iv)	$Ca(OH)_2$

a) (A) → (i), (B) → (iii), (C) → (iv), (D)→ (ii)
b) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)
c) (A) → (iii), (B) → (ii) , (C) → (i), (D) → (iv)
d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

34. Which of the following equation depicts reducing nature of H_2O_2?
a) $2[Fe(CN)_6]^{4-} + 2H^+ + H_2O_2 \rightarrow 2[Fe(CN)_6]^{3-} + 2H_2O$
b) $I_2 + H_2O_2 + 2OH^- \rightarrow 2I^- + 2H_2O + O_2$ c) $Mn^{2+} + H_2O_2 \rightarrow Mn^{4+} + 2OH^-$
d) $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

35. Water gas is mixed with steam and the mixture is passed over heated Fe_2O_3 in presence of Cr_2O_3. The mixture when passed in water dissolves CO_2 and dihydrogen left undissolved is collected. This method of preparation of hydrogen gas is known as
a) Bosch process b) Lane process c) Kellner process d) Hall process

36. Which gas is produced when calcium nitride (Ca_3N_2)is hydrolysed by water?

a) N_2 b) NH_3 c) H_2 d) O_2

37. The method used to remove temporary hardness of water is:
a) Clark's method b) Ion-exchange method c) Synthetic resins method
d) Calgon's method

38. Match List-I with List-II. Choose the correct matching codes from the choices given

List I (Hydride)		List II (Type of Hydride)	
A.	BeH_2	1.	Complex
B.	AsH_3	2.	Lewis acid
C.	B_2H_6	3.	Interstitial
D.	LaH_3	4.	Covalent
E	$LiAlH_4$	5.	Intermediate

a) A-6, B-2, C-4, D-5, E-I b) A-6, B-2, C-4, D-3, E-I c) A-6, B-4, C-2, D-3, E-5
d) A-5, B-4, C-2, D-3, E-I

39. What will be the mass of oxygen liberated by decomposition of 200 mL hydrogen peroxide solution with a strength of 34 g per litre?
a) 25.5 g b) 3.0 g c) 3.2 g d) 4.2 g

40. Which is not a property of water?
a) It is a colourless and tasteless liquid.
b) There is no hydrogen bonding in solid state of water.
c) It is an excellent solvent for transportation of ions in plants and animals.
d) Ice is lighter than liquid water.

41. Liquid water is denser than ice due to
a) higher surface tension b) hydrogen bonding c) van der Waals forces
d) covalent bonding.

42. Which of the following statements regarding hydrogen peroxide is false?
a) It is a strong oxidising agent. b) It is decomposed by MnO_2.
c) It behaves as a reducing agent. d) It is more stable in basic solution.

43. Which of the following compounds is used for water softening?
a) $Ca_3(PO_4)_2$ b) Na_3PO_4 c) $Na_6P_6O_{18}$ d) Na_2HPO_4

44. A metal (M) produces a gas (N) on reaction with alkalies like NaOH and KOH. Same gas is produced when the metal reacts with dilute sulphuric acid. Gas (N) reacts with another toxic gas (P) to form methanol at high temperature and pressure. (N) also reacts with metals like (Q) to form electrovalent hydrides. M, N, P and Q respectively are
a) Zn, H_2, CO, Na b) Na, H_2, Cl_2,Ca c) Al, H_2, H_2S, B d) Mg, H_2, NO_2, Al

45. In the following reaction using isotopic O in H_2O_2, isotopic oxygen goes _____
$2MnO_4 + 3H_2O_2^{18} \rightarrow 2MnO_2 + 3O_2 + 2H_2O + 2OH^-$
a) with O_2 b) with MnO_2 c) with OH^- d) one with O_2 and one with MnO_2

46. Which of the following easily catalys the decomposition of H_2O_2 when stored?
(i) Rough surface, (ii) Sunlight, (iii) Dust particles, (iv) Metals

a) (i) and (ii) b) (i), (ii) and (iii) c) (ii) and (iv) d) All of these.

47. **Assertion:** In gaseous phase, H_2O and H_2O_2 both have bent structures.
Reason : Bond angle of both H_2O and H_2O_2 104.5^0.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

48. Elements of which of the following group(s) of periodic table do not form hydrides.
a) Groups 7, 8, 9 b) Group l3 c) Groups 15,16,17 d) Group 14

49. **Assertion:** Permanent hardness of water can be removed by using washing soda.
Reason: Washing soda reacts with soluble calcium and magnesium chlorides and sulphates in hard water to form insoluble carbonates.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

50. Among NH_3, H_2O, HF and H_2S which would have highest magnitude of hydrogen bonding?
a) HF due to maximum polarity. b) H_2O due to lone pairs of electrons.
c) NH_3 due to small size of nitrogen. d) H_2S due to higher electron affinity of sulphur.

51. Hydrogen resembles halogens in many respects for which several factors are responsible. Of the following factors which one is the most important in this respect?
a) Its tendency to lose an electron to form a cation.
b)
Its tendency to gain a single electron in its valence shell to attain stable electronic configuration.
c) Its low negative electron gain enthalpy value d) Its small size

52. A water sample is said to contain permanent hardness if water contains
a) sulphates and chlorides of calcium and magnesium
b) carbonates of calcium and magnesium c) bicarbonates of calcium and magnesium
d) sulphates and chlorides of sodium and potassium.

53. Which of the following reactions shows reducing nature of H_2O_2?
a) $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$ b) $Ag_2O + H_2O_2 \rightarrow 2Ag + H_2O + O_2$
c) $2HCHO + H_2O_2 \rightarrow 2HCOOH + H_2O$ d) $Na_2SO_3 + H_2O_2 \rightarrow Na_2SO_4 + H_2O$

54. Which of the following ions will cause hardness in water sample?
a) Ca^{2+} b) Na^+ c) Cl^- d) K^+

55. Compound X on reduction with $LiAlH_4$ gives a hydride Y containing 21.72% hydrogen and other products. The compound Y reacts with air explosively resulting in boron trioxide. What are X and Y respectively?
a) BCl_3, B_2H_6 b) PCl_3, B_2H_6 c) B_2H_6, BCl_3 d) $LiAlH_4$, PCl_3

56. Match the following and identify the correct option.
B_2H_6
a) An electron deficient hydride b) Non-Planar structure c) Synthesis gas
d) $Mg(HCO_3)_2 + Ca(HCO_3)_2$

57. Which of the following reactions shows reduction of water?
a) $2H_2O + 2Na \rightarrow 2NaOH + H_2$ b) $6C0_2 + 12H_2O \rightarrow C_6H_{12}O_6 + 6H_20 + 60_2$
c) $2F_2 + 2H_2O \rightarrow 4H^+ + 4F^- + O_2$ d) $P_4O_{10} + 6H_2O \rightarrow 4H_3PO_4$

58. The temporary hardness of water due to calcium bicarbonate can be removed by adding
a) $CaCO_3$ b) $CaCl_2$ c) HCl d) $Ca(OH)_2$

59. Syngas is a mixture of:
a) $CO_2 + H_2$ b) $CO + H_2$ c) $CO + CO_2$ d) $CO + O_2$

60. Which of the following statements regarding hydrides is not correct?
a) Ionic hydrides are crystalline, non-volatile and non-conducting in solid state.
b) Electron-deficient hydrides act as Lewis acids or electron acceptors.
c) Elements of group-13 form electron-deficient hydrides.
d) Elements of group 15-17 form electron-precise hydrides.

61. Strength of 10 volume hydrogen peroxide solution means
a) 30.35 gL^{-1} b) 17 gL^{-1} c) 34 gL^{-1} d) 68 gL^{-1}

62. The maximum number of hydrogen bonds formed by a water molecule in ice is
a) 4 b) 1 c) 2 d) 3

63. Which of the following reactions is an example of use of water gas in the synthesis of other compounds?
a) $CH_4(g) + H_2O(g) \xrightarrow[Ni]{1270k} CO_{(g)} + H2_{(g)}$ b) $CO_{(g)} + H_2O(g) \xrightarrow[catalyst]{673k} CO_2(g) + H_2(g)$
c) $CnH_{2n+2} + nH_2O_{(g)} \xrightarrow[Ni]{1270K} nCO + (2n+1)H_2$ d) $CO(g) + 2H_{2(g)} \xrightarrow[catalyst]{cobalt} CH_3OH_{(l)}$

64. Match the following and identify the correct option.
H_2O_2
a) Non-Planar structure b) Synthesis gas c) An electron deficient hydride
d) $Mg(HCO_3)_2 + Ca(HCO_3)_2$

65. Which of the following is an amphoteric hydroxide?
a) $Ca(OH)_2$ b) $Mg(OH)_2$ c) $Be(OH)_2$ d) $Sr(OH)_2$

66. Which of the following represents calgon?
a) $Na_2Al_2Si_2O_8$ b) $Mg_3(PO_4)_2$ c) $Na_2[Na_4(PO_3)6]$ d) $Na_2[Mg_2(PO_3)6]$

67. From group 6, only one metal forms hydride. This metal is
a) Mo b) W c) Cr d) Sg

68. Which of the following statements is correct regarding hydrogen?
    a) Hydrogen shows +1 and -1 oxidation states.
    b) Hydrogen is never liberated at anode.
    c) Hydrogen has same ionisation enthalpy as that of alkali metals.
    d) Hydrogen has same electronegativity as that of halogens.

69. Which of the following properties of hydrogen is incorrect?
    a) Like halogens, hydrogen is liberated at cathode
    b) The ionisation energy of hydrogen is quite close to halogens.
    c) Like halogens, hydrogen exists as a diatomic gas.
    d) Like halogens, hydrogen exhibits -1 oxidation state in its compounds with metals.

70. **Assertion:** Hydrides of N, O and F have lower boiling points than the hydrides of their subsequent group members.
    Reason: Boiling point depends upon the molecular mass only.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.

71. Two structures of H_2O_2 are drawn below. Identify the phases X and Y of H_2O_2.

    a) (X) is the structure of H_2O_2 in gas phase and (Y) in solid phase
    b) (X) is structure of H_2O_2 in solid phase and (Y) in gas phase
    c) (X) and (Y) are structures of H_2O_2 in gas phase
    d) (X) and (Y) are structures of H_2O_2 in solid phase

72. Which of the following cannot be used as a test for H_2O_2?
    a) It gives blue colour with $K_4[Fe(CN)_6]$. b) It decolourises acidified $KMnO_4$ solution.
    c) A paper dipped in PbS (black) turns white when brought in contact with H_2O_2.
    d)
    Potassium ferricyanide is reduced to potassium ferrocyanide and H_2O_2 is oxidised to O_2,

73. **Assertion:** Hydrides of group 13 elements are Lewis acids whereas hydrides of group 15-17 elements are Lewis bases..
    Reason : Group 13 hydrides have few electrons whereas group 15-17 hydrides have excess electrons which are present as lone pairs.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

74. Radioactive elements emit α, β and y rays and are characterised by their half-lives. The radioactive isotope of hydrogen is
a) protium b) deuterium c) tritium d) hydronium.

75. The various types of hydrides and examples of each type are given below:

	Hydride type		**Compound**
(A)	Electron deficient	(i)	LiH
(B)	Saline	(ii)	CH_4
(C)	Electron -precise	(iii)	NH_3
(D)	Interstitial	(iv)	B_2H_6
(E)	Electron rich	(v)	CrH

Choose the correct matching from the codes given below:
a) (A) - (ii), (B) - (iv), (C) - (v), (D) - (iii), (E) - (i)
b) (A) - (iv), (B) - (i), (C) - (ii), (D) - (v), (E) - (iii)
c) (A) - (iv), (B) - (iii), (C) - (v), (D) - (ii), (E) - (i)
d) (A) - (v), (B) - (iii), (C) - (iv), (D) - (ii), (E) - (i)

76. In a permutit, the calcium and magnesium ions of hard water are exchanged by:
a) CO_3^{2-} and HCO_3^- ions of permutit b) Na^+ ions of permutit
c) Al^{3+} ions of permutit d) Si^{4+} ions of permutit.

77. H_2O_2 acts as a bleaching agent because of
a) reducing nature of H_2O_2 b) oxidising nature of H_2O_2 c) acidic nature of H_2O_2
d) basic nature of H_2O_2

78. **Assertion:** A 30% solution of H_2O_2 is marketed a '100 volume' hydrogen peroxide.
Reason: 1 L of 30% H_2O_2 will give 100 mL ofoxygen at STP.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

79. Which of the following is not a disadvantage of using hard water?
a) In production of steam in boilers b) Formation of scales in cooking utensils
c) In cooking, bathing and washing d) In ion exchangers

80. During hydrate formation from aqueous solution, water can be associated in different forms. Indicate the wrong combination.
(i) Coordinated water - $[Cr(H_2O)_6^{3+}3Cl^-$
(ii) Interstitial water - $BaCl_2 \cdot 2H_2O$
(iii) Hydrogen bonded water - $[Cu(H_2O)_4]^{2+}SO_4^{2-} \cdot H_2O$
a) (i) b) (ii) c) (iii) d) None of these.

81. What is meant by demineralised water?
a) Water free from cations and anions b) Water free from minerals dissolved in it.
c) Water free from impurities. d) Water free from Na^+ and K^+ ions

82. The density of water is less in its solid state because:
a)
in solid state (ice), water molecules are arranged in highly ordered open cage like structure
b) more extensive hydrogen bonding is present in solid state ice
c) the water molecules are closest in solid state of water
d) water is a rigid crystalline, closely packed structure in its solid state.

83. Which of the following metal evolves hydrogen on reacting with cold dilute HNO_3?
a) Mg b) Al c) Fe d) Cu

84. Metal hydrides are ionic, covalent or molecular in nature. Among LiH, NaH, KH, RbH, CsH, the correct order of increasing ionic character is
a) LiH > NaH > CsH > KH>RbH b) LiH < NaH < KH < RbH < CsH
c) RbH> CsH > NaH > KH > LiH d) NaH> CsH > RbH > LiH > KH

85. When CO_2 is bubbled through a solution of barium peroxide in water
a) carbonic acid is formed b) H_2O_2 is formed c) H_2O is formed
d) barium hydroxide is formed.

86. The H -O-H angle in water molecule is about
a) 90^0 b) 180^0 c) 102^0 d) 105^0

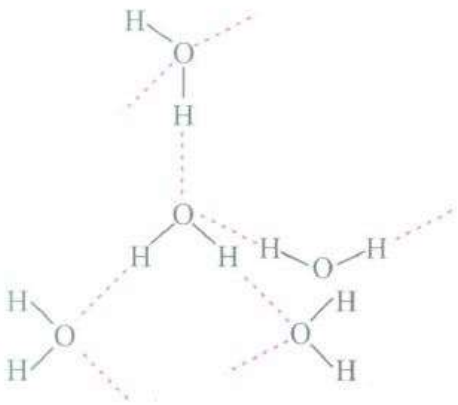
87. Peroxodisulphate, on hydrolysis yields
a) water b) dihydrogen c) hydrogen peroxide d) deuterium.

88. In complex hydrides, hydride ions act as ligand and are coordinated to metal ions. These hydrides are good reducing agents. Which of the following hydrides is not a complex hydride?
a) $LiAlH_4$ b) $NaBH_4$ c) $(AlH_3)_n$ d) $LiBH_4$

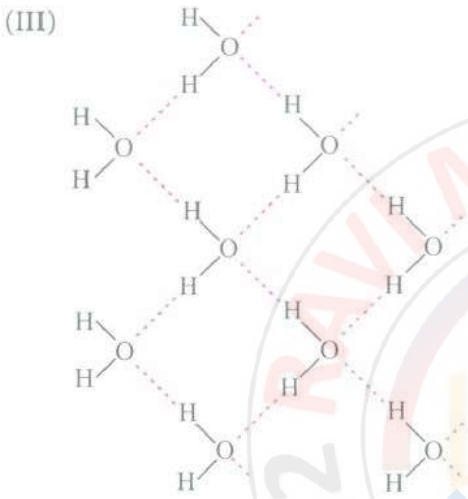
89. Choose the correct statement about the given figures.

(I)

(II)



(III)



a) (II) represents solid state while (III) represents liquid state
b) (II) represents liquid state while (III) represents solid state
c) (1) represents solid state while (III) represents liquid state
d) (I) represents liquid state while (III) represents solid state,

90. Heavy water is used as
a) drinking water b) detergent c) washing water d) a moderator.

91. Pure nascent hydrogen is best obtained by
a) Na and C_2H_5OH b) Al and NaOH c) Zn and dil. H_2SO_4 d) all of these.

92. Given below are the two reactions of H_2O_2. Mark the correct statement which follows.
(i) $2KMnO_4+3H_2SO_4+5H_2O_2 \rightarrow K_2SO_4+2MnSO_4 + 8H_2O + 5O_2$
(ii) $2Cr(OH)_3 + 4NaOH + 3H_2O_2 \rightarrow 2Na_2CrO_4 + 8H_2O$
a) (i) Shows oxidising nature of H_2O_2 and (ii) shows reducing nature of H_2O_2.
b) In (i) H_2O_2 acts as a reducing agent and in (ii) it acts as an oxidising agent.
c) In both (i) and (ii), H_2O_2 acts as an oxidising agent.
d) In both (i) and (ii), H_2O_2 acts as a reducing agent.

93. Which compound is formed when calcium carbide reacts with heavy water?
a) C_2D_2 b) CaD_2 c) CD_2 d) Ca_2D_2

94. The order of reactivity of halogens towards hydrogen is

a) $F_2 > Cl_2 > Br_2 > I_2$ b) $I_2 > Br_2 > Cl_2 > F_2$ c) $Cl_2 > Br_2 > I_2 > F_2$
d) $Br_2 > Cl_2 > F_2 > I_2$

95. On moving from left to right in a period what is the order of acidic character of hydrides?
a) $NH_3 < H_2O < HF$ b) $HF < H_2O < NH_3$ c) $H_2O < HF < NH_3$ d) $H_2O < NH_3 < HF$

96. The process of production of syngas from sewage, saw-dust, scrap wood, etc. is quite common these days. The production of syngas from coal is called
a) carbonisation b) water gas shift c) coal gasification d) synthesis gas shift

97. Polyphosphates like sodium hexametaphosphate (calgon) are used as water softening agents because they
a) form soluble complexes with anionic species b) precipitate anionic species
c) form soluble complexes with cationic species d) precipitate cationic species.

98. Mark the following statements as true or false.
(i) Ordinary hydrogen is a mixture of 75% ortho and 25% para-forms.
(ii) All the four atoms of molecule of H_2O_2 lie in the same plane.
(iii) Hydrogen peroxide is neutral like water.
(iv) H_2O_2 can be prepared from BaO_2 but not from MnO_2 and PbO_2.
a) (i) and (iv) - true, (ii) and (iii) - false b) (i) and (ii) - true, (iii) and (iv) - false
c) (iii) and (iv) - true, (i) and (ii) - false d) (i) and (iii) - true, (ii) and (iv) - false

99. Match the column I with column II and mark the appropriate choice.

Column - I		**Column - II**	
(A)	Syngas	(i)	$Na_6P_6O_{18}$
(B)	Calgon	(ii)	$NaAlSi0_4$
(C)	Permutit	(iii)	$CO+H_2$
(D)	Producer gas	(iv)	$CO+N_2$

a) (A)→ (i), (B)→(ii), (C)→ (iii), (D)→ (iv) b) (A)→(iii), (B)→(i), (C)→(ii), (D)→(iv)
c) (A)→(iii), (B)→ (ii) , (C)→(iv), (D)→(i) d) (A)→(iii), (B)→(ii), (C)→(i), (D)→ (iv)

100. Presence of water can be detected by
a)
adding a drop to anhydrous copper sulphate which changes its colour from white to blue
b) by boiling and testing for the presence of H_2 and O_2,
c) by seeing its colour and transparency
d) by checking the production of lather when mixed with soap.

101. Which of the statements given below are true for the structure of water molecule?
(i) Oxygen undergoes sp^3 hybridisation.
(ii) Due to the presence of two lone pairs of electrons on oxygen the H - O - H bond angle is 118.4°.
(iii) Due to angular geometry the net dipole moment of water is not zero, u = 1.84 D.
a) (i) and (ii) b) (ii) and (iii) c) (i) and (iii) d) only (ii)

102. Which of the following reactions of hydrogen with non-metals represents Haber's process?

a) $2H_2 + O_2 \xrightarrow{heat} 2H_2O; \triangle H = -285.9$ KJ mol^{-1}

b) $3H_2 + N_2 \xrightarrow[1100\ C]{673k, Fe} 2NH_3; \triangle H = -92.6$ KJ mol^{-1} c) $H_2 + Cl_2 \xrightarrow{hv} 2HCl$

d) $2H_2 + C \xrightarrow{200\ atm} CH_4$

103. Match the reactions of column I with their types given in column II and mark the appropriate choice.

Column - I		Column -II	
(A)	$H_2O + NH_3 \rightleftharpoons NH_4^+ + OH$	(i)	Self ionisation of H_2O
(B)	$FeCl_3 + 3H_2O \rightarrow Fe(OH)_3 + 3HCl$	(ii)	Decomposition
(C)	$H_2O + H_2O \rightleftharpoons H_3O^+ + OH$	(iii)	Acidic nature of H_2O
(D)	$2H_2O \rightarrow 2H_2 + O_2$	(iv)	Hydrolysis

a) (A) →(ii), (B) → (i), (C) → (iii), (D) → (iv)

b) (A) →(iii), (B) → (ii), (C) → (iv), (D) → (i)

c) (A) → (i), (B) → (ii), (C) → (iv), (D) → (iii)

d) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

104. Only one element of_____forms hydride.

a) group 8 b) group 9 c) group 6 d) group 7

105. **Assertion:** H_2O_2 is stored in wax-lined glass or plastic vessels.

Reason : H_2O_2 decomposes slowly on exposure to light.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

106. Given below are two reactions of water with sodium and carbon dioxide. What is the nature of water in these reactions?

(i) $2Na + 2H_2O \longrightarrow 2NaOH + H_2$

(ii) $6CO_2 + 12H_2O \longrightarrow C_6H_{12}O_6 + 6H_2O + 6O_2$

a) In (ii) water acts as an oxidising agent and in (i) it acts as a reducing agent.

b) In (i) water acts as an oxidising agent while in (ii) it acts as a reducing agent.

c) In both, (i) and (ii) hydrogen acts as a reducing agent.

d) In both, (i) and (ii) hydrogen acts as an oxidising agent.

107. Hydrogen burns in air with a _____ .

a) light bluish flame b) yellow flame c) crimson red flame d) green flame.

108. Study the following reactions and mark the correct properties shown by water:

(i) $SO_3 + H_2O \longrightarrow H_2SO_4$

(ii) $Cl_2O_7 + H_2O \longrightarrow 2HClO_4$

(iii) $Na_2O + H_2O \rightarrow 2NaOH$

(iv) $CaO + H_2O \rightarrow Ca(OH)_2$

a) All oxides react with water to give hydroxides.

b) Acidic oxides are formed by metals and basic oxides by non-metals.

c)

Non-metal oxides combine with water to form acids while metallic oxides combine with water to form alkalies

d) Acidic oxides are stronger than basic oxides since they form strong acids.

109. The molecular formula of a commercial resin used for exchanging ions in water softening is $C_8H_7SO_3Na$ (Mol. wt. 206). What would be the maximum uptake of Ca^{2+} ions by the resin when expressed in mole per gram resin?

a) $\frac{2}{309}$ b) $\frac{1}{412}$ c) $\frac{1}{103}$ d) $\frac{1}{206}$

110. Consider the reactions:

(A) $H_2O_2 + 2HI \rightarrow I_2 + 2H_2O$

(B) $HOCl + H_2O_2 \rightarrow H_3O^+ + Cl^- + O_2$

Which of the following statements is correct about H_2O_2 with reference to these reactions? Hydrogen peroxide is_____.

a) an oxidising agent in both (A) and (B)

b) an oxidising agent in (A) and reducing agent in (B)

c) a reducing agentin (A)and oxidisingagent in (B)

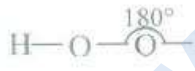
d) a reducing agent in both (A) and (B)

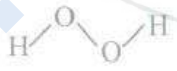
111. In which of the following properties hydrogen does not show similarity with alkali metals?

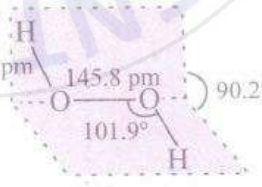
a) Electropositive character b) Reducing nature c) Electronic configuration (ns^1)

d) Diatomic nature of molecule

112. Which of the following is a true structure of H_2O_2 in solid phase?

a) 

b) 

c) 

d)

113. Which of the following represents the chemical equation involved in the preparation of $H_2O_2$from barium peroxide?

a) $BaO_2 \cdot 8H_2O + H_2SO_4 \rightarrow BaSO_4 + H_2O_2 + 8H_2O$

b) $CH_3CHOHCH_3 + O_2 \rightarrow CH_3COCH_3 + H_2O_2$

c) $BaO_2 + CO_2 + H_2O \rightarrow BaCO_3 + H_2O_2$

d) $Ba_3(PO_4)_2 + 3H_2SO_4 \rightarrow 3BaSO_4 + 2H_3PO_4$

114. Number of hydrogen-bonded water molecules are associated in $CuSO_4 \cdot 5H_2O$ is:

a) Five b) One c) Four d) Three

115. **Assertion:** Softwater lathers with soap but not hard water.

Reason : Hard water reacts with soap to form insoluble salts which form scum, not lather.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

116. The reaction of H_2O_2 with hydrogen sulphide is an example of ..... reaction:
a) Addition b) Oxidation c) Reduction d) Acidic

117. Which property of hydrogen is shown by the following reactions?
(i) $Fe_3O_4 + 4H_2 \rightarrow 3Fe + 4H_2O$
(ii) $CO + H_2 \xrightarrow[ZnO_3]{Cr_2O_3} CH_3OH$
a) Reducing character b) Oxidising character c) Combustibility d) High reactivity

118. Hydrogen peroxide is_____
a) an oxidising agent b) a reducing agent c) both an oxidising and a reducing agent
d) neither oxidising nor reducing agent

119. **Assertion:** Melting and boiling points of D_2O are higher than those of ordinary H_2O.
Reason: D_2O has lesser degree of association and lower molecular mass than H_2O.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

120. Which of the following is not true?
a) Ordinary water is electrolysed more rapidly than D_2O.
b) Reaction between H_2 and Cl_2 is much faster than D_2 and Cl_2.
c) D_2O freezes at lower temperature than H_2O.
d) Bond dissociation energy for D_2 is greater than H_2

121. Match the following and identify the correct option.
Temporary hardness of water
a) $Mg(HCO_3)_2 + Ca(HCO_3)_2$ b) An electron deficient hydride c) Synthesis gas
d) Non-Planar structure

122. Heavy water (D_2O) freezes at
a) -3.8 ^{0}C b) 3.8 ^{0}C c) 0 ^{0}C d) 3.82 ^{0}C

123. Select the incorrect statement from the following:
a) H^+ can exist as $H_9O_4^+$ in water b) H_2 is thermally stable.
c) Ionisation of CH_3COOH is slower than that of CH_3COOD.

d)

Kinetic isotopic effect is observed when there is retardation in the rate if H_2O is replaced by D_2O.

124. What is the trend of boiling points of hydrides of N, O and F?

a)

Due to lower molecular masses NH_3, H_2O and HF have lower boiling points than those of the subsequent group member hydrides.

b)

Due to higher electronegativity of N, O and F; NH_3, H_2O and HF show hydrogen bonding and hence higher boiling points than the hydrides of their subsequent group members.

c) There is no regular trend in the boiling points of hydrides.

d)

Due to higher oxidation states of N, O and F, the boiling points of NH_3, H_2O and HF are higher than the hydrides of their subsequent group members.

125. When sodium peroxide is treated with dilute sulphuric acid, we get_____.

a) sodium sulphate and water b) sodium sulphate and oxygen

c) sodium sulphate, hydrogen and oxygen d) sodium sulphate and hydrogen peroxide

126. Why does H^+ ion always get associated with other atoms or molecules?

a) Ionisation enthalpy of hydrogen resembles that of alkali metals.

b) Its reactivity is similar to halogens. c) It resembles both alkali metals and halogens.

d)

Loss of an electron from hydrogen atom results in a nucleus of very small size as compared to other atoms or ions. Due to small size it cannot exist free.

127. The formula for permutit or zeolite which is used as softner in ion-exchange method is

a) $NaAlSiO_4$ b) $NaAlO_2$ c) $Ca_3(PO_4)_2$ d) Na_2SO_4

128. Dihydrogen forms three types of hydrides. (i) hydrides are formed by alkali metals and alkaline earth metals. (ii) hydrides formed by non-metals and (iii) hydrides formed by d and f-block elements at elevated temperature. Complex metal hydrides that are powerful reducing agents are:

a)

(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**
Covalent	Molecular	Saline	NaH	LiH

b)

(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**
Molecular	Covalent	Ionic	$LiAlH_4$	CaH_2

c)

(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**
Ionic	Covalent	Interstitial	$LiAlH_4$	CaH_2

d)

(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**
Covalent	Saline	Interstitial	$LiAlH_4$	$NaBH_4$

129. **Assertion:** Hydrogen resembles both, alkali metals as well as halogens.

Reason : Hydrogen forms oxides, halides andsulphides, and exists as diatomic molecule.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

130. Water plays a key role in the biosphere. It is due to certain properties of H_2O as compared to other liquids. These are except
a) higher specific heat b) lesser thermal conductivity c) high dielectric constant
d) high surface tension.

131. If a mole of hydrogen molecule is heated to a high temperature then which of the following reactions take place?
a) $H_{2(g)}$+ 436 kJ $mol^{-1} \rightarrow H_{(g)} + H_{(g)}$ b) $2H_{2(g)}$ + 820 kJ $mol^{-1} \rightarrow 2H_{2(g)}$
c) $H_{2(g)}+ H_{2(g)}$+ 436 kJ $mol^{-1} \rightarrow H^+_{(aq)}+ H^-_{(aq)}$ d) $H_{2(g)}$+ 200 kJ $mol^{-1} \rightarrow H_{(g)} + H_{(g)}$

132. Hydrogen peroxide is obtained by the electrolysis of_____
a) water b) Sulphuric acid c) hydrochloric acid d) fused sodium peroxide

133. 5.0 cm^3 of H_2O_2 liberates 0.508 g of iodine from an acidified KI solution. The strength of H_2O_2 solution in terms of volume strength at STP is
a) 6.48 volumes b) 4.48 volumes c) 7.68 volumes d) none of these.

134. Heavy water is obtained by
a) boiling water b) heating H_2O_2 c) prolonged electrolysis of H_2O d) All of these.

135. Hydrolysis of $SiCl_4$ gives
a) $Si(OH)_4$ b) $SiOCl_2$ c) SiO_2 d) H_2SiO_4

136. Match the following and identify the correct option.
$CO(g) + H_2(g)$
a) An electron deficient hydride b) Synthesis gas c) Non-Planar structure
d) $Mg(HCO_3)_2 + Ca(HCO_3)_2$

137. **Assertion:** When sodium hydride in fused state is electrolysed, hydrogen is discharged at anode.
Reason : Sodium hydride is an electrovalent compound in which hydrogen is present as cation.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

138. Which of the following is laboratory preparation of dihydrogen?
a) $3Fe + 4H_2O$ (steam) $\rightarrow Fe_3O_4 + 4H_2$ b) $2Na + 2H_2O \rightarrow 2NaOH + H_2$
c) $CaH_2 + 2H_2O \rightarrow Ca(OH)_2 + 2H_2$ d) $Zn + H_2SO_4$(dil.) $\rightarrow ZnSO_4 + H_2$

139. Calgon used as a water softener, is :
a) $Na_2[Na_4(PO_3)_6]$ b) $Na_4[Na_2(PO_3)_6]$ c) $Na_4[Na_4(PO_4)_5]$ d) $Na_4[Na_2(PO_4)_6]$

140. The process used for the removal of hardness of water is
a) Baeyer b) Calgon c) Hoope d) Serpeck

141. What will be the strength of 20 vol of H_2O_2 in terms of gram per litre?
a) 60.71 gL^{-1} b) 5.6 gL^{-1} c) 30.62 gL^{-1} d) 17 gL^{-1}

142. Which of the following reactions increase production of dihydrogen from synthesis gas?
a) $CH_{4(g)} + H_2O_{(g)} \xrightarrow[Ni]{1270K} CO_{(g)} + 3H_{2(g)}$ b) $C(s) + H_2O_{(g)} \xrightarrow{1270K} CO_{(g)} + H_{2(g)}$
c) $CO_{(g)} + H_2O_{(g)} \xrightarrow[catalyst]{673k} CO_{2(g)} + H_{2(g)}$ d) $C_2H_{6(g)} + 2H_{2(g)}O \xrightarrow[Ni]{1270\ k} 2CO_{(g)} + 5H_{2(g)}$

143. Which of the following is not a property of hydrogen?
a) It is a colourless, odourless gas. b) It is highly combustible.
c) It is highly poisonous gas. d) It is lighter than air.

144. The structure of H_2O_2 is
a) planar b) non-Planar c) spherical d) linear

145. Which of the following statements about hydrogen is incorrect?
a) Hydronium ion, H_3O^+ exists freely in solution.
b) Dihydrogen does not act as a reducing agent.
c) Hydrogen has three isotopes of which tritium is the most common.
d) Hydrogen never acts as cation in ionic salts.

146. Which of the following reagents cannot be used for the preparation of hydrogen peroxide
a) Sodium peroxide b) 2 - EthylanthraquinolSodium thiosulphate
c) Sodium thiosulphate d) Barium peroxide

147. Which of the following series of transitions in the spectrum of hydrogen atom fall in visible region?
a) Balmer series b) Paschen series c) Brackett series d) Lyman series

148. Given below are the elements and the type of hydrides formed by them. Mark the incorrect match.
a) Phosphorus-Molecular hydride b) Potassium-Ionic hydride
c) Vanadium-Interstitial hydride d) Nitrogen-Electron-deficient covalent hydride

149. Which of the following reactions is not used in preparation of deuterium compounds using heavy water?
a) $CaC_2 + 2D_2O \rightarrow C_2D_2 + Ca(OD)_2$ b) $SO_3 + D_2O \rightarrow D_2SO_4$
c) $2AlN + 3D_2O \rightarrow Al_2O_3 + 2ND$ d) $Al_4C_3 + 12D_2O \rightarrow 3CD_4 + 4Al(OD)_3$

150. **Assertion:** Ice cube floats on water.
Reason: Density of ice is less than that of water.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

151. **Assertion :** Dihydrogen is inert at room temperature.
Reason : The H - H bond dissociation enthalpy is the highest for a single bond between two atoms of any element.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

152. What is the reaction given below, called?
$H_2O_{(l)} + H_2O_{(l)} \rightleftharpoons H_3O^+_{(aq)} + OH^-_{(aq)}$
a) Hydrolysis of water b) Hydration of water c) Disproportionation of water
d) Auto-protolysis of water

153. The isotopes of hydrogen have different physical properties due to difference in mass. They have almost same chemical properties with a difference in their rates of reactions which is mainly due to
a) their different enthalpy of bond dissociation b) different electronic configurations
c) different atomic masses d) different physical properties

154. Carbon hydrides of the type, C_nH_{2n+2} do not act as Lewis acid or Lewis base. They behave as normal covalent hydrides because:
a) carbon hydrides are electron-rich hydrides
b) carbon hydrides are electron -deficient hydrides
c) carbon hydrides are electron-precise hydrides
d) carbon hydrides are non-stoichiometric hydrides.

155. (i) $H_2O_2 + O_3 \rightarrow H_2O + 2O_2$
(ii) $H_2O_2 + Ag_2O \rightarrow 2Ag + H_2O + O_2$
Role of hydrogen peroxide in the above reactions is repectively.
a) Oxidizing in (i) andreducing in (ii) b) Reducing in (i) and oxidizing in (ii)
c) Reducing in (i) and (ii) d) Oxidizing in (i) and (ii)

156. A metal which does not react with cold water but reacts with steam to liberate H_2 gas is
a) Na b) Mg c) Au d) Fe

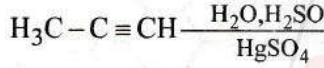
157. **Assertion:** In atomic form hydrogen consists of one proton and one electron.
Reason : In elemental form hydrogen exists as a diatomic molecule and is called dihydrogen.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

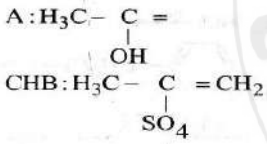
158. Assertion: Iodination of alkanes is carried out in the presence of oxidising agents like HIO_3 or HNO_3.
Reason : Iodination of alkanes is an irreversible reaction.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

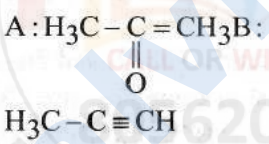
159. Which one of the following gives only one monochloro derivative?
a) neo- Pentane b) n-Hexane c) 2-Methylpentane d) 3-Methylpentane

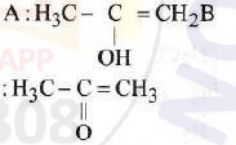
160. Predict the correct intermediate and product in the following reaction:

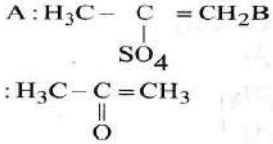


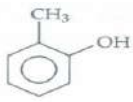
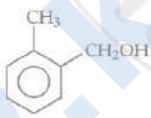
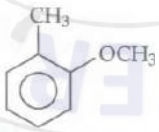
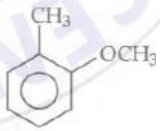
Intermediate → product
(A) (B)

a) 

b) 

c) 

d) 

161. Which one is the most reactive towards electrophilic reagent?
a)  b)  c)  d) 

162. The compound that will react most readily with gaseous bromine has the formula is:
a) C_3H_6 b) C_2H_6 c) C_4H_{10} d) C_2H_4

163. Name the products of the following reactions.
(I) C_6H_6 reacts with methyl chloride in presence of $AlCl_3$.
II) C_6H_6 reacts with acetyl chloride in presence of $AlCl_3$.
(III) C_6H_6 reacts with fuming nitric acid in presence of conc. H_2SO_4.
(IV) C_6H_6 is catalytically hydrogenated.
a)

I	II	III	IV
Chloro-methane	Tolune	Nitro-benzene	n-Hexane

b)

I	II	III	IV
Methyl-benzene	Chloro-benzene	Phenyl nitrate	Trimethyl-benzene

c)

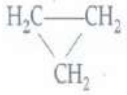
I	II	III	IV
Benzyl chloride	Trimethyl-benzene	Trinitro-tolune	Tolune

d)

I	II	III	IV
Tolune	Aceto-phenone	Trinitro-benzene	Cyclo hexane

164. The alkene that exhibits geometrical isomerism is
a) propene b) 2-methylpropene c) 2-butene d) 2-methyl-2-butene.

165. Which of the following compounds will not undergo Friedel - Craft's reaction easily?
a) Cumene b) Xylene c) Nitrobenzene d) Toluene

166. Which of the following compounds shall not produce propene by reaction with HBr followed by elimination or direct only elimination reaction?
a)  b) $H_3C-\overset{H_2}{\overset{|}{C}}-CH_2OH$ c) $H_2C=C=O$ d) $H_3C-\overset{H_2}{\overset{|}{C}}-CH_2Br$

167. Nitration and chlorination of benzene are:
a) nucleophilic and electrophilic substitution respectively
b) electrophilic and nucleophilic substitution respectively
c) electrophilic substitution in both the reactions
d) nucleophilic substitution in both the reactions.

168. Which of the following chemical system is non-aromatic?
a) b) c) d)

169. The correct trend of acidic nature of the following alkynes is:
a) $CH\equiv CH > CH_3-C\equiv CH > CH_3C\equiv CCH_3$
b) $CH_3-C\equiv CH > CH\equiv CH > CH_3C\equiv CCH_3$
c) $CH_3C\equiv CCH_3 > CH_3-C\equiv CH > CH\equiv CH$
d) $CH\equiv CH > CH_3C\equiv CCH_3 > CH_3C\equiv CH$

170. In the following reaction:

$$HC\equiv CH \xrightarrow[Hg^{2+}]{H_2SO_4} \text{'P'}$$

Product 'P' will not give.
a) Idoform test b) Tollen's reagent test c) Brady's reagent test d) Victor Meyer test

171. Ozonolysis products of 2-pentyne after decomposition of ozonide with water and subsequent oxidation are
a) ethanoic acid and propanoic acid b) ethanoic acid and propanone
c) ethanoic acid d) formic acid and glyoxal.

172. $CH_3CH_2CH_2OH \xrightarrow[170^oC]{conc.H_2SO_4} A \xrightarrow[500^oC]{Cl_2} B$

A and B are:

a) A = $CH_3CH_2CH_3$, B = $CH_3CH_2CH_2Cl$ b) A = CH_3CH =CH_2, B = CH_2ClCH =CH_2
c) A = CH_2 =CH_2, B = CH_3CH_2Cl d) A = $CH_3CH_2CH_3$, B = CH_3CH =CH_2

173. Match the column I with column II and mark the appropriate choice.

Column-I		Column-II	
(A)	n-Butane⟶2- Methylpropane	(i)	Free radical substitution
(B)	$CH_4 + Cl_2 \xrightarrow{hv} CH_3Cl$	(ii)	Wurtz reaction
(C)	RCOONa + soda lime⟶RH	(iii)	Isomerisation
(D)	$RX + Na \xrightarrow{ether} R\text{-}R$	(iv)	Decarboxylation

a) (A)→(iii), (B)→(i), (C)→(iv), (D)→(ii) b) (A) → (ii), (B) → (iv), (C) → (i), (D) → (iii)
c) (A)→ (i), (B)→ (ii), (C)→ (iv), (D)→ (iii) d) (A) →(iv), (B) →(i), (C) →(iii), (D) →(ii)

174. With respect to the conformers of ethane, which of the following statements is true?
a) Bond angles remains same but bond length changes
b) Bond angle changes but bond length remains same
c) Both bond angle and bond length change
d) Both bond angle and bond length remain same.

175. The cylindrical shape of an alkyne is due to the fact that it has:
a) three sigma C - C bonds b) three π C - C bonds
c) two sigma C - C and one π C - C bonds d) one sigma and two π C - C bonds

176. Which of the following can exhibit cis−trans isomerism?
a) CH_3 - CHCl - COOH b) H - C ≡≡ C - Cl c) ClCH = CHCl d) $ClCH_2$ - CH_2Cl

177. An alkene X is obtained by dehydration of an alcohol Y. X on ozonolysis gives two molecules of ethanal for every molecule of alkene. X and Y are:
a) X = 3-hexene, Y = 3-hexanol b) X = 2-butene, Y = 2-butanol
c) X = 1-butene, Y = 1-butanol d) X = 1-hexane, Y = 1-hexanol.

178. Which of the following reactions is expected to readily give a hydrocarbon product in good yields?
a) $RCOOK \xrightarrow[\text{oxidation}]{\text{Electrolytic}}$ b) $RCOOAg \xrightarrow{I_2}$ c) $CH_3CH_3 \xrightarrow[hv]{cl_2}$
d) $(CH_3)_2CCl \xrightarrow{C_2H_5OH}$

179. Which of the following will give 2,2-dibromopropane on reaction with HBr?
a) CH_3 - CH = CH_2 b) $CH_3C \equiv CH$ c) CH_3CH = CHBr d) CH≡CH

180. Reduction of 2-butyne with sodium in liquid ammonia gives predominantly:
a) cis-2-butene b) trans-2-butene c) no reaction d) n-butane

181. What happens when calcium carbide is treated with water?
a) Ethane is formed b) Methane and ethane are formed c) Ethyne is formed
d) Ethene and ethyne are formed

182. Wurtz reaction may be used to unite:
a) two alkyl halides b) two aryl halides c) alkyl and aryl halides
d) two benzene units.

183. The pair of electrons in the given carbanion, $CH_3C \equiv C^-$ is present in which of the following orbitals?
a) sp^2 b) sp c) 2p d) sp^3

184. Which of the following products is formed when n-heptane is passed over ($Al_2O_3 + Cr_2O_3$) catalyst at 773 K?
a) Benzene b) Toluene c) Polyheptane d) Cycloheptane

185. The alkene $R-CH=CH_2$ reacts readily with B_2H_6 and the product on oxidation with alkaline hydrogen peroxides produces ?
a) $R - CH_2 - CHO$ b) $R - CH_2 - CH_2 - OH$ c) $R - \underset{CH_3}{\overset{|}{C}} = O$ d) $R - \underset{OH}{\overset{|}{CH}} - \underset{OH}{\overset{|}{CH_2}}$

186. Which of the following will not show cis-trans isomerism?
a) $CH_3 - CH = CH - CH_3$ b) $CH_3 - CH_2 - CH = CH - CH_2CH_3$
c) $CH_3 - \underset{CH_3}{\overset{|}{C}} = CH - CH_2 - CH_3$ d) $CH_3 - \underset{CH_3}{\overset{|}{C}} - CH = CH - CH_2 - CH_3$

187. The reaction in terms of intermediates and type of reaction is given below. Mark the incorrect option.
a) $CH_3 - \underset{CH_3}{\overset{CH_3}{\overset{|}{\underset{|}{C}}}} = CH_2 + HBr \longrightarrow Carbocation \quad intermediate$
b) $CH_3 - \underset{CH_3}{\overset{CH_3}{\overset{|}{\underset{|}{C}}}} = CH_2 + HBr \overset{peroxide}{\longrightarrow} Free \quad radical \quad intermediate$
c) $>C=C< + X_2 \longrightarrow$ Electrophilic substitution d) $>C=C< + O_3 \longrightarrow$ Ozonide

188. Assertion: Staggered conformation of ethane is most stable while eclipsed conformation is least stable.
Reason: Staggered form has the least torsional strain and the eclipsed form has the maximum torsional strain.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

189. Which of the following reactions does not show the correct products of the reaction?
a) $CH_3-CH=CH_2 \overset{HBr}{\underset{peroxide}{\longrightarrow}} CH_3-CH_2-CH_2Br$ b) $CH_3 - CH = CH_2 \overset{HCl}{\underset{peroxide}{\longrightarrow}} CH_3-CH_2-CH_2Cl$
c) $CH_3 - CH = CH_2 \overset{HBr}{\longrightarrow} CH_3 - \underset{Br}{\overset{|}{CH}} - CH_3$
d) $CH_3 - CH = CH_2 \overset{HCl}{\longrightarrow} CH_3 - \underset{Cl}{\overset{|}{CH}} - CH_3$

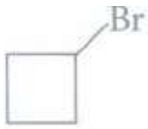
190. Which of the following alkynes is most acidic?
a) $CH_3C \equiv CH$ b) $CH_3C \equiv CCH_3$ c) $CH_3CH_2C \equiv CH$ d) $CH \equiv CH$

191. Ozonolysis of 2,3-dimethylbut-l-ene followed by reduction with zinc and water gives
a) methanal and hexanoic acid b) methanoic acid and butanone
c) methanal and 3-methylbutan-2-one d) butanoic acid and 2,3-dimethylbutanoic acid.

192. Which of the following alkane cannot be made in good yield by Wurtz reaction?
a) n-Butane b) n-Hexane c) 2, 3-Dimethylbutane d) n-Heptane

193. Assertion: The reaction, $C_2H_5Br + 2Na + C_2H_5Br \rightarrow C_4H_{10} + 2NaBr$ is known as Wurtz reaction.
Reason : The reaction is carried out in presence of dry ether.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

194. I-Bromo-3-chlorocyclobutane is treated with two equivalents of Na, in the presence of ether. Which of the following compounds will be formed?

a) 

b)

c)
d)

195. The ozonolysis product(s) of the following reaction is(are)

CH_3CH_2 -C =CH $\xrightarrow[(ii)H_2O]{(i)O_3}$ product(s)

a) CH_3COCH_3 b) CH_3COCH_3 + HCHO c) CH_3COOH + HCOOH
d) CH_3CH_2COOH + HCOOH

196. in the given reactions:

(i) CH3Br $\xrightarrow{Na,\ ether}$ $X \xrightarrow[Br_2]{hv} Y \xrightarrow[CaO]{Na,\ ether} Z$

(ii)CH3COOH $\xrightarrow{NaOH}$ $X \xrightarrow[NaOH]{CaO} Y \xrightarrow[Br_2]{hv} Z$

a)

	X	Y	Z
(i)	CH_4	CH_3Br	CH_3CH_3
(ii)	CH_3COONa	CH_3CH_3	CH_3CH_2Br

b)

	X	Y	Z
(i)	CH_3CH_3	CH_4	CH_3Br
(ii)	CH_3COONa	CH_4	$CH_3CH_2CH_3$

c)

	X	Y	Z
(i)	CH_3CH_2Br	CH_3CH_3	$CH_3CH_2CH_3$
(ii)	$CH_3COONaCH_4$	CH_4	CH_3Br

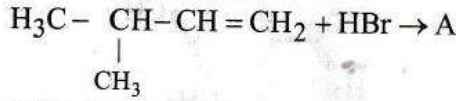
d)

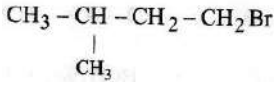
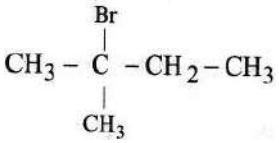
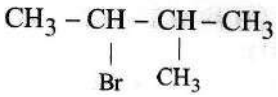
	X	Y	Z
(i)	CH_3CH_3	CH_3CH_2Br	$CH_3CH_2CH_2CH_3$
(ii)	CH_3COONa	CH_4	CH_3Br

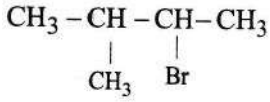
197. Nitration of benzene is carried out with conc. HNO_3 in presence of cone. H_2SO_4, The role of cone, H_2SO_4 is to provide:

a) nucleophile during the reaction b) free radical during the reaction
c) electrophile during the reaction d) catalyst during the reaction.

198. The number of chain isomers possible for hydrocarbon C_5H_{12} is
a) 3 b) 5 c) 4 d) 6

199. 
A (Predominantly) is:

a)  b)  c) 

d) 

200. Consider the nitration of benzene using mixed concentrated H_2SO_4 and HNO_3. If a large amount of $KHSO_4$ is added to the mixture, the rate of nitration will be:
a) unchanged b) doubled c) faster d) slower

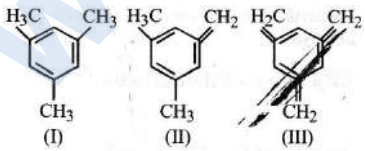
201. An inhibitor is described as:
a) a substance that slows down or stops a reaction
b) a substance which inhibits the properties of a catalyst
c) a substance formed during the reaction and does not participate in the reaction
d) a substance which prevents formation of products in a reaction being most reactive

202. Kerosene is a mixture of:
a) aromatic hydrocarbons b) aliphatic hydrocarbons c) unsaturated hydrocarbons
d) saturated hydrocarbons

203. Complete the following reaction by identifying X and Y

$$CH_3CH_2C \equiv CH \xrightarrow{NaNH_2} X \xrightarrow{C_2H_2BrY}$$

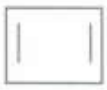
a) X = CH_3CH_2COONa, Y = $CH_3CH_2CH = CH_2$
b) X = $CH_3CH_2C \equiv CNa$, Y = $CH_3CH_2C \equiv CC_2H_5$
c) X = $CH_3CH_2CH_2CH_2Na$, Y = $CH_3CH_2CH_2CH_3$
d) X=$CH_3CH_2CH{\equiv}CNa$, $Y = CH_3CH_2 - \underset{C_2H_5}{\underset{|}{CH}} - CH_3$

204. Given:

The enthalpy of the hydrogenation of these compounds will be in the order as:
a) III>II>I b) II>III>I c) II>I>III d) I>II>III

205. The IUPAC name of the compound having the formula $CH = C - CH \equiv CH_2$ is _____ .
a) l-butyn-3-ene b) but-1-yne-3-ene c) l-butene-3-yne d) 3-butene-l-yne

206. Base strength of-
(i) H_3CCH_2
(ii) $H_2C = CH$
and (iii) H - C ≡ C is in the order of :
a) (ii) > (i) > (iii) b) (iii) > (ii) > (i) c) (i) > (iii) > (ii) d) (i) > (ii) > (iii)

207. The IUPAC name of the compound $CH_3CH = CHC \equiv CH$ is _____ .
a) Pent-1-yn-3-ene b) Pent-4-yn-2-ene c) Pent-3-en-1-yne d) Pent-2-en-4-yne

208. Which of the following species does not show aromaticity?
a) b) c) d) 

209. Dehydrohalogenation involves removal of the halogen atom together with a hydrogen atom from a carbon atom adjacent to the one with halogen atom. Alcoholic KOH is used for dehydrohalogenation. According to Saytzeff's rule, when two alkenes may be formed, the alkene which is most substituted is the major product.
Arrange the following alkyl halides in decreasing order of the rate of β-elimination reaction with alcoholic KOH.

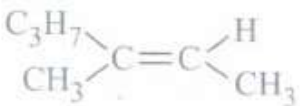
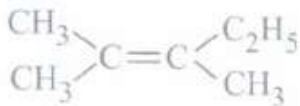
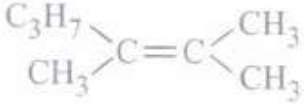
$\underset{(i)}{CH_3CH_2CH_2Br}$ $\underset{(ii)}{CH_3-\underset{CH_3}{\underset{|}{CH}}-CH_3Br}$ $\underset{(iii)}{CH_3-CH_2-\underset{Br}{\underset{|}{CH}}-CH_3}$

a) (ii) > (iii) > (i) b) (iii) > (ii) > (i) c) (i) > (ii) > (iii) d) (ii) > (i) > (iii)

210. The radical is aromatic because it has:
a) 7p--orbitals and 6 unpaired electrons b) 7p--orbitals and 7 unpaired electrons
c) 6p-orbitals and 7 unpaired electrons d) 6p--orbitals and 6 unpaired electrons

211. Coal tar is the main source of:
a) aromatic compounds b) alicyclic compounds c) aliphatic compounds
d) nitro compounds.

212. The distance between two adjacent carbon atoms is largest in:
a) benzene b) ethene c) butane d) ethyne

213. An unsaturated hydrocarbon was treated with ozone and resulting ozonide on hydrolysis gives 2-pentanone and acetaldehyde. What is the structure of alkene?
a) C_3H_7-CH=CH-CH_3 b)  c) 
d) 

214. 2, 3-Dimethyl-2-butene can be prepared by heating which of the following compounds with a strong acid?

a) $(CH_3)_3C - CH = CH_2$ b) $(CH_3)_2C = CHCH_2CH_3$ c) $(CH_3)_2CHCH_2CH = CH_2$

d) $(CH_3)_2CH - \underset{\underset{CH_3}{|}}{CH} - CH = CH_2$

215. Assertion: Wurtz reaction is not preferred for the preparation of alkanes containing odd number of carbon atoms.
Reason : It is not possible to prepare alkanes with odd number of carbon atoms through Wurtz reaction
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

216. Nitrobenzene can be prepared from benzene by using a mixture of concentrated HNO_3 and cone, H_2SO_4, In the mixture, nitric acid acts as an/a:
a) reducing agent b) acid c) base d) catalyst

217. **Assertion:** Addition of HBr to propene yields 2-bromopropane but in presence of a peroxide it yields l-bromopropane.
Reason: When reaction is carried out in the presence of a peroxide it follows free radical mechanism, 20 free radical is more stable than 10 free radical.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

218. Which of the following statements is true?
a) Soda lime is a mixture of sodium hydroxide and potassium hydroxide
b) Methane can be prepared by Wurtz reaction
c) In alkanes all carbon atoms are sp^3 hybridised.
d) neo-Pentane yields three different monochloro derivatives.

219. Which of the compounds with molecular formula C_5H_{10} yields acetone on ozonolysis?
a) 3-methane-1-butene b) cyclopentane c) 2-methyl-l-butene d) 2-methyl-2-butene

220. Assertion: Boiling point of pentane is higher than 2,2-dimethylpropane.
Reason : There is steady increase in boiling point with increase in molecular mass.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

221. The major constituent of natural gas is:
a) methane b) propane c) butane d) hexane.

222. Presence of unsaturation in organic compounds can be tested with:
a) Fehling's reagent b) Tollens'reagent c) Baeyer's reagent d) Fittig's reaction.

223. Match the column I with column II to identify the products of oxidation of alkanes and mark the appropriate choice

Column-I		Column-II	
(A)	$CH_4 + 2O_2 \xrightarrow[[O]]{KMnO_4}$	(i)	$HCOOH + H_2O$
(B)	$2CH_4 + O_2 \xrightarrow[100atm]{Cu/523K}$	(ii)	$CO_2 + 2H_2O$
(C)	$CH_4 + O_2 \xrightarrow[\triangle]{M_{O_2}O_3}$	(iii)	$2CH_3OH$
(D)	$CH_4 + \frac{3}{2}O_2 \xrightarrow{(CH_3COO)_2Mn}$	(iv)	$HCHO+H_2O$

a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv) b) (A) →(ii), (B) →(iii), (C) →(iv), (D) →(i)
c) (A) → (iv), (B) → (ii), (C) → (iii), (D) → (i) d) (A) → (iii), (B) → (i), (C) → (ii), (D) → (iv)

224. In preparation of alkene from alcohol using Al_2O_3 which is effective factor?
a) Temperature b) Concentration c) Surface area of Al_2O_3 d) Porosity of Al_2O_3

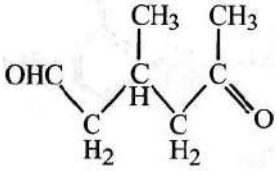
225. **Assertion**: Cyclopentadienyl anion is aromatic in nature.
Reason: Cyclopentadienyl anion has six πelectrons.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

226. Benzene reacts with CH_3Cl in the presence of anhydrous $AlCl_3$ to form:
a) toluene b) chlorobenzene c) benzylchloride d) xylene

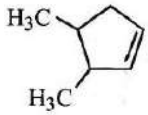
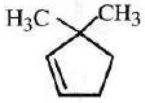
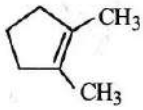
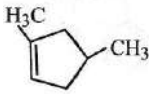
227. Which of the following organic compounds has same hybridizationas its combustion product (CO_2)?
a) Ethane b) Ethyne c) Ethene d) Ethanol

228. Benzene easily shows
a) ring fission reactions since it is unstable
b) addition reactions since it is unsaturated.
c) electrophilic substitution reactions due to stable ring and high π electron density.
d) nucleophilic substitution reactions due stable ring and minimum electron density.

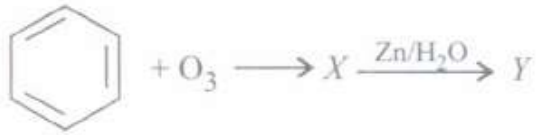
229. A single compound of the structure:



is obtainable from ozonolysis of which of the following cyclic compounds?

a)  b)  c)  d) 

230. Similar to alkenes and alkynes benzene also undergoes ozonolysis. In the sequence of the given reaction identify X and Y.



a) X = Triozonide, Y = Glyoxal b) X = Diozonide, Y = Succinic acid

c) X = Monoozonide, Y = Benzoic acid d) X = Triozonide, Y = Benzaldehyde.

231. Complete the following reactions:

(i) $C_2H_5I + H_2 \xrightarrow[C_2H_5OH]{Zn-Cu} X$

(ii) $CH_3COONa + H_2O \xrightarrow{Electrolysis} Y$

(iii) $CH_3CH_2CH_2CH_2CH_2CH_3 \xrightarrow[773K]{Cr_2O_3/AI_2O_3} Z$

a) X = C_2H_6, Y = C_2H_6, Z = C_6H_6 b) X = CH_4, Y = CH_3COOH, Z = CH_3CH_3

c) X = C_2H_6, Y = CH_4, Z = C_4H_{10} d) X = C_2H_6, Y = CH_4, Z = C_5H_{10}

232. Mark the incorrect statement from the following.

a) Benzene has a planar structure

b) Benzene is an unsaturated hydrocarbon and shows addition reactions like alkenes

c) In benzene carbon uses two p-orbitals for hybridisation.

d)

Aromatic hydrocarbons contain high percentage of carbon hence burn with sooty flame.

233. Which of the following steps is not correct in the mechanism of electrophilic substitution of benzene?

a) Generation of electrophile like X^+, R^+, RC^+O, NO^+_2, etc.

b)

Attack of electrophile resulting in the formation of arenium ion in which one of the carbon is Sp^3 hybridised.

c) Addition of proton on benzene ring to give carbocation.

d) Removal of proton from Sp^3 carbon atom to restore aromatic character.

234. Which of the following compounds will react with Na to form 4,5-diethyloctane?

a) $CH_3CH_2CH_2CH_2Br$ b) $CH_3CH_2CH_2-\underset{CH_3}{CH}-CH_2CH_2Br$

c) $CH_3CH_2CH_2CH_2-\underset{Br}{CH}-CH_3$ d) $CH_3CH_2CH_2-\underset{Br}{CH}-CH_2CH_3$

235. The following reaction is known as

$C_6H_6 + CH_3Cl \xrightarrow[(anhy.)]{AlCl_3} C_6H_5CH_3 + HCl$

a) Wurtz-Fittig reaction b) Friedel-Crafts reaction c) Rosenmund reaction
d) Sandmeyer reaction.

236. Which of the following isomeric heptanes can yield seven different monochlorinated products upon free radical chlorination?
a) 2,2- Dimethylpentane b) 2- Methylhexane c) 3-Methylhexane
d) 2,4-Dimethylpentane

237. Which of the following reagents will be able to distinguish between 1-butyne and 2-butyne?
a) $NaNH_2$ b) HCl c) O_2 d) Br_2

238. Hydrocarbon (A) reacts with bromine by substitution to form an alkyl bromide which by Wurtzreaction is converted to gaseous hydrocarbon containing less than four carbon atoms. (A) is:
a) $CH_3 - CH_3$ b) $CH_2 = CH_2$ c) $CH \equiv CH$ d) CH_4

239. 2-Bromopentane is treated with alcoholic KOH solution. What will be the major product formed in this reaction and what is the type of elimination called?
a) Pent-1-ene,β-Elimination b) Pent -2-ene, β - Elimination
c) Pent-l-ene, Nucleophilic substitution d) Pent-2-ene, Nucleophilic substitution

240. Which alkane is produced when sodium salt of butanoic acid is heated with soda lime?
a) CH_3CH_3 b) $CH_3CH_2CH_2CH_3$ c) CH_4 d) $CH_3CH_2CH_3$

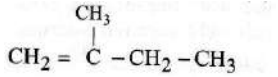
241. Ethane is formed during the formation of chloromethane by chlorination of methane because:
a) higher members of the hydrocarbons are generally formed during reactions
b) two methyl free radicals may combine during chlorination to give ethane
c) two chloromethane molecules react to form ethane
d) chlorine free radical reacts with methane to give ethane.

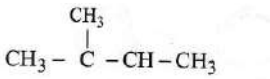
242. In the following reactions,

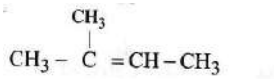
(i) $CH_3-\underset{OH}{\underset{|}{CH}}-\underset{CH_3}{\underset{|}{CH}}-CH_3 \xrightarrow{H^+/Heat}$ A (Major Products) + B (Minor Products)

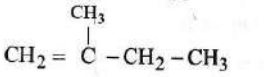
(ii) $A \xrightarrow[\text{in absence of peroxide}]{HBr, dark}$ C (Major product) + D (Minor Product)

the major products (A) and (C) are respectively:

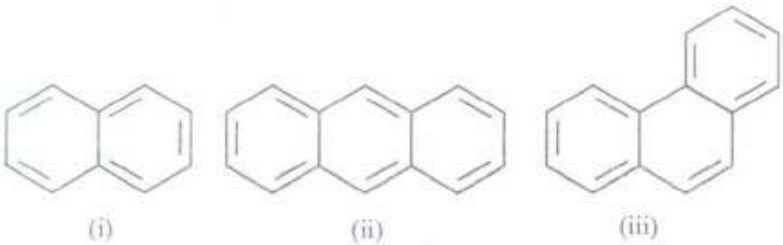
a) 

b) 

c) 

d) 

243. Identify the polynuclear aromatic compound which is aromatic.



a) (i) and (ii) b) (ii) and (iii) c) (i), (ii) and (iii) d) (i) and (iii)

244. In Friedel-Craft's alkylation, besides $AlCl_3$ the other reactants are:

a) $C_6H_6 + NH_2$ b) $C_6H_6 + CH_4$ c) $C_6H_6 + CH_3Cl$ d) $C_6H_6 + CH_3COCl$

245. Pent-1-ene with HCl gives:

a) 3-chloropentane b) 2-chloropentane c) 1,2-dichloropentane d) 1-chloropentane

246. Geometrical isomerism is caused:

a) by restricted rotation around C = C bond

b) by the presence of one asymmetric carbon atom

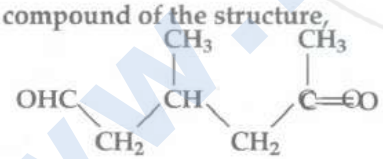
c) due to the different groups attached to the same functional group

d) by swing of hydrogen atom between two divalent atoms.

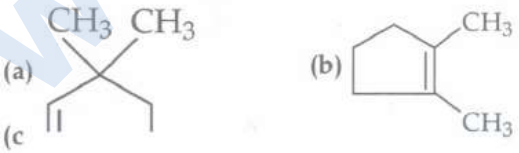
247. Hydrocarbon which is liquid at room temperature is:

a) pentane b) butane c) propane d) ethane.

248. A single compound of the structure,



is obtainable from ozonolysis of which of the following cyclic compounds?



A (predominantly) is :

a) $CH_3 - \underset{CH_3}{CH} - CH_2 - CH_2Br$ b) $CH_3 - \underset{CH_3}{\overset{Br}{C}} - CH_2CH_2$

c) $CH_3 - \underset{Br}{CH} - \underset{CH_3}{CH} - CH_3$ d) $CH_3 - \underset{CH_3}{CH} - \underset{Br}{CH} - CH_3$

249. Chlorination of methane does not occur in dark because:

a) methane can form free radicals in presence of sunlight only

b)

to get chlorine free radicals from Cl_2 molecules energy is required. It cannot happen in dark

c) substitution reaction can take place only in sunlight and not in dark

d) termination step cannot take place in dark. It requires sunlight.

250. Arrange the halogens F_2, Cl_2, Br_2, I_2, in order of their increasing reactivity with alkanes _____ .

a) $I_2 < Br_2 < Cl_2 < F_2$ b) $Br_2 < Cl_2 < F_2 < I_2$ c) $F_2 < Cl_2 < Br_2 < I_2$

d) $Br_2 < I_2 < Cl_2 < F_2$

251. Cyclic hydrocarbon 'A' has all the carbon and hydrogen atoms in a single plane. All the carbon bonds have the same length less than 1.54 Å but more than 1.34 Å. The C - C - C bond angle will be:

a) $109^0 28'$ b) 100^0 c) 180^0 d) 120^0

252. What is the order of reactivity of hydrogen atoms attached to the carbon atom in an alkane for free radical substitution?

a) 3°>1°>2° b) 2°>1°>3° c) 3°>2°>1° d) 1°>2°>3°

253. During halogenation of alkanes the halogens and alkane show a specific trend. Which of the following statements is not correct?

a) The reactivity of halogens is in the order $F_2 > Cl_2 > Br_2 > I_2$

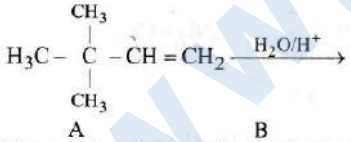
b) For a given halogen the reactivity of hydrocarbon is in the order of 3° > 2° > 1°.

c) Bromine is less reactive than chlorine towards a particular alkane.

d)

On chlorination monosubstituted product is formed while on bromination disubstituted products are formed.

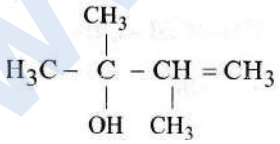
254. In the following reaction:

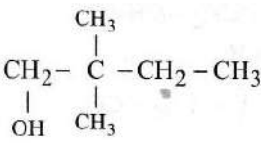


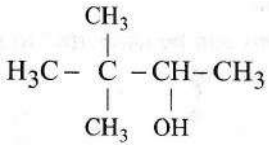
A B

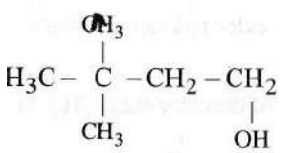
Minor product (+) Minor product

The major product is:

a) 

b) 

c) 

d) 

255. Which step is chain propagation step in the following mechanism?

hv

(i) $Cl_2 \longrightarrow Cl\cdot + Cl\cdot$

(ii) $Cl + CH_4 \longrightarrow \cdot CH_3 + HCl$

(iii) $Cl + Cl\cdot \longrightarrow Cl_2$

(iv) $CH_3 + \cdot Cl \longrightarrow CH_3Cl$

a) (i) b) (ii) c) (iii) d) (iv)

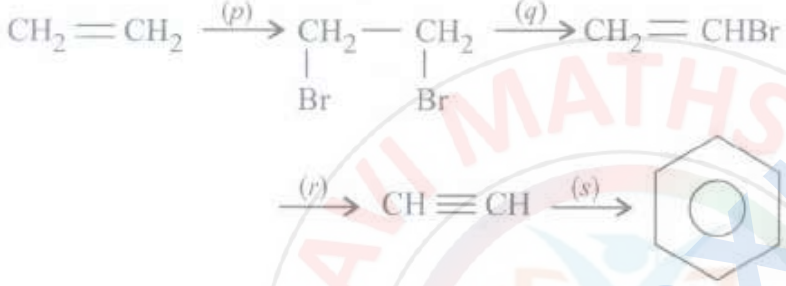
256. Assertion: 2,2-Dimethylbutane does not have any tertiary carbon atom.
Reason: Tertiary carbon atom is attached to three carbon atoms

a)
If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

257. Choose the correct reagents used in the conversion.



a)

p	q	r	s
Br_2	alc.KOH	NaOH	Al_2O_3

b)

p	q	r	s
HBr	alc.KOH	CaC_2	$KMnO_4$

c)

p	q	r	s
HBr	alc.KOH	$NaNH_2$	red hot iron tube

d)

p	q	r	s
Br_2	alc.KOH	$NaNH_2$	red hot iron tube

258. Some meta-directing substituents in aromatic substitution are given. Which one is most deactivating?

a) CN b) SO_3H c) COOH d) NO_2

259. An organic compound C_6H_{12} (X) on reduction gives C_6H_{14} (Y). X on ozonolysis gives two aldehydes C_2H_4O (I) and C_4H_8O (II). Identify the compounds X, Y and aldehydes (I) and (II).

a)
X = $CH_3CH = CHCH_2CH_2CH_3$, Y = $CH_3(CH_2)_4CH_3$,(I) = CH_3CHO, (II) = $CH_3(CH_2)_2CHO$

b) X = $CH_3CH_2CH = CHCH_2CH_3$, Y = $CH_3(CH_2)_4CH_3$,(I) = CH_3CHO, (II) = CH_3CHO

c)
X = $CH_3CH_2CH_2CH_2CH = CH_2$, y = $CH_3(CH_2)_3CH_3$, (I) = HCHO, (II) = $CH_3(CH_2)_2CHO$

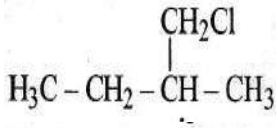
$X = CH_3CH_2 - \underset{\underset{CH_3}{|}}{C} = CH - CH_3$,Y=$CH_3(CH_2)_3CH_3$

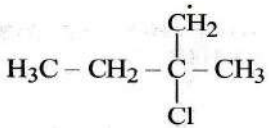
d) (I) = CH_3CHO, (II) = CH_3CH_2CHO

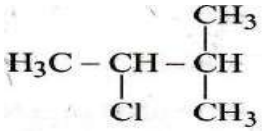
260. Reaction of HBr with propene in the presence of peroxide gives:

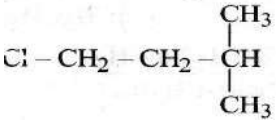
a) iso - propyl bromide b) 3 - bromo propane c) allyl bromide d) n - propyl bromide

261. An alkene "A" on reaction with O_3 and $Zn - H_2O$ gives propanone and ethanal in equimolar ratio, Addition of HCl to alkene "A" gives "B" as the major product. The structure of product "B" is:

a) 

b) 

c) 

d) 

262. The Cl - C - Cl angle in 1, 1, 2, 2 - tetrachloroethene and tetrachloromethane respectively will be about:

a) 120.0° and 109.5° b) 90° and 109.5° c) 109.5° and 90° d) 109.5° and 120°

263. Which one is the correct order of acidity?

a) $CH_2 = CH_2 > CH_3 - CH = CH_2 > CH_3 - C \equiv CH > CH \equiv CH$

b) $CH \equiv CH > CH_3 - C \equiv CH > CH_2 = CH_2 > CH_3 - CH_3$

c) $CH \equiv CH > CH_2 = CH_2 > CH_3 - C \equiv CH > CH_3 - CH_3$

d) $CH_3 - CH_3 > CH_2 = CH_2 > CH_3 - C \equiv CH > CH \equiv CH$

264. Which one of the following has the shortest carbon - carbon bond length?

a) Benzene b) Ethene c) Ethyne d) Ethane

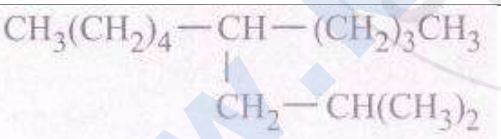
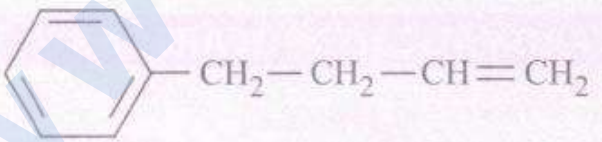
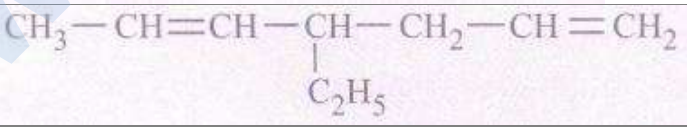
265. How many structures are possible for C_5H_8 with one triple bond?

a) 4 b) 3 c) 2 d) 1

266. The most stable configuration of n-butane will be _____ .

a) Skew boat b) Eclipsed c) Gauche d) Staggered-anti

267. Match the column I with column II to give the correct IUPAC names and mark the appropriate choice.

	Column I		Column II
A.		(i)	Pent-1-en-3-yne
B.	CH_2=CH-C $\equiv$ C-CH_3	(ii)	4-Ethyl-1, 5-heptadiene
C.		(iii)	5-(2-Methylpropyl) decane
D		(iv)	4-Phenylbut-1-ene

a) (A) ⟶ (i), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (iii)

b) (A) ⟶ (iv), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (i)

c) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (ii)

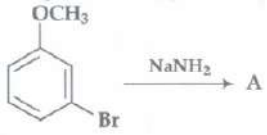
d) (A) ⟶ (ii), (B) ⟶ (Iii), (C) ⟶ (i), (D) ⟶ (iv)

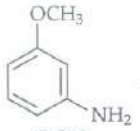
268. How many geometrical isomers are possible for the given compound?

CH_3 - CH= CH- CH= CH- C_2H_5

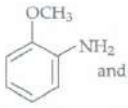
a) Four b) Three c) Two d) Five

269. Identify A and predict the type of reaction

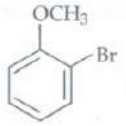


a) 

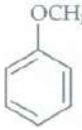
and substitution reaction

b) 

and elimination addition reaction

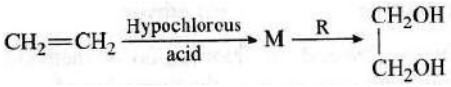
c) 

and cine substitution reaction

d) 

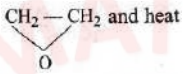
and cine substitution reaction

270. In a reaction,



M = molecules, R = reagent, M and R are

a) CH_3CH_2Cl and NaOH b) $CH_2Cl \cdot CH_2OH$ and aq.$NaHCO_3$

c) CH_3CH_2OH and HCl d) 

271. Assertion: In case of aryl halides, halogens are moderately deactivating.

Reason: Halogens are ortho, para directing groups.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

272. Propanal-l and pentan-3-one are the ozonolysis products of an alkene. What is the structural formula of alkene?

a) $CH_3CH_2-\underset{CH_2CH_3}{\overset{|}{C}}=CH-CH_2CH_3$ b) $CH_3CH_2-CH=CH-\overset{CH_2CH_3}{\overset{|}{CH}}-CH_3$

c) $CH_3-\underset{CH_2CH_3}{\overset{|}{C}}=\overset{CH_2CH_3}{\overset{|}{C}}-CH_3$ d) $CH_3CH_2CH_2CH_2 - CH = CH - CH_2CH_3$

273. Chlorination of alkanes is a photochemical process. It is initiated by the process of:

a) heterolysis b) homolysis c) pyrolysis d) hydrolysis.

274. The reaction of toluene with Cl_2 in the presence of $FeCl_3$ gives 'X' and reaction in presence of light gives 'Y', Thus, 'X' and 'Y' are:

a) X = m-chlorotoluene, Y = p-chlorotoluene

b) X = o - and p-chlorotoluene, Y = Trichloromethyl benzene

c) X = benzyl chloride, Y = m-chlorotoluene

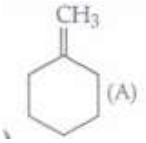
d) X = benzal chloride, Y = 0-chlorotoluene

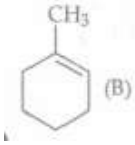
275. In the reaction, $Cl_2+CH_4 \xrightarrow{h\upsilon} CH_3Cl + HCl$ presence of a small amount of oxygen

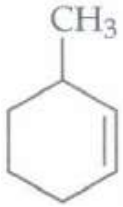
a) increases the rate of reaction for a brief period of time
b) decreases the rate of reaction for a brief period of time
c) does not affect the rate of reaction d) completely stops the reaction

276. Reactivity of hydrogen atoms attached to different carbon atoms in alkanes has the order:
a) tertiary > primary > secondary b) primary > secondary > tertiary
c) Both (a) and (b) d) tertiary > secondary > primary

277. In the reaction with HCl, an alkene reacts in accordance with the Markovnikov's rule to give a product 1-chloro-1 methyl cyclohenxane. The possible alkene is:

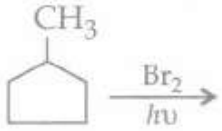
a) 

b) 

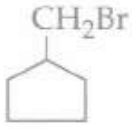
c) (a) and (b) d) 

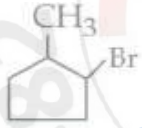
278. What are the products of dehydrohalogenation of 2-iodopentane?
a) 2-Pentene (major), 1-Pentene (minor) b) 1-Pentene (major), 2-Pentene (minor)
c) 2-Pentene (50%), 1-Pentene (50%) d) None of these

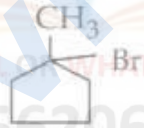
279. In the following reaction,

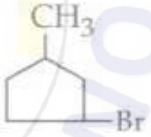


the major product obtained is

a) 

b) 

c) 

d) 

280. Which one of these is not compatible with arenes?
a) Greater stability b) Delocalisation of π - electrons c) Electrophilic additions
d) Resonance

281. Which of the following groups is o-p directing but deactivates benzene ring for electrophilic substitution?
a) - CH_3 b) - NH_2 c) - Cl d) - NO_2

282. How many stereoisomers does this molecule has?
$CH_3CH = CHCH_2CHBrCH_3$
a) 4 b) 6 c) 8 d) 2

283. Which of the following has the lowest boiling point?
a) 2-Methylbutane b) 2-Methylpropane c) 2,2-Dimethylpropane d) n-Pentane

284. Which is the most suitable reagent among the following to distinguish compound (III) from rest of the compounds?
I. $CH_3 - C \equiv C - CH_3$
II. $CH_3 - CH_2 - CH_2 - CH_3$
III. $CH_3 - CH_2 - C \equiv CH$
IV. $CH_3 - CH = CH_2$

a) Bromine in carbon tetrachloride b) Bromine in acetic acid c) Alkaline $KMnO_4$
d) Ammoniacal silver nitrate reagent

285. Among the following compounds one that is most reactive towards electrophilic nitration is:
a) benzoic acid b) nitrobenzene c) toluene d) benzene

286. $CH_3CH_2CH_2CH_3 \xrightarrow[Cl_2]{hv} \underset{(monochlorinationproducts)}{A+B}$
The approximate ratio of percentage yields of A and B formed in the above reaction is
a) 50: 50 b) 72: 28 c) 45: 55 d) 60:40

287. Which of the following compound has the lowest boiling point?
a) $CH_3CH_2CH_2CH_2CH$ b) $CH_3CH = CH - CH_2CH_3$ c) $CH_3 CH = CH - CH = CH_2$
d) $CH_3CH_2CH_2CH_3$

288. A mixture of 1-iodoethane and 1-iodopropane is treated with sodium metal and dry ether to carry out Wurtz reaction. Which of the following hydrocarbons will be formed?
a) Propane + Hexane b) Ethane + Propane c) Butane + Propane
d) Butane + Pentane + Hexane

289. The ease of dehydrohalogenation for different halogens is in the order:
a) iodide> bromide> chloride b) bromide> iodide> chloride
c) chloride > bromide > iodide d) iodide> chloride > bromide.

290. Few reactions of alkanes are given below. Identify the name of the reaction which is not correctly matched with the reaction is:
a) $CH_3CH_2CH_2CH_3 \xrightarrow{AlCl_3+HCl} \underset{Isomerisation}{CH_3-\overset{CH_3}{\overset{|}{C}}H-CH_3}$
b) $CH_6H_{14} \xrightarrow[773\ K]{} C_4H_8 + C_2H_6$-Pyrolysis
c) $CH_4 + 2O_2 \xrightarrow{\triangle} CO_2 + 2H_2O$-Controlled oxidation
d) $CH_4 + HNO_3 \xrightarrow{400^oC} CH_3NO_2$-Nitration

291. Assertion : Alkenes are easily attacked by electrophilic reagents.
Reason : Alkenes are unstable molecules in comparison to alkanes
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

292. Although benzene is highly unsaturated it does not undergo addition reactions. The explanation of this can be suggested as
a) π-electrons of benzene ring are delocalised
b) since π-electrons are present inside the ring, addition cannot take place

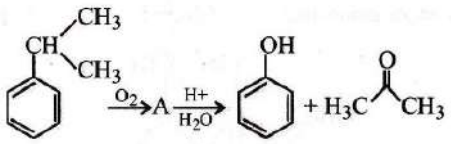
c) cyclic structures do not show addition reactions

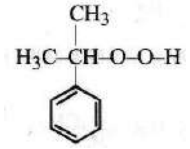
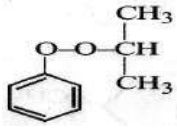
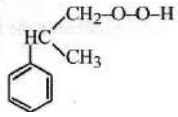
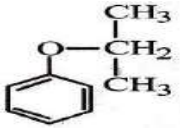
d) benzene is not a reactive compound.

293. Which of the following compounds with molecular formula, C_5H_{10} yields acetone on ozonolysis?

a) 2-methyl-2-butene b) 3-methyl-l-butene c) Cyclopentane d) 2-methyl-l-butene

294. The structure of intermediate A in the following reaction, is:



a)  b)  c)  d) 

295. Fill in the blanks with appropriate words.

Benzene has a planar structure. All carbon atoms in benzene are __(I)__ hybridised. The ring structure of benzene was proposed by ___(II)___ It shows __(III)_substitution reactions It reacts with __(IV)__ in presence of aluminium chloride to form acetophenone.

a)

I	II	III	IV
sp^2	Kekule	electrophilic	acetyl chloride

b)

I	II	III	IV
sp	Dewar	nucleophilic	chloromethane

c)

I	II	III	IV
sp^3	Ladenberg	electrophilic	chloroethane

d)

I	II	III	IV
sp^2	Baeyer	nucleophilic	methyl bromide

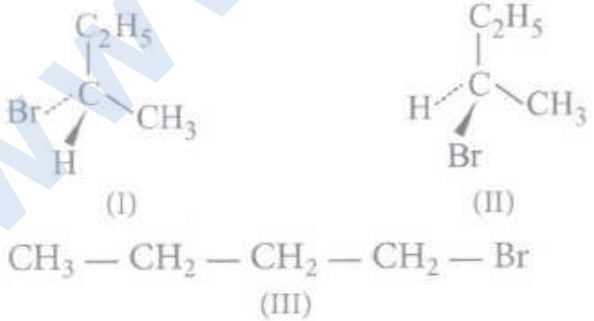
296. Products of the following reaction:

$$CH_3C \equiv CCH_2CH_3 \xrightarrow[(i)O_3]{(ii)Hydrolysis} \text{... are}$$

a) $CH_3CHO + CH_3CH_2CHO$ b) $CH_3COOH + CH_3COCH_3$

c) $CH_3COOH + HOOC.CH_2CH_3$ d) $CH_3COOH + CO_2$

297. The addition of HBr to l-butene gives a mixture of products (I), (II) and (III)



The mixture consists of

a) (I) and (II) as major and (III) as minor products

b) (II) as major, (I) and (III) as minor products

c) (II) as minor, (I) and (III) as major products

d) (I) and (II) as minor and (III) as major products.

298. Geometrical isomers differ in:
a) position of functional group b) position of atoms c) spatial arrangement of atoms
d) length of carbon chain

299. Which is the correct symbol relating the hetero Kekule structure of benzene?
a) ⇌ b) ⟶ c) ≡ d) ↔

300. Liquid hydrocarbons can be converted to a mixture of gaseous hydrocarbons by:
a) Oxidation b) Cracking c) Distillation under reduced pressure d) Hydrolysis

301. Which of the following species is aromatic?
a) b) c) d)

302. Select the true statement about benzene amongst the following:
a) Because of unsaturation benzene easily undergoes addition
b) There are two types of C - C bonds in benzene molecule
c) There is cyclic delocalization of pi-bonds in benzene
d) Monosubstitution of benzene gives three isomeric products

303. Which of the following compounds will show cistrans isomerism?
a) $(CH_3)_2C = CHC_2H_5$ b) $H_2C = CCl_2$ c) $CH_3HC = CClCH_3$ d) $HClC = CH_2$

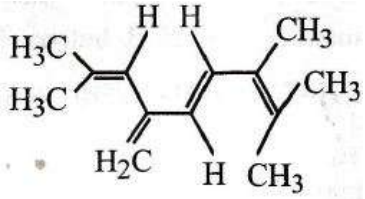
304. Match the column I with column II and mark the appropriate choice.

Column-I		Column-II	
A	Alkyl halide + Sodium in presence of dry ether	(i)	Sulphonation
B	Arene+Acid halide in presence of $AlCl_3$	(ii)	Wurtz reaction
C	Arene + Fuming sulphuric acid	(iii)	Catalytic hydrogenation
D	Arene + Hydrogen in presence of Ni	(iv)	Friedel-crafts reaction

a) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv) b) (A) → (iv), (B) → (ii), (C) → (iii), (D) → (i)
c) (A) → (iii), (B) →(i), (C) → (iv), (D) → (ii) d) (A) → (ii), (B) → (iv), (C) → (i), (D) → (iii)

305. Arrange the following in decreasing order of their boiling points
(I) n-Butane
(II) 2-Methylbutane
(III) n-Pentane
(IV) 2,2-Dimethylpropane
a) I > II > III > IV b) II > III > IV > I c) IV > III > II > 1 d) III > II > IV > I

306. In halogenation of aromatic hydrocarbon, a halogen carrier is used which is generally a Lewis acid. The main function of this reagent is to generate the species
a) X b) X^- c) X^+ d) $X\cdot$

307. The total number of π-bond electrons in the following structure is:


a) 8 b) 12 c) 16 d) 4

308. Identify the reagent from the following list which can easily distinguish between l-butyne and 2-butyne.
a) Bromine water b) Baeyer's reagent c) Dilute H_2SO_4 + $HgSO_4$
d) Ammoniacal Cu_2Cl_2

309. Assertion: Sodium salt of butanoic acid on heating with soda lime gives butane.
Reason : Decarboxylation reaction yields alkanes havingsamenumber of carbon atoms as the parent acid
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If assertion is true but reason is false.

310. Which of the following reactions of methane is incomplete combustion?
a) $2C_4+O_2 \xrightarrow{Cu/523K/100atm} 2CH_3OH$ b) $CH_4 + O_2 \xrightarrow{Mo_2O_3} HCHO + H_2O$
c) $CH_4 + O_2 \rightarrow C_{(s)} + 2H_2O_{(l)}$ d) $CH_4 + 2O_2 \rightarrow CO_{2(g)} + 2H_2O_{(l)}$

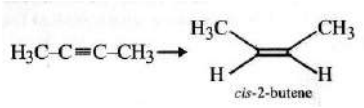
311. Arrange the following hydrogen halides in order of their decreasing reactivity with propene.
a) HCl> HBr > HI b) HBr> HI > HCl c) HI> HBr > HCl d) HCl> HI > HBr

312. When acetylene is passed through dilute H_2SO_4 in presence of $HgSO_4$, the compound formed is:
a) ether b) ketone c) acetic acid d) acetaldehyde

313. **Assertion**: Decolourisation of $KMnO_4$ solution is used as a test for unsaturation.
Reason : Alkenes on reaction with cold, dilute aqueous solution of potassium permanganate produce vicinal glycols.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

314. Products of the following reaction:
a) $CH_3COOH + CO_2$ b) $CH_3COOH + HOOC.CH_2CH_3$
c) $CH_3CHO + CH_3CH_2CHO$ d) $CH_3COOH + CH_3COCH_3$

315. The most suitable reagent for the following conversion is:



a) $H_2, Pd/C, quinoline$ b) Zn/HCl c) $Hg^{2+}/H^+, H_2O$ d) $Na/liquid NH_3$

316. In commercial gasolines the type of hydrocarbons which are more desirable is:

a) branched hydrocarbon b) straight chain hydrocarbon
c) linear, unsaturated hydrocarbon d) toluene

317. **Assertion**: cis-form of alkene is found to be more polar than the trans-form.
Reason : Since the groups are in opposite directions in the trans-form, the dipole moments of bonds cancel each other making trans-form almost non-polar.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

318. Identify the product for the following reaction:
$CH \equiv CH + HOCl \rightarrow$
a) Cl_2CHCHO b) $CH(OH) = CHCl$ c) $ClCH_2CH_2OH$ d) CH_3COCl

319. Arrange the following carbanions in order of their decreasing stability
(I) $H_3C\text{-}C\equiv C$
(II) $H\text{-}C\equiv C$
(III) $H_3C\text{ - }CH_2$
a) I > II > III b) II > I> III c) III > II > I d) III > I > II

320. The shortest C - C bond distance is found in:
a) acetylene b) diamond c) ethane d) benzene

321. A compound is treated with $NaNH_2$ to give sodium salt. Identify the compound.
a) C_2H_2 b) C_6H_6 c) C_2H_6 d) C_2H_4

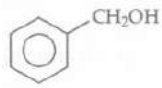
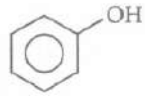
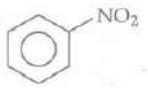
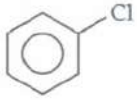
322. An alkane C_6H_{14} gives two monochloro derivatives on chlorination. Its possible structure is
a) $CH_3CH_2CH_2CH_2CH_2CH_3$ b) $CH_3-\underset{CH_3}{\underset{|}{CH}}-CH_2CH_2CH_3$
c) $CH_3-\underset{CH_2CH_3}{\underset{|}{CH}}-CH_2CH_3$ d) $CH_3-\underset{CH_3}{\underset{|}{CH}}-\underset{CH_3}{\underset{|}{CH}}-CH_3$

323. Predict the product C obtained in the following reaction of 1-butyne:
$CH_3CH_2\text{ - C} \equiv CH + HCl \longrightarrow B \xrightarrow{HI} C$
a) $CH_3-\underset{Cl}{\underset{|}{CH}}-CH_2CH_2I$ b) $CH_3-CH_2-CH_2-\underset{Cl}{\underset{|}{\overset{I}{\overset{|}{C}}}}-H$
c) $CH_3-CH_2-\overset{I}{\overset{|}{CH}}-CH_2Cl$ d) $CH_3-CH_2-\underset{Cl}{\underset{|}{\overset{I}{\overset{|}{C}}}}-CH_3$

324. Which of the following alkynes can be identified and distinguished from the rest of the alkynes on reaction with ammoniacal silver nitrate to gave a white precipitate?
a) $CH_3C\equiv C\text{-}CH_3$ b) $CH_3CH_2C\equiv CH$ c) $CH_3CH_2C\equiv CCH_3$ d) $CH_3C\equiv CCH_2CH_2CH_3$

325. In the free-radical chlorination of methane, the chain-initiating step involves the formation of:
a) chlorine radical b) hydrogen chloride c) methyl radical d) chloromethyl radical

326. The compound formed when alcoholic solution of ethylene dibromide is heated with granulated zinc is
a) ethene b) ethyne c) ethane d) bromoethane.

327. Which one of the following is most reactive towards electrophilic attack?
a)  b)  c)  d) 

328. The most acidic hydrogen atoms are present in
a) ethane b) ethene c) ethyne d) benzene.

329. One mole of 1, 2-dibromopropane on treatment with X moles of $NaNH_2$ followed by treatment with ethyl bromide gave a 2-pentyne. The value of X is:
a) one b) two c) three d) four

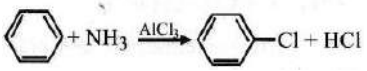
330. What is the carbon-carbon bond length in benzene?
a) 1.20 $\mathring{A}$ and 1.31$\mathring{A}$ b) 1.39$\mathring{A}$ c) 1.39$\mathring{A}$ and 1.20$\mathring{A}$ d) 1.20 $\mathring{A}$

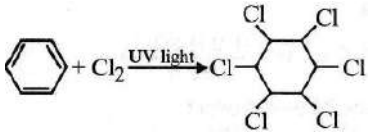
331. Assertion: The second substituent may enter the mono- substituted benzene ring at either ortho, para or at meta position.
Reason : The position of the incoming group is determined by the nature of the group present in monosubstituted benzene ring.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

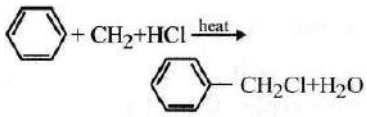
332. The correct order of reactivity towards electrophilic substitution is
a) benzene> phenol> benzoic acid> chlorobenzene
b) phenol> benzene> chlorobenzene > benzoic acid
c) chlorobenzene > benzoic acid> phenol> benzene
d) benzoic acid> chlorobenzene > benzene> phenol.

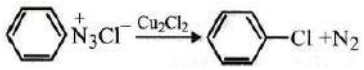
333. When I-butyne undergoes oxymercuration with the help of $HgSO_4$ + H_2SO_4, the product(s) formed is/are
a) CH_3CH_2COOH + HCOOH b) $CH_3CH_2COCH_3$ c) $CH_3CH_2CH_2COOH$
d) $CH_3CH_2CH_2CHO$

334. Among the following, the reaction that proceeds through an electrophilic substitution, is _____ .

a) 

b) 

c) 

d) 

335. 1, 2-Benzpyrene is _____ .

a) a polynuclear hydrocarbon b) carcinogenic in nature c) an aromatic hydrocarbon d) both (a) and (b).

336. The products for the following reactions are

(i) $CH_3 - \underset{H}{\overset{Br}{\underset{|}{\overset{|}{C}}}} - CH_2 - CH_3 + alc.\,KOH \longrightarrow X$

(ii) $CH_3 - \underset{CH_3}{\underset{|}{CH}} - CH = CH_2 \xrightarrow{O_3} Y + Z$

a) X=$(CH_3)_2C = CH_2$, Y = CH_3CH_2CHO, Z = CH_3CH_2CHO

b) X=$CH_2= CH_2$,Y=CH_3CHO,Z=CH_3COOH

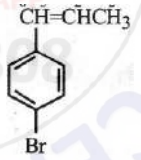
c) X = CH_3-CH=CH-CH_3, $Y = CH_3 - \overset{CH_3}{\overset{|}{C}}H - CHO, Z = HCHO$

d) X = CH_3 - CH = $C(CH_3)_2$ Y = HCHO, Z= CH_3CHO

337. 1,3,5,7-Octatetraene contains X σ-bonds and Y π bonds. 'X' and 'Y' are:

a) 23,4 b) 17,4 c) 18,5 d) 33,2

338. The reaction of $C_6H_5CH = CHCH_3$ with HBr produces:

a) $C_6H_5CH_2\underset{Br}{\underset{|}{C}}HCH_3$ b) $C_6H_5CH_2CH_2CH_3Br$ c)  d) $C_6H_5\underset{Br}{\underset{|}{C}}HCH_2CH_3$

339. The correct statement regarding the comparison of staggered and eclipsed conformations of ethane is:

a)
the eclipsed conformation of ethane is more stable than staggered conformation even though the eclipsed conformation has torsional strain

b)
the staggered conformation of ethane is more stable than eclipsed conformation, because staggered conformation has no torsional strain

c)
the staggered conformation of ethane is less stable than eclipsed conformation, because staggered conformation has torsional strain

d)
the eclipsed conformation of ethane is more stable than staggered conformation, because eclipsed conformation has no torsional strain.

340. The increasing order of reduction of alkyl halides with zinc and dilute HCl is:

a) R-Cl < R-I < R-Br b) R-Cl < R-Br < R-I c) R-I < R-Br < R-Cl d) R-Br < R-I < R-Cl

341. In the reaction,

$$H\text{-}C\equiv CH \xrightarrow[(i)\ NaNH_2/liq.NH_3]{(ii)\ CH_3CH_2Br} X \xrightarrow[(i)\ NaNH_2/liq.NH_3]{(ii)\ CH_3CH_2Br} Y$$

X and Y are:

a) X = 2-butyne, Y = 2-hexyne b) X = 1-butyne, Y = 2-hexyne

c) X = 1-butyne, Y = 3-hexyne d) X = 2-butyne, Y = 3-hexyne

342. Hydrolysis of ozonide of but-l-ene gives

a) ethylene only b) acetaldehyde and formaldehyde

c) propionaldehyde and formaldehyde d) acetaldehyde only.

343. Which of the following reactions does not show the acidic nature of ethyne?

a) Acetylene reacts with sodamide to form sodium acetylides

b)

When passed through ammoniacal cuprous chloride solution, a red precipitate is formed

c) Acetylene reacts with chlorine in the dark to form di or tetrachlorides

d) Acetylene when passed through ammoniacal silver nitrate gives a white precipitate.

344. What happens when methane reacts with conc. HNO_3 at high temperature?

a) Nitromethane is formed b) Methanol is formed c) CO_2 and H_2O are formed

d) CO and H_2O are formed

345. $R\text{-}CH_2\text{-}CC1_2\text{-}R \xrightarrow{Reagent}$

$R\text{-}C\equiv C\text{-}R$. The reagent is:

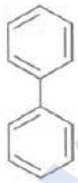
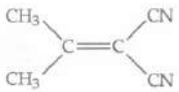
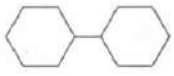
a) Na b) HCl in H_2O c) KOH in C_2H_5OH d) Zn in alcohol

346. In the following reaction, $C_6H_5CH_2Br \xrightarrow[2.H_3O^+]{1.Mg,\ Ether} X$ the product 'X' is _____ .

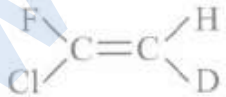
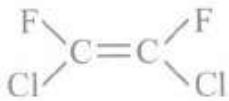
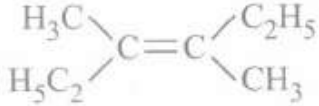
a) $C_6H_5CH_2CH_2C_6H_5$ b) $C_6H_5CH_2OCH_2C_6H_5$ c) $C_6H_5CH_2OH$

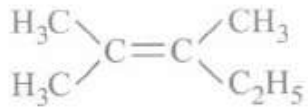
d) $C_6H_5CH_3$

347. In which of the following molecules, all atoms are coplanar?

a)  b) c)  d) 

348. Which of the following will not show geometrical isomerism?

a)  b)  c) 

d) 

349. Assertion: Ethyne reacts with sodium metal and sodamide to form sodium acetylide with the liberation of dihydrogen gas.

Reason: Alkynes are highly unsaturated.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

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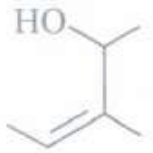
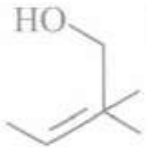
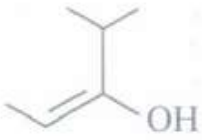
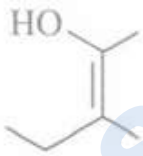
Time : 1 Mins **ORGANIC CHEMISTRY SOME BASIC PRINCIPLES AND TECHNIQUES 1** **Marks : 1042**

1. Correct representation of 3-methylpent-3-en-2-01 is:

a) 

b) 

c) 

d) 

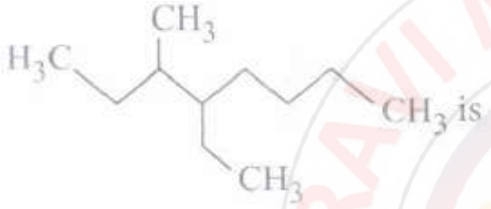
2. The correct order of increasing bond length of C-H, C-O, C-C and C = C is:
   a) C-H b) C-C c) C-O d) C-H
3. Which of the following compounds is not correctly matched with its IUPAC name?
   a) $CH_3CH_2CH_2COOCH_2CH_3$ - Ethyl butanoate
   b) $CH_3 - C\overset{|}{C}H_3H - CH_2 - CHO \quad -2-methylpentan-3-one$
   c) $CH_3 - C\overset{|}{C}H_3H - C\overset{||}{O} - CH_2CH_3 - 2-methylpentan-3-one$
   d) $CH_3 - C\overset{|}{O}HH - C\overset{|}{C}H_3H - CH_3 - 2-methylpentan-3-oI$
4. In sodium fusion test of organic compounds, the nitrogen of the organic compound is converted into
   a) sodamide b) sodium cyanide c) sodium nitrate d) sodium nitrate
5. The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system of nomenclature is
   a) - $CONH_2$, - CHO, - SO_3H, - COOH b) - COOH, - SO_3H, - $CONH_2$, - CHO
   c) - SO_3H, -COOH, -$CONH_2$, - CHO d) - CHO, -COOH, - SO_3H, -$CONH_2$
6. Which of the following is a characteristic feature of a free radical?
   a) It has a positive charge b) It has a negative charge c) It has all paired electrons
   d) It has an unpaired electron
7. Hyperconjugation is not possible in:
   a) CH_3-CH=CH_2 b) CH_2=CH_2 c) $CH_3 - \overset{+}{C}\begin{matrix}CH_3\\CH_3\end{matrix}$ d) $CH_3 - C\overset{|}{C}H_3 = C\overset{|}{C}H_3 - CH_3$
8. Match the column I with column II in which formula for estimation of an element is given and mark the appropriate choice

Column I		Column II	
(A)	Estimation of carbon	(i)	$\frac{80}{188} \times \frac{w_1}{w} \times 100$

Column I		Column II	
(B)	Estimation of nitrogen	(ii)	$\frac{62}{222} \times \frac{w_1}{w} \times 100$
(C)	Estimation of bromine	(iii)	$\frac{32}{233} \times \frac{w_1}{w} \times 100$
(D)	Estimation of sulphur	(iv)	$\frac{28}{22400} \times \frac{V}{w} \times 100$
(E)	Estimation of phosphorus	(v)	$\frac{12}{44} \times \frac{w_1}{w} \times 100$

a) (A) → (v), (B) → (ii), (C) → (iv), (D) → (i), (E) → (iii)
b) (A) → (v), (B) → (iv), (C) → (i), (D) → (iii), (E) → (ii)
c) (A) → (v), (B) → (iv), (C) → (ii), (D) → (i), (E) → (iii)
d) (A) → (iv), (B) → (iii), (C) → (i), (D) → (ii), (E) → (v)

9. IUPAC name of the compound

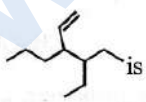


a) 2,3-dimethylheptane b) 3-methyl-4-ethyloctane c) 5-ethyl-6-methyloctane
d) 4-ethyl-3-methyloctane.

10. Assertion: The following structures (1) and (II) cannot be the major contributors to the real structure of CH_3COOCH_3.

Reason: Both the structures involve charge separation and structure (I) contains a carbon atom with an incomplete octet.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false.

11. The correct IUPAC name of the compound



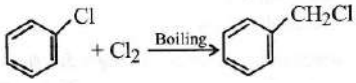
a) 4-Ethyl-3-propyl hex-l-ene b) 3-Ethyl-4-ethenyl heptane c) 3-Ethyl-4-propyl hex-1-ene
d) 3*(1-ethylpropyl) hex-l-ene

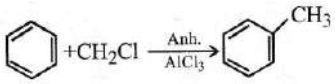
12. The correct representation of 4-hydroxy-2-methylpent-2-en-l-al is

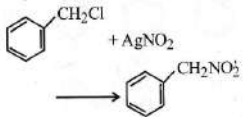
a) $CH_3 - CHOH - CH = CHCH_3 - CHO$ b) $CH_3 - CHCH_3 - CH = COH - CHO$

c) $CH_3 - \overset{CH_3}{C}OH - CH = CCH_3 - CHO$ d) $CH_3 - CHOH - CH_2 - CHCH_3 - CHO$

13. Which one of the following is a free-radical substitution reaction?

a) $CH_3CHO + HCN \longrightarrow CH_3CH(OH)CN$ b) 

c) 

d) 

14. The blue compound formed in the positive test for nitrogen with Lassaigne solution of an organic compound is
a) $Na_4[Fe(CN)_5(NOS)]$ b) $Na_3[Fe(CN)_6]$ c) $Fe(CN)_6$ d) $Fe_4[Fe(CN)_6]_3$

15. The increasing order of electron donating inductive effect of alkyl groups is
a) - H < - CH_3 < - C_2H_S < - C_3H_7 b) - H > - CH_3 > - C_2H_5 > - C_3H_7
c) - H < - C_2H_5< - CH_3 < - C_3H_7 d) - H > - C_2H_5 > - CH_3 > - C_3H_7

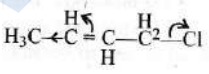
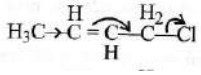
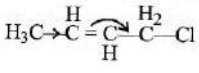
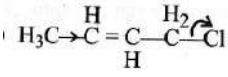
16. The Lassaigne's extract is boiled with concentrated HNO_3 while testing for halogens. By doing so, it
a) helps in the precipitation of AgCl b) increases the solubility product of AgCl
c) increases the concentration of NO_3^- ions d) decomposes Na_2S and NaCN, formed

17. Nitrogen detection in an organic compound is carried out by Lessaigne's test. The blue colour formed corresponds to which of the following formulae?
a) $Fe_3\left[Fe(CN)_6\right]_3$ b) $Fe_3\left[Fe(CN)_6\right]_2$ c) $Fe_4\left[Fe(CN)_6\right]_3$ d) $Fe_4\left[Fe(CN)_6\right]_2$

18. Which type of hybridisation of each carbon is there in the compound?
CH_3- CH=CH- CN
a) sp^3,sp^2,sp^2,sp b) sp^3,sp^2,sp^2,sp^3 c) sp^3,sp^2,sp^3,sp^3 d) sp^3,sp^2,sp,sp^3

19. Given below are the structures of few compounds with molecular formula C_4HIOO. Select metamers from these structures.
(i) CH_3 - O - $CH_2CH_2CH_3$
(ii) $CH_3CH_2CH_2CH_2OH$
(iii) CH_3 - CH_2 - O - CH_2 - CH_3
(iv) $CH_3 - \underset{|}{CHOH} - CH_2 - CH_3$
a) (i) and (ii) b) (ii) and (iii) c) (i) and (iii) d) (ii) and (iv)

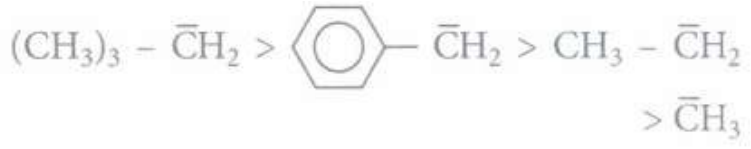
20. During sodium extract preparation for Lassaigne's test both Nand S present in organic compound change to
a) NaCN and Na_2S b) $NaNH_2$ and Na_2SO_4 c) NaSCN d) $NaNO_3$ and Na_2S

21. Which of the following is the most correct electron displacement for a nucleophilic reaction to take place?
a)  b)  c)  d) 

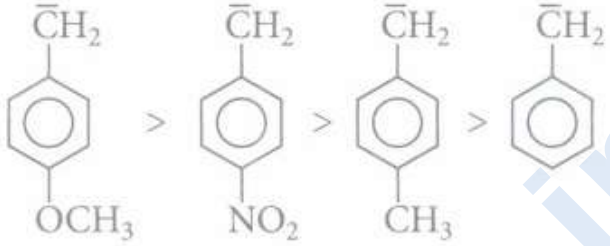
22. Inductive effect of which atom is taken as zero to compare inductive effect of other atoms?
a) Hydrogen b) Chlorine c) Carbon d) Oxygen

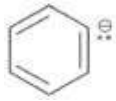
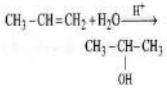
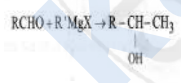
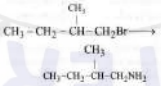
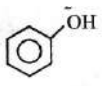
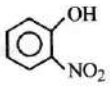
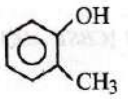
23. Among the given compounds, the most susceptible to nucleophilic attack at the carbonyl group is
a) CH_3COOCH_3 b) CH_3CONH_2 c) $CH_3COOCOCH_3$ d) CH_3COCl

24. Which of the following orders correctly depicts the decreasing order of stability of carbanion?

a) 

b) $OHC - \bar{C}HCHO - CHO > OHC - \bar{C}H - CHO > H_3C - \overset{||}{C}O - \bar{C}H - \overset{||}{C}O - CH_3 > \bar{C}H_2 - CHO$

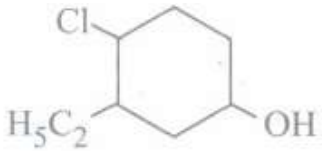
c) $\bar{C}H_2NO_2 < \bar{C}H_2CN < \bar{C}H_2Cl < \bar{C}H_2CH_3$ d) 

25. Which of the following compounds will exhibit is-trans (geometrical) isomerism?
    a) Butanol b) 2-Butyne c) 2-Butenol d) 2-Butene
26. How many chain isomers could be obtained from the alkane C_6H_{14}?
    a) Four b) Five c) Six d) Seven
27. The stability of carbanions in the following:
    (i) $RC \equiv \overset{s}{C}$
    (ii) 
    (iii) $R_2C = \overset{s}{C}H$
    (iv) $R_3C - \overset{s}{C}H_2$
    a) (i) > (ii) > (iii) > (iv) b) (ii) > (iii) > (iv) > (i) c) (iv) > (ii) > (iii) > (i) d) (i) > (iii) > (ii)> (iv)
28. Which one is a nucleophilic substitution reaction among the following?
    a)  b)  c)  d)
29. Which of the following is least reactive in an nucleophilic substitution reaction?
    a) $\left(CH_3\right)_3C - Cl$ b) $CH_2 = CHCl$ c) CH_3CH_2Cl d) $CH_2 = CHCH_2Cl$
30. Which of the following compounds is isomeric with 2, 2, 4, 4-tetramethylhexane?
    a) 3-ethyl- 2, 2-dimethylpentane b) 4- isopropylheptane
    c) 4-ethyl-3-methyl-4-n-propyloctane d) 4, 4-diethyl-3-methylheptane
31. Which of the following compounds is not chiral?
    a) $DCH_2CH_2CH_2C$ b) CH_3CH_2CHOCl c) CH_3CHDCH_2Cl d) $CH_3CHCTCH_2D$
32. Which one of the following compounds is most acidic?
    a) Cl-CH_2-CH_2-OH b)  c)  d) 
33. Which of the following possesses a sp-carbon in its structure?
    a) $CH_2{=}{=}CCl{-}CH{=}{=}CH_2$ b) $CH_2{=}{=}C{=}{=}CH_2$ c) $CCl_2{=}{=}CCl_2$ d) $CH_2{=}{=}CH{-}CH{=}{=}CH_2$
34. How many stereoisomers does this molecule have?
    $CH_3CH = CHCH_2CHBrCH_3$

a) 4 b) 6 c) 8 d) 2

35. Kjeldahl's method is used in the estimation of :
a) nitrogen b) halogens c) sulphur d) oxygen

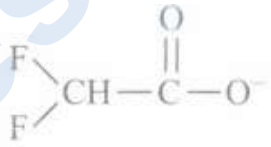
36. The correct IUPAC name of the following compound is



a) 2-ethyl-1-chlorocyclohexanol b) 4-carboxy-2-oxocyclohexanal
c) 4-hydroxy-2-ethyl-1-chlorocyclohexane d) 4-chloro-3-ethylcyclohexanol.

37. Which of the following will not give a white ppt. when $AgNO_3$ is added to its solution?
a) CCl_4 b) NaCl c) $MgCl_2$ d) KCl

38. Ionic species are stabilised by the dispersal of charge. Which of the following carboxylate ion is the most stable?

a) $CH_3-\overset{O}{\overset{||}{C}}-O^-$ b) $Cl-CH_2-\overset{O}{\overset{||}{C}}-O^-$ c) $F-CH_2-\overset{O}{\overset{||}{C}}-O^-$ d) 

39. Free radicals can undergo
a) rearrangement to a more stable free radical
b) decomposition to give another free radical c) combination with other free radical
d) all are correct

40. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: The name of the hydrocarbon $(CH_3)_2CHCH_2CH_2CH(CH_3)CH_2CH_3$ is 2,5-dimethylheptane and not 3,6-dimethylheptane.
Reason: Numbering should be done in such a way that sum of the locants on the parent chain is lowest possible number.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

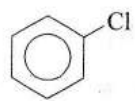
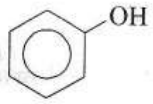
41. The general molecular formula, which represents the homologous series of alkanols is:
a) $C_nH_{2n}O$ b) $C_nH_{2n+1}O$ c) $C_nH_{2n+2}O$ d) $C_nH_{2n}O_2$

42. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Heterolytic fission occurs readily in polar covalent bonds.
Reason : Heterolytic fission involves breaking of bond in such a way that the shared pair of electrons go with one atom.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

43. Which of the following carbanion expected to be most stable?

a) $p-NO_2C_6H_4\overline{C}H_2$ b) $o-NO_2C_6H_4\overline{C}H_2$ c) $o-CHOC_6H_4\overline{C}H_2$ d) $p-CHOC_6H_4\overline{C}H_2$

44. Which one of the following compounds will be most easily attacked by an electrophile

a)  b) c) d) 

45. Which of the following compounds will not undergo Friedal-Craft's reaction easily?
a) Xylene b) Nitrobenzene c) Toluene d) Cumene

46. Which of the following acids does not exhibit optical isomerism?
a) Maleic acid b) α-amino acids c) Lactic acid d) Tartaic acid.

47. The type of isomerism shown by the following compounds is

$$CH_2CH_2CH_2CH_2CH_3, CH_3-\overset{CH_3}{\overset{|}{C}H}-CH_2CH_3, CH_3-\overset{CH_3}{\overset{|}{C}}CH_3-CH_3$$

a) position' isomerism b) metamerism c) ring-chain isomerism d) chain isomerism

48. In HS^-, I^-, RNH_2, NH_3 order of proton accepting tendency will be :
a) $I^- > NH_3 > RNH_2 > HS^-$ b) $NH_3 > RNH_2 > HS^- > I^-$ c) $RNH_2 > NH_3 > HS^- > I^-$
d) $HS^- > RNH_2 > NH_3 > I^-$

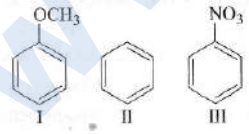
49. The hybridisation of carbons of C - C single bond of $HC \equiv C - CH = CH_2$ is
a) sp^3-sp^3 b) sp-sp^2 c) sp^3-sp d) sp^2-sp^3

50. Isomers of a substance must have the same
a) structural fomula b) physical properties c) chemical properties d) molecular formula

51. Which of the following is the correct order of acidity of carboxylic acids?
(i) $Cl_3CCOOH > Cl_2CHCOOH > ClCH_2COOH$
(ii) $CH_3CH_2COOH > (CH3)_2CHCOOH > (CH_3)_3CCOOH$
(iii) $F_2CHCOOH > FCH_2COOH > ClCH_2COOH$
a) (i) and (ii) b) (ii) and (iii) c) (i) and (iii) d) (i), (ii) and (iii)

52. Distillation under reduced pressure is generally used to purify those liquids which
a) have very low boiling points b) are volatile
c) have high boiling points and which decompose below their boiling points
d) have a large difference in their boiling points

53. Among the following compounds (III), the connect order of reaction with electrophile is



a) II >III >I b) III c) I>II>III d) I>III>II

54. If on adding $FeCl_3$ solution to acidified Lassaigne solution, a blood red colouration is produced, it indicates the presence of
a) S b) N c) N and S d) S and Cl

55. Number of chiral carbons in $\beta-D-(+)-$ glucose is
a) five b) six c) three d) four

56. Which of the following is not chiral?

a) 2, 3 -Dibromopentane b) 3-Bromopentane c) 2-Hydroxpropanoic d) 2-Butanol

57. The correct statement regarding the comparision of staggered and eclipsed conformation of ethane, is

a)

The staggered conformation of ethane is less stable than eclipsed conformation, because staggered conformation has torsional strain

b)

The eclipsed conformation of ethane is more stable than staggered conformation, because eclipised conformation has no torsional strain

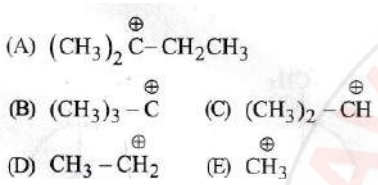
c)

The eclipsed conformation of ethane is more stable than staggered conformation, even through the eclipsed conformation has torsional strain

d)

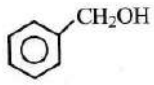
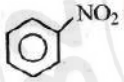
The staggered conformation of ethane is not.- stable then eclipsed conformation, because staggered conformation has no torsional strain.

58. Arrange the following in increasing order of stability

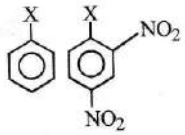


a) E<D<C<B <A b) E<D<C<A<B c) D<E<C<A<B d) A<E<D<C<B

59. Which one of the following is most reactive towards electrophilic attack?

a)  b)  c) d)

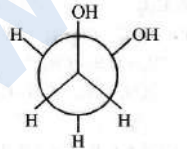
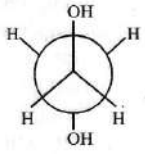
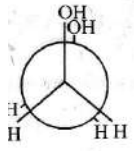
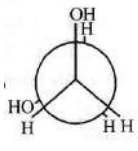
60. The correct order of increasing reactivity of C - X bond towards nucleophile in the following compounds is:



$(CH_3)_3C-X$, $(CH_3)_2CH-X$

a) I>II>IV>III b) II>III>I>IV c) IV>III>I>II d) III>II>I>IV

61. Which of the following conformers for ethylene glycol is most stable

a)  b)  c)  d) 

62. Point out the incorrect statement about resonance?

a) Resonance structures should have equal energy

b) In resonance structures, the constituent atoms must be in the same position

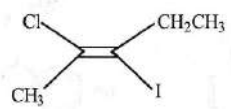
c) In resonance structures, there should not be same number of electron pairs

d)

Resonance structures should differ only in the location of electrons around the constituent atoms.

63. The most suitable method of separation of 1 : 1 mixture of ortho- and para-nitrophenols is :
a) sublimation b) chromatography c) crystallisation d) steam distillation

64. The IUPAC name of the following compound is



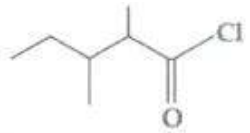
a) trans-2-chloro-3 -iodo-2-pentene b) cis-3-iodo-4-chloro-3-pentene
c) trans-3-iodo-4-chloro-3-pentene d) cis-2-chloro-3-iodo-2-pentene

65. The pair of electron in the given carbanion, $CH_3C = C$, is present in which of the following orbitals
a) 2p b) $2p^3$ c) sp^2 d) sp

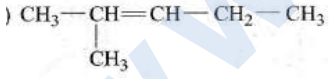
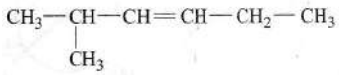
66. IUPAC name of the following is
$CH_2 = CH- CH_2 -CH_2 - C = CH$
a) 1, 5 hexenyne b) 1-hexene-5-yne c) 1-hexyne-5-ene d) 1, 5-hexynene

67. An organic compound gave 0.4655 g of CO_2 on complete combustion. If the mass of the compound taken was 0.2115 g, what is the percentage of C in it?
a) 13.30% b) 26.67% c) 60.03% d) 28.80%

68. The IUPAC name of



is :
a) 3, 4 dimethylpentanoyl chloride b) 1-chloro-1-oxo 2, 3 dimethyl pentane
c) 2-ethyl-3-methyl butanoyl chloride d) 2, 3 dimethyl pentanoyl chloride

69. Which of the following will not show cis-loans-isomerism?
a) $CH_3 - CH = CH - CH_3$ b) $CH_3 - CH_2 - CH = CH - CH_2 - CH_3$
c)  d) 

70. The number of structural isomers possible from the molecular formula C_3H_9N is :
a) 4 b) 5 c) 2 d) 3

71. Which one of the following acids would you expect to be the strongest?
a) I - CH_2COOH b) Cl- CH_2COOH c) Br - CH_2COOH d) F - CH_2COOH

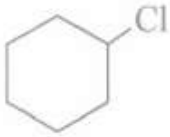
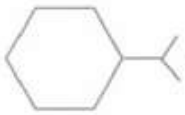
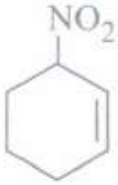
72. Which type of intermediate (A) is formed during the reaction?

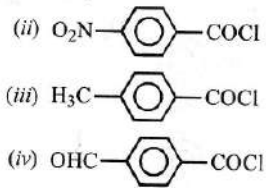
$$CH_3CH_2\text{- N= N - }CH_2CH_3 \xrightarrow{Heat} (A) + N_2$$

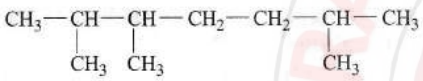
a) Carbo cation b) Carbanion c) Free radical d) Carbene

73. Which of the following reactions is an example of nucleophilic substitution reaction?
a) R-X + KOH ⟶ ROH + KX b) 2RX + 2Na ⟶ R-R + 2NaX c) RX + H_2 ⟶ RH + HX
d) RX + Mg ⟶ RMgX

74. Maximum -I effect is exerted by the group
a) $-C_6H_5$ b) $-OCH_3$ c) -Cl d) $-NO_2$

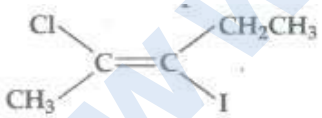
75. Which of the following IUPAC names is not correctly matched?
a) - Cyclopentane
b)  - Chlorocyclohexane
c)  - 1,1-dimethylcyclohexane
d)  - 3-Nitrocyclohexene

76. Consider the following compounds.
(i) C_6H_5COCl

The correct decreasing order of their reactivity towards hydrolysis is
a) (i) > (ii)> (iii)> (iv) b) (iv) > (ii) > (i)> (iii) c) (ii) > (iv) > (i)> (iii) d) (ii)> (iv) > (iii) > (i)

77. The IUPAC name of
 is
a) 1, 3 -isopropyl-3 -methyl propane b) 2, 3, 6-trimethyl heptane
c) 2, 5, 6-trimethyl heptane d) 2, 6, 3 -trimethyl heptane

78. Which one of the following can exhibit cis-trans isomerism
a) $CH_3 - CHCl - COOH$ b) $H - C = C - Cl$ c) $Cl - CH = CHCl$ d) $ClCH_2 - CH_2Cl$

79. Prussian blue is formed when :
a) ferrous sulphate reacts with $FeCl_3$ b) ferric sulphate reacts with $Na_4[Fe(Cn)_6]$
c) ferrous ammonium sulphate reacts with $FeCl_3$ d) ammonium sulphate reacts with $FeCl_3$

80. IUPAC name of the compound
 is :
a) trans-3-iodo 4-chloro-3-pentene b) Cis-2-chloro 3-iodo 2-pentene
c) trans-2-chloro-3-iodo-2-pentene d) Cis-3-iodo-4-chloro-3-pentene

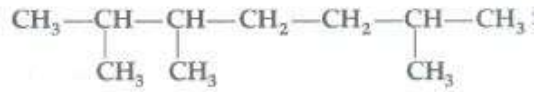
81. Which of the following represents 3-methylpenta-1,3-diene?
a) $CH_2= CH(CH_2)_2CH_3$ b) $CH_2= CHCH(CH_3)CH_2CH_3$ c) $CH_3CH = C(CH_3)CH = CH_2$
d) $CH_3CH = C(CH_3)_2$

82. Freshly prepared solution of sodium nitroprusside is added to the sodium extract. Appearance of a deep violet colour indicates the presence of
a) nitrogen b) sulphur c) both nitrogen and sulphur d) halogen.

83. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Rotation about C=C is restricted.
Reason : Electron charge cloud of the π bond is located above and below the plane of bonding atoms.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

84. The process of separation of a racemic modification into d and l-enantiomers is called
a) resolution b) dehydration c) revolution d) dehydrohalogenation

85. The IUPAC name of



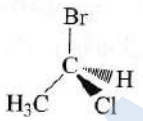
a) 1, 3 isoproyl-3-rnethyl propane b) 2, 3, 6-trirnethyl heptane c) 2, 5, 6-trirnethyl heptane
d) 2, 6, 3-trimethyl heptane

86. Which of the following statements is not true about the stability of carbanions?
a) Stability of carbanions increases with increase in s-character of orbital
b)
The electron withdrawing groups like - NO_2, - CN, >C=O increases the stability of carbanions.
c) Order of stability of carbanions is 3° > 2° > 1°.
d) The negatively charged carbon is sp^3 hybridised and pyramidal.

87. The correct order regarding the electronegativity of hybrid orbitals of carbon is:
a) $sp > sp^2 < sp^3$ b) $sp > sp^2 > sp^3$ c) $sp < sp^2 > sp^3$ d) $sp < sp^2 < sp^3$

88. Lassaigne's test is used in qualitative analysis to detect :
a) nitrogen b) sulphur c) chlorine d) All of these

89. The chirality of the compound



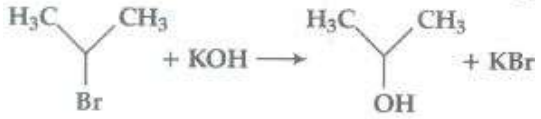
a) R b) S c) E d) Z

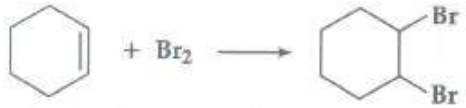
90. In Duma's method 0.52 g of an organic compound on combustion gave 68.6 mL N_2 at 27°C and 756 mm pressure. What is the percentage of nitrogen in the compound?
a) 12.22% b) 14.93% c) 15.84% d) 16.23%

91. In the Kjeldahl's method for estimation of nitrogen present in a soil sample, ammonia envolved from 0.75 g of sample neutralized 10 mL of 1 M H_2SO_4. The percentage of nitrogen in the soil is:
a) 37.33 b) 45.33 c) 35.33 d) 43.33

92. For the following reactions:

(A) $CH_3CH_2CH_2Br + KOH \longrightarrow CH_3CH = CH_2 + KBr + H_2O$

(B) 

(C) 

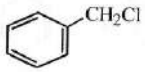
a) (A) is elimination, (B) and (C) are substitution reactions.

b) (A) is substitution, (B) and (C) are addition reactions.

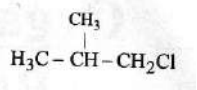
c) (A) and (B) are elimination reactions and (c) is addition reaction

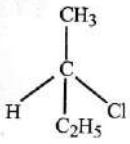
d) (A) is elimination, (B) is the substitution and (C) is the addition reaction.

93. Which of the following compounds will undergo racemisation when solution of KOH hydrolyses?

(i) 

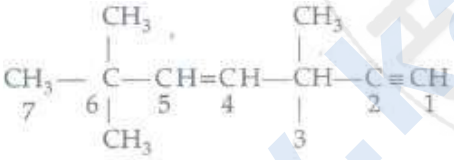
(ii) $CH_3CH_2CH_2Cl$

(iii) 

(iv) 

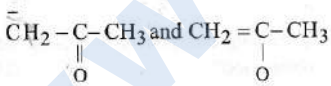
a) (i) and, (ii) b) (ii) and (iv) c) (iii) and (iv) d) (i) and (iv)

94. The state of hybridisation of C_2, C_3, C_5 and C_6 of the hydrocarbon,



a) sp, sp^3, sp^2 and sp^3 b) sp^3, sp^2, sp^2 and sp c) sp, sp^2, sp^2 and sp^3

d) sp, sp^2, sp^3 and sp^2

95. 

a) Resonating structure b) Tautomers c) Geometrical isomers d) Optical isomers

96. Which of the following compounds reacts slower in electrophilic substitution?

a) $C_6H_5NO_2$ b) C_6H_5OH c) $C_6H_5CH_3$ d) $C_6H_5NH_2$

97. The correct statement regarding electrophile is

a)

Electrophile is a negative charged species and can a bond by accepting a pair of electrons from another electrophile

b)

Electrophiles are generally neutral species and can form a bond by accepting a pair of electrons from a nucleophile

c)
Etrectrophile can be either neutral or positively charged species and can form a bond by accepting a pair of electrons from a nucleophile

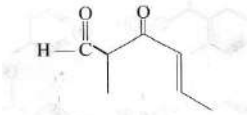
d)
Electrophile is a negatively charged species and can form a bond by accepting a pair of electrons form a nucleophile.

98. 0.2 g of an organic compound contains C, H and O. On combustion, it yields 0.15 g CO_2 and 0.12 g H_2O. The percentage of C, H and O respectively is:
a) C = 15%,, H = 20%, 0 = 65% b) C = 10%, H = 8.2%, 0 = 81.8%
c) C = 12.2%, H = 8.8%, 0 = 79% d) C = 20%, H = 6.66%, 0 = 73.34%

99. Which of the following is correct with respect to -I effect of the substituents? (R = alkyl)
a) $-NH_2 > -OR > -F$ b) $-NR_2 < -OR < -F$ c) $-NH_2 < -OR < -F$ d) $-NR_2 > -OR > -F$

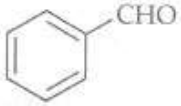
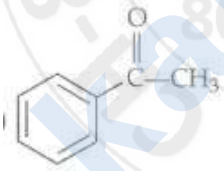
100. Inductive effect involves
a) displacement of a-electrons resulting in polarisation
b) displacement of 1t-electrons resulting in polarisation c) delocalisation of a-electrons
d) delocalisation of π-electrons

101. The IUPAC name of the compounds is



a) 5-formylhex 2-en-3-one b) 5-methyl 4-oxohex-2-en-5-a1 c) 3-keto-2-trethylhex-5-enal
d) 3 -keto -2-methylhex-4-enal

102. Which is the most reactive towards nucleophilic addition reactions?

a)  b)  c) d)

103. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion : Paper chromatography is a type of partition chromatography.
Reason : Moving phase is liquid and stationary phase is solid.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is fals d) If both assertion and reason are false

104. 0.46 g of an organic compound was analysed. The increase in mass of $CaCl_2$ U-tube was 0.54 g and potash bulb was 0.88 g. The percentage composition of the compound is:
a) C = 52.17%, H = 13.04%, 0 = 34.79% b) C = 50%, H = 50%
c) C = 32.19%, H = 18.01%, 0 = 49.8% d) C = 72%, H = 28%

105. Given are cyclohexanol (I) acetic acid (II) 2, 4, 6 - trinitrophenol (III) and phenol (IV). In these the order of decreasing acidic character will be
a) III>II>IV>I b) II>III>I>IV c) II>III>IV>I d) III>IV>II>I

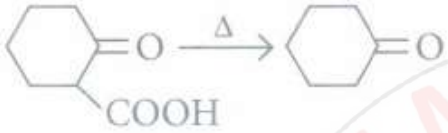
106. Those substances can be separated by steam distillation which are
a) steam volatile and insoluble in water b) steam volatile and soluble in water
c) steam volatile and sparingly soluble in water
d) in liquid form in steam and solid form in water

107. In Carius method of estimation of halogen, 0.15 g of an organic compound gave 0.12 g of AgBr.What is the percentage of bromine in the compound?
a) 68.08% b) 34.04% c) 42.1% d) 50%

108. Correct increasing order of acidity is given as:
a) H_2O, C_2H_2, H_2CO_3, phenol b) C_2H_2, H_2O, H_2CO_3, phenol
c) Phenol, C_2H_2, H_2CO_3, H_2O d) C_2H_2, H_2O, phenol and H_2CO_3

109. Consider the following reactions,

I. $CH_2{=}CHCOOH \xrightarrow{\Delta} CH_2{=}CH2$

II. 

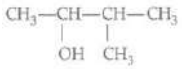
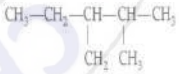
III. $CH_3CH(COOH)_2 \xrightarrow{\Delta} CH_3CH_2COOH$

In which cases, parent compound loses its functional group in preference?

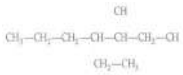
a) I,II b) I,II,III c) II,III d) I,III

110. The order of decreasing reactivity towards an electrophilic reagent, for the following would be
a) benzene b) toluene c) chlorobenzene d) phenol

111. Names of some compounds are given, which one is not the correct naming in IUPAC system?

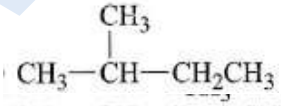
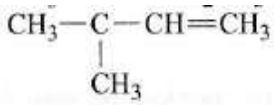
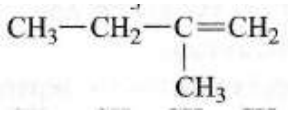
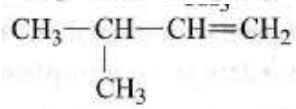
 $CH_3{-}C{\equiv}C{-}CH(CH_3)_2$ 

a) (3-rnethyl-2-butanol) b) (4-rnethyl-2-pentyne) c) (2-ethyl-3-rnehtyl but-l-ene)



d) (3-rnethyl-4-ethyheptane)

112. In which of the following compounds the carbon marked with asterisk is expected to have greatest positive charge?
a) $\overset{*}{C}H_3 - CH_2 - CI$ b) $\overset{*}{C}H_3 - CH_2 - Mg^+CI^-$ c) $\overset{*}{C}H_3 - CH_2 - Br$ d) $\overset{*}{C}H_3 - CH_2 - CH_3$

113. 2-methyl-2-butene will be represented as
a)  b)  c) 
d) 

114. Which of the following statement is not correct for a nucleophile?
a) Nucleophile is a lewis acid b) Ammonia is a nucleophile
c) Nucleophiles attack low electron density sites d) Nucleophiles are not electron seeking

115. An organic compound contains 69% carbon and 4.8% hydrogen, the remainder being oxygen. What will be the masses of carbon dioxide and water produced when 0.20 g of this substance is subjected to complete combustion.
a) 0.69 g and 0.048 g b) 0.506 g and 0.086 g c) 0.345 g and 0.024 g
d) 0.91 g and 0.72 g

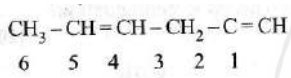
116. Lassaigne's test for the detection of nitrogen fails in :
a) $NH_2CONHNH_2.HCl$ b) $NH_2NH_2.HCl$ c) NH_2CONH_2 d) $C_6H_5NHNH_2.HCl$

117. The masses of carbon, hydrogen and oxygen in an organic compound are in the ratio 6: 1: 8 respectively. Which of the following pairs of formulae correspond to above information?
a) CH_2O and CH_3CHO b) CH_2O and C_3H_6O c) C_3H_6O and $C_2H_6O_2$
d) $C_3H_6O_3$ and HCHO

118. Which of the following represents the given sequence of hybridisation of carbon atoms from left to right sp^2,sp^2, sp, sp?
a) $H_2C = CH - C = CH$ b) $HC{\equiv}C\text{-}CH{=}CH_2$ c) $H_3C - CH = CH - CH_3$
d) $H_2C{=}CH\text{-}CH{=}CH_2$

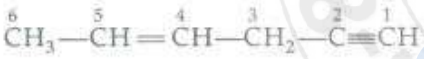
119. Which of the following undergoes nucleophilic substitution exclusively by S_N1 mechanism.
a) Ethyl chloride b) Isopropyl chloride c) Chlorobenzene d) Benzylchloride

120. In the hydrocarbon



The state of hybridization of carbons 1, 3 and 5 are in the following sequence
a) sp^2, sp, sp^3 b) sp, sp^3, sp^2 c) sp, sp^2, sp^3 d) sp^3, sp^2, sp

121. In the hydrocarbon



The state of hybridization of carbons 1, 3 and 5 are in the following sequence :
a) sp^2, sp, sp^3 b) sp, sp^3, sp^2 c) sp, sp^2, sp^3 d) sp^3, sp^2, sp

122. Which of the following is the correct IUPAC name?
a) 3-Ethyl-4, 4-dimethylheptane b) 4, 4-Dimethyl- 3-ethylheptane
c) 5-Ethyl-4, 4-dimethylheptane d) 4, 4-Bis(methyl)-3-ethylheptane

123. The correct order of increasing bond length of C—H, C—O, C—C and C = C is:
a) C—C < C = C < C—O < C—H b) C—O < C—H < C—C < C = C
c) C—H < C—O < C—C < C = C d) C—H < C = C < C—O < C—C

124. In Kjeldahl's method of estimation of nitrogen, nitrogen is quantitatively converted to ammonium sulphate. It is then treated with standard solution of alkali. The nitrogen which is present is estimated as
a) N_2 gas b) NO_2 gas c) NH_3 gas d) $(NH_4)SO_4$ ppt.

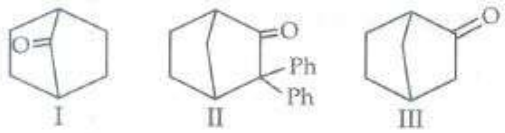
125. Few mixtures and their methods of separation are given in the columns I and II respectively. Match the columns and mark the appropriate choice

Column I		**Column II**	
(A)	Ether + Toluene	(i)	Steam distillation
(B)	o- Nitrophenol + p- Nitrophenol	(ii)	Distillation

Column I		Column II	
(C	Benzoic acid +Benzaldehyde	(iii)	Fractional distillation
(D)	Fractions of crude oil	(iv)	Sublimation

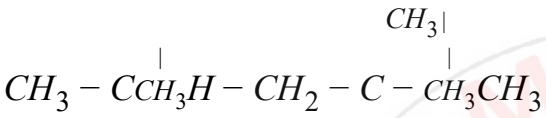
a) (A) → (iii), (B) → (ii), (C) → (i), (D) → (iv)
b) (A) → (ii), (B) → (iii), (C) → (i), (D) → (iv)
c) (A) → (ii), (B) → (i), (C) → (iv), (D) → (iii)
d) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)

126. Which among the given molecules can exhibit tautomerism?



a) III only b) Both I and III c) Both I and II d) Both II and III

127. How many primary, secondary, tertiary and quaternary carbon atoms are present in the following compound?



a) One primary, two secondary and one tertiary b) Five primary, three secondary
c) Five primary, one secondary, one tertiary and one quaternary
d) Four primary, two secondary and two quaternary

128. The increasing order of stability of the following free radicals is

a) $(CH_3)_2\dot{C}H < (CH_3)\dot{C} < (C_6H_5)_2CH < (C_6H_5)_3\dot{C}$

b) $(C_6H_5)_3\dot{C} < (C_6H_5)_2\dot{C}H < (CH_3)_3\dot{C} < (CH_3)_2\dot{C}H$

c) $(C_6H_5)_3\dot{C}H < (C_6H_5)_2\dot{C} < (CH_3)_3\dot{C} < (CH_3)_2\dot{C}H$

d) $((CH_3)_2\dot{C}H < (CH_3)_3\dot{C} < (C_6H_5)_3\dot{C} < (C_6H_5)_2\dot{C}H)$

129. The best method for the separation of naphthalene and benzoic acid from their mixture is
a) distillation b) sublimation c) chromatography d) crystallisation

130. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	Beilstein test	(i)	Sulphur
(B)	Sodium nitroprusside	(ii)	Carbon
(C)	Liebig's method	(iii)	Nitrogen
(D)	Kjeldahl's method	(iv)	Chlorine

a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)
b) (A) → iii), (B) → (ii), (C) → (i), (D) → (iv)
c) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)
d) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)

131. Hyperconjugation is

a) σ−π conjugation b) noticed due to delocalisation of σ and π bonds

c) no bond resonance d) all the above.

132. The principle involved in paper chromatography is:

a) adsorption b) partition c) solubility d) volatility

133. In steam distillation of toluene, the pressure for toluene in vapour is

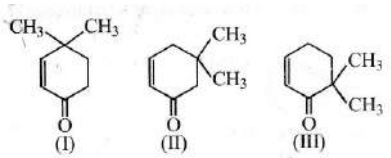
a) Less than pressure of barometer

b) Equal to vapour pressure of toluene in simple distillation

c) More than vapour pressure of toluene in simple distillation

d) Equal to pressure of barometer

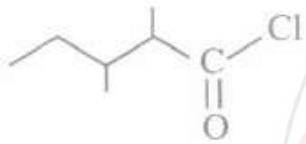
134. Given:



Which of the given compounds can exhibit tautomerism?

a) I and III b) II and III c) I, II and III d) I and II

135. The IUPAC name of

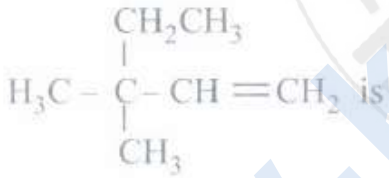


is

a) 1-chloro-1-oxo-2,3-dimethylpentane b) 2-ethyl-3-methylbutanoyl chloride

c) 2,3-dimethylpentanoyl chloride d) 3,4-dimethylpentanoyl chloride

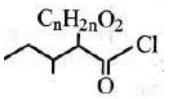
136. The IUPAC name of the compound having formula



is

a) 3,3,3-trimethylprop-l-ene b) 1,1,1- trimethylprop- 2-ene c) 3,3-dimethylpent -1-ene

d) 2,2-dimethylbut-3-ene.

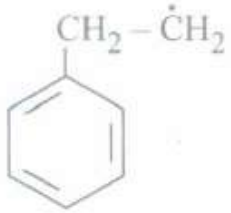
137. The IUPAC name of 

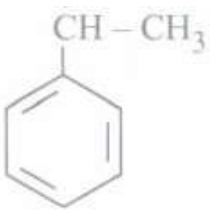
is

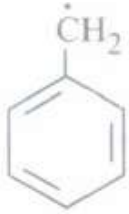
a) 1-chloro-1-oxo-2, 3-dimethyl pentane b) 2-ethyl-3-methylbutanoyl chloride

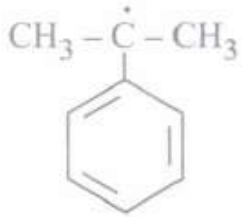
c) 2, 3-dimethylpentanoyl chloride d) 3, 4-dimethylpentanoyl chloride

138. The most stable free radical among the following is

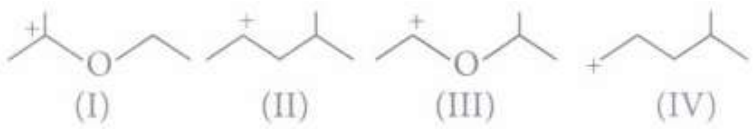
a) 

b) 

c) 

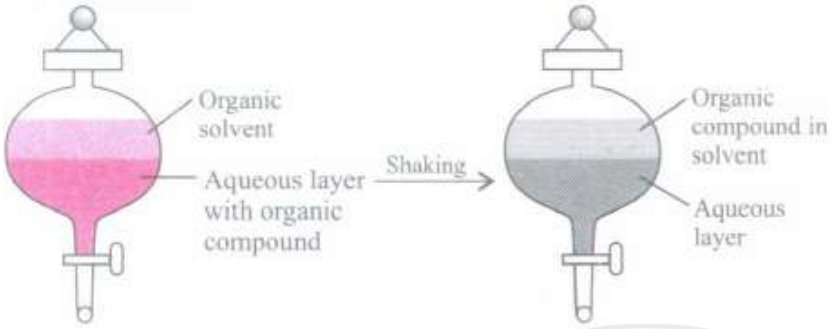
d) 

139. The correct stability order for the following species is



a) (II) > (IV) > (I) > (III) b) (I) > (II) > (III) > (IV) c) (II) > (I) > (IV) > (III)
d) (I) > (III) > (II) > (IV)

140. The process of separation of an organic compound from its aqueous solution by shaking with a suitable solvent is termed solvent extraction or differential extraction.



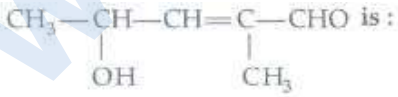
The organic compound present in the aqueous layer moves to the organic solvent because
a) the organic substance is more soluble in the organic solvent
b) organic compound being lighter moves in the upper layer
c) organic solvent is insoluble in water hence organic compound moves up
d) from the supersaturated aqueous solution the solute starts diffusing.

141. IUPAC name of $(CH_3)_3C - CH = CH_2$ is:
a) 2, 2-dimethylbut-3-ene b) 2, 2-dimethylpent -4-ene c) 3, 3-dimethylbut-1-ene
d) hex-1-ene

142. Heterolysis of a carbon-chlorine bond produces
a) two free radicals b) two carbo cations c) one cation and one anion
d) two carbanions.

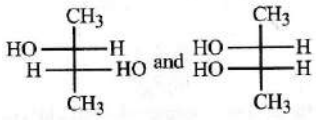
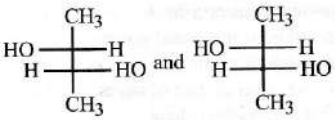
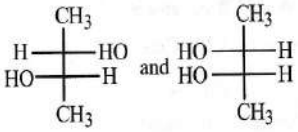
143. Which of the following is a false statement?
a) Free radicals, carbonium ions or carbanions are reaction intermediates
b) Reaction between methane and chlorine in presence of sunlight proceeds via free radical
c) The electronegative atom in the carbon chain produces +I effect.
d) Homolytic fission of C - C bonds gives free radicals

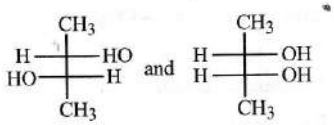
144. The IUPAC name of



a) 4-hydroxy-1-methyl pentanal b) 4-hydroxy-2-methyl pent 2-en-1-al
c) 2-hydroxy-4-methyl pent 3-en-5-al d) 2-hydroxy-3-methyl pent 2-en-5-al

145. Which of the following pairs of compounds are enantiomers?

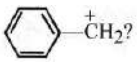
a)  b)  c) 

d) 

146. The most important chemical method to resolve a racemic mixture makes use of the formation of

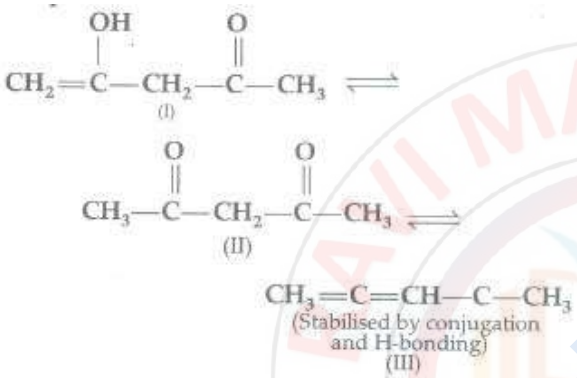
a) ameso-compound b) enantiorners c) diastereomers d) racemates

147. What is the hybridisation state of benzyl carbonium ion



a) sp^3 b) sp^2 c) spd^2 d) spd

148. The order of stability of the following tautomeric compound is :



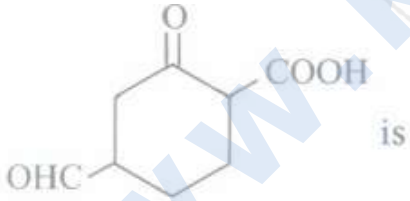
a) I > II > III b) III > II > I c) II > I > III d) II > III > I

149. How many σ and π bonds are present in

HC≡ C- CH = CH - CH_3?

a) $9\sigma, 4\pi$ b) $10\sigma, 3\pi$ c) $6\sigma, 6\pi$ d) $6\sigma, 6\pi$

150. The correct IUPAC name of the compound

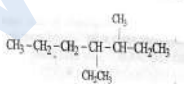
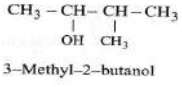


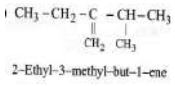
is

a) 4-formyl-2-oxocytlohexanecarboxylic acid b) 4-carboxy-2-oxocyclohexanal

c) 4-carboxy-1- formylcyclohexanone d) 2-carboxy -5- formyl-1-oxocyclohexane

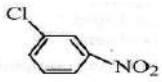
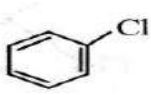
151. Name of some compounds are given, which one is not correct in IUPAC system?

a)  b) 
3–Methyl–2–butanol

c) 
2-Ethyl-3-methyl-but-1-ene

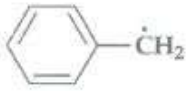
d) $CH_3-C\equiv C-CH-(CH_3)_2$
4-Methyl-2-pentyne

152. Which of the following compounds undergoes nucleophilic substitution reaction most easily?

a)  b) c) d) 

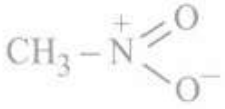
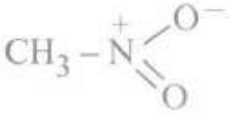
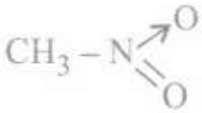
153. 2.18 g of an organic compound containing sulphur produces 1.02 g of $BaSO_4$. The percentage of sulphur in the compound is:

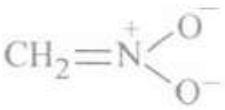
a) 7.26% b) 8.98% c) 10% d) 6.42%

154. The radical  is aromatic because it has :

a) 6p orbitals and 6 unpaired electrons b) 7p orbitals and 6 unpaired electrons
c) 7p orbitals and 7 unpaired electrons d) 6p orbitals and 7 unpaired electrons

155. Which of the following is not a structure of nitromethane molecule?

a)  b)  c) 

d) 

156. Few pairs of molecules are given below. Which bond of the molecule of the pairs is more polar?

(i) H_3C - H, H_3C - Br
(ii) H_3C - NH_2, H_3C - OH
(iii) H_3C - OH, H_3C - SH
(iv) H_3C - Cl, H_3C - Br

a) C - Br, C - N, C - O, C - Br b) C - Br, C - O, C - O, C - Cl c) C - Br, C - O, C - O, C - Cl
d) C - Br, C - O, C - S, C - Br

157. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: Hybridisation influences the bond length and bond enthalpy in organic compounds.
Reason : More the s character of hybrid orbital, shorter and stronger will be the bond

a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

158. Stability of alkyl carbocations can be explained by

a) inductive effect only b) hyperconjugation only
c) both inductive effect and hyperconjugation d) electromeric effect only.

159. In which of the following, functional group isomerism is not possible?

a) Alcohols b) Aldehydes c) Alkyl halides d) Cyanides

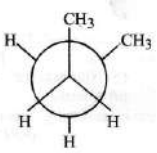
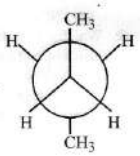
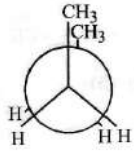
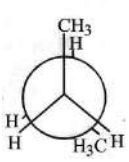
160. The presence of carbon in an organic compound can be shown by

a) heating the compound with sodium b) heating the compound with cupric oxide
c) heating the compound on buns en flame d) heating the compound with magnesium

161. Glycerine can be purified by

a) vacuum distillation b) simple distillation c) steam distillation d) fractional distillation

162. In the following the most stable conformation of n-butane is:

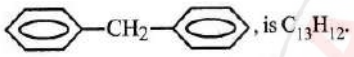
a)  b)  c)  d) 

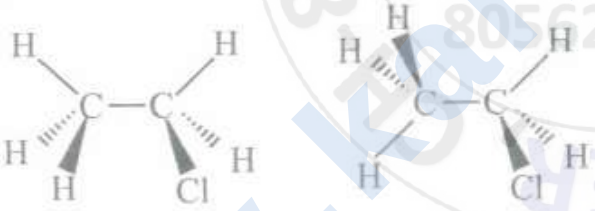
163. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: When inductive and electromeric effects operate in opposite directions, the inductive effect predominates.
Reason: Inductive effect is the complete transfer of shared pair of ππ electrons to one of the atoms
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

164. The number of structural and configurational isomers of a bromo compound, CSH_9Br, formed by the addition of HBr to 2-pentyne respectively are:
a) 1 and 2 b) 2 and 4 c) 4 and 2 d) 2 and 1

165. Which among the following is the most stable carbocation?
a) b) c) $\overset{+}{C}H_3$ d) $CH_3\overset{+}{C}H_2$

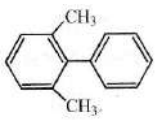
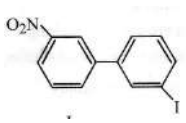
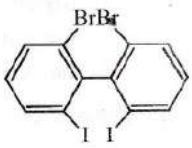
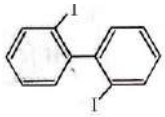
166. Which of the following is an optically active compound?
a) 1-butanol b) 1-propanol c) 2-chlorobutane d) 4-hydroxybutanal

167. The molecular formula of diphenylmethane,

is $C_{13}H_{12}$. How many structural isomers are possible when one of the hydrogens is replaced by a chlorine atom?
a) 6 b) 4 c) 8 d) 7

168. What is the relationship between the structures shown?

a) Structural isomers b) Geometrical isomers c) Conformational structures
d) Identical structures

169. Which of the following ions is the most resonance stabilised?
a) Ethoxide b) Phenoxide c) Butoxide d) Isopropoxide

170. Stability of is o-butylene can be best explained by:
a) inductive effect b) mesomeric effect c) hyperconjugative effect d) steric effect

171. Which of the foilorving biphenyls is optically active?
a)  b)  c)  d) 

172. Which of the following orders is correct regarding the -I effect of the substituents?
a) $--NR_2 < —OR > —F$ b) $NR_2 > —OR > —F$ c) $--NR_2 < —OR < —F$
d) $-- NR_2 > —OR < —F$

173. Which of the following species is not electrophilic in nature?
a) $\overset{\oplus}{NO_2}$ b) $\overset{\oplus}{Cl}$ c) BH_3 d) $\overset{\oplus}{H_3O}$

174. Homolyic fission of the following alkanes form free radicals CH_3 - CH_3, CH_3 - CH_2 - CH_3, $(CH_3)_2CH$ - CH_3, CH_3-CH_2-$CH(CH_3)_2$.
a) $\left(CH_3\right)_3\dot{C} < \left(CH_3\right)_2\dot{C} - CH_2CH_3 < CH_3 - \dot{C}H - CH_3 < \dot{C}H_3 - CH_2$
b) $\left(CH_3\right)_2\dot{C} < CH_2CH_3 < CH_3 - \dot{C}H - CH_3 < \dot{C}H_2 < \left(CH_3\right)_3\dot{C}$
c) $CH_3 - \dot{C}H_2 < CH_3 - \dot{C}H - CH_3 < \left(CH_3\right)_2\dot{C} - CH_2 - CH_3 < \left(CH_3\right)_3\dot{C}$
d) $CH_3 - \dot{C}H_2 < CH_3 - \dot{C}H - CH_3 < \left(CH_3\right)_3\dot{C} < \left(CH_3\right)_2\dot{C} - CH_2CH_3$

175. Lassaignes test for the detection of nitrogen fails in
a) $NH_2CONHNH_2 \cdot HCl$ b) $NH_2NH_2 \cdot HCl$ c) $NH_2\ CONH_2$ d) $C_6H_5NHNH_2.HCl$

176. Which of the following is an isomer of ethanol?
a) Methanol b) Acetone c) Diethylether d) Dimethylether

177. Two possible stero-structure of $CH_3CHOH.COOH$, which are optically active, are called
a) Diastereomers b) Astropisorners c) Enantiomers d) Mesomers

178. For (i) I^-, (ii) Cl^-, (iii) Br^-, the increasing order of nucleophilicity would be
a) $Cl^- < Br^- < I^-$ b) $1^- < Cl^- < Br^-$ c) $Br^- < Cl^- < I^-$ d) $1^- < Br^- < Cl^-$

179. Which method can be applied to separate a mixture of camphor and benzoic acid?
a) Sublimation b) Chemical methods c) Crystallisation d) Extraction with solvent

180. Which one of the following compounds is resistant to nucleophilic attack by hydroxyl ions?
a) Methyl acetate b) Acetonitrile c) Dimethyl ether d) Acetamide

181. Which of the following statements is not correct for a nucleophile?
a) Nucleophile is a Lewis acid b) Ammonia is a nucleophile
c) Nucleophiles are electron seeking. d) Nucleophiles are not electron seeking.

182. A strong base can abstract an α-hydrogen from
a) alkene b) amine c) ketone d) alkane

183. What are the hybridization and shapes of the following molecules?
(i) CH_3F (ii) HC = N
a) (i) sp^2, trigonal planar; (ii) sp^3, tetrahedral b) (i) sp^3, tetrahedral; (ii) sp, linear
c) (i) sp, linear; (ii) sp^2, trigonal planar d) (i) sp^2, trigonal planar, (ii) sp^2, trigonal planar

184. Electrophilic addition reactions proceed in two steps. The first step involves the addition of an electrophile. Name the type of intermediate formed in the first step of the following addition reaction.
$H_3C - HC = CH_2 + H^+ \longrightarrow\ ?$
a) 2° Carbanion b) 1° Carbo cation c) 2° Carbo cation d) 1° Carbanion

185. Which of the following intermediates contains three pairs of electrons in its valence shell?
a) Carbocations b) Carbanions c) Free radicals d) Both (a) and (b)

186. Electronegativity of carbon atoms depends upon their state of hybrid is at ion. In which of the following compounds, the carbon marked with asterisk is most electronegative?

a) CH_3-CH_2-$\overset{*}{C}H_2$-CH_3 b) CH_3-$\overset{*}{C}H$=CH-CH_3 c) CH_3-CH_2-C $\equiv$ $\overset{*}{C}H$ d) CH_3-CH_2-CH=$\overset{*}{C}H_2$

187. The number of possible isomers of the compound with molecular formula C_7H_8O is:

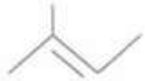
a) 3 b) 5 c) 7 d) 9

188. A is a lighter phenol and B is an aromatic carboxylic acid. Separation of a mixture of A and B can be carried out easily by using a solution of:

a) sodium hydroxide b) sodium sulphate c) calcium chloride d) sodium bicarbonate

189. Complete the following reactions by filling most stable intermediate and the product.

(i) $CH_3 - \overset{CH_3|}{CH} - CH = CH_2 + HCI \longrightarrow \underset{Intermediate}{(A)} \xrightarrow{CI} (B)$

(ii)  $+ HBr \longrightarrow \underset{\text{Intermediate}}{(C)} \xrightarrow{Br^-} (D)$

a) b) c) d)

190. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: Glycerol is purified by distillation under reduced pressure.

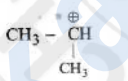
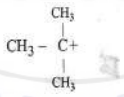
Reason : Method of distillation under reduced pressure is used to purify liquids having very high boiling points and those, which decompose at or below their boiling points.

a) If both assertion and reason are true and reason is the correct explanation of assertion

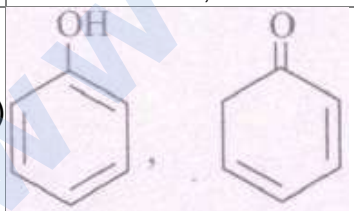
b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

191. Which amongst the following is the most stable carbocation?

a) $\overset{+}{C}H_3$ b) $CH_3\overset{+}{C}H_2$ c)  d) 

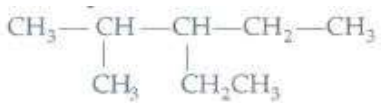
192. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	CH_3CH_2OH, H_3C - O - CH_3	(i)	Position isomers
(B)	$C_2H_5COC_2H_5$, $C_3H_7COCH_3$	(ii)	Tautomers
(C)		(iii)	Functional isomers
(D)	$CH_3CH_2CH_2OH$, $CH_3 - \underset{OH}{CH} - CH_3$	(iv)	Metamers

a) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶ (ii) b) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (iv)

c) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (i) d) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii)

193. For the compound



which of the following IUPAC names is correct?

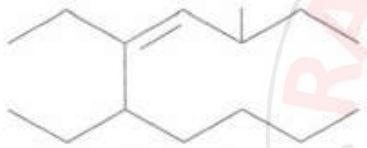
a) 2-methy-3-ethyl pentane b) 3-ethyl-2-methyl pentane c) 2-ethyl-3-methyl pentane
d) 3-methyl-2-ethyl pentane

194. The fragrance of flowers is due to the presence of : some steam volatile organic compounds called essential oils. These are generally insoluble in water at room temperature but are miscible with water vapour in vapour phase. A suitable method for the extraction of these oils from the flowers is
a) distillation b) crystallisation c) distillation under reduced pressure d) steam distillation

195. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as
Assertion: The order of stability of carbocations is 3° > 2° > 1°.
Reason: Carbon atom in carbocation is in sp^3 state of hybridisation.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false.

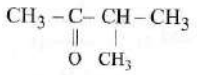
196. Which of the following techniques is most suitable for purification of cyclohexanone from a mixture containing benzoic acid, isoamyl alcohol, cyclohexane and cyclohexanone?
a) Crystallisation b) IR spectroscopy c) Sublimation d) Evaporation

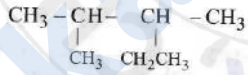
197. The correct IUPAC name of the compound

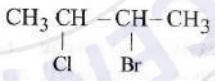


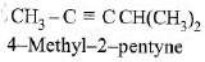
a) 2,3-dimethylheptane b) 5,6-diethyl-3-methyldec-4-ene c) 5-butyl-3-methyloct-4-ene
d) 8-methyl-3-propylhex-3-ene

198. The incorrect IUPAC name is

a) 
2–Methyl–3–butanone

b) 
2, 3–Dimethylpentane

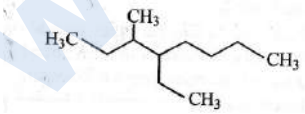
c) 
2–Bromo–3–chlorobutane

d) 
4–Methyl–2–pentyne

199. Which of the following will exhibit chirality?
a) 2-methyl hexane b) 3-methyl hexane c) Neopentane d) Isopentane

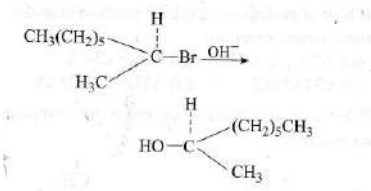
200. The substance which can be used as adsorbent in column chromatography is
a) Na_2O b) Na_2SO_4 c) Al_2O_3 d) NaCl

201. Name of the compound given below is



a) 5- ethyl- 6 -methyloctane b) 4- ethyl- 3 -methylo ctane c) 3- ethyl- 4 -methyloctane
d) 2, 3-diethylheptane

202. The reaction is described as



a) S_E2 b) S_N1 c) S_N2 d) S_N0

203. During hearing of a court case, the judge suspected that some changes in the documents had been carried out. He asked the forensic department to check the ink used at two different places. According to you which technique can give the best results?
a) Column chromatography b) Solvent extraction c) Distillation
d) Thin layer chromatography

204. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Nitroalkanes and alkyl nitrites exhibit functional isomerism.
Reason : Compounds having same molecular formula but different functional groups are called functional isomers
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

205. Decreasing order of stability of following alkenes is
(i) $CH_3 - CH = CH_2$
(ii) $CH_3 - CH = CH - CH_3$
(iii) $CH_3 - C\overset{|}{C}H_3 = C - CH_3$
(iv) $CH_3 - \overset{CH_3}{\overset{|}{C}} = \overset{CH_3}{\overset{|}{C}} - CH_3$
a) (i) > (ii) > (iii) > (iv) b) (iv) > (iii) > (ii) > (i) c) (iii) > (ii) > (i) > (iv) d) (ii) > (iii) > (iv) > (i)

206. Which of the following organic compounds has same hybridization as its combustion (CO_2) product?
a) Ethane b) Ethyne c) Ethene d) Ethanol

207. 0.92 g of an organic compound was analysed by combustion method. The mass of the U-tube increased by 1.08 g. What is the percentage of hydrogen in the compound?
a) 13.04% b) 52.17% c) 65.21% d) 11.30%

208. In Duma's method of estimation of nitrogen 0.35 of an organic compound gave 55 mL of nitrogen collected at 300 K temperature and 715 mm pressure. The percentage composition of nitrogen in the compound would be:(Aqueous tension at 300 K = 15 mm)
a) 15.45 b) 16.45 c) 17.45 d) 14.45

209. In which of the following species hyperconjugation is possible?
a) $CH_3 - CH_2$ b) $C_6HS - CH_3$ c) $CH_2 = CH_2$ d) $CH_3 - \overset{CH_3|}{C}\overset{|}{C}H_3 - CH = CH_2$

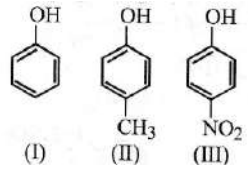
210. Which of the following alcohols on dehydration gives most stable carbocation?
a) $CH_3 - CH|CH_3 - CH_2OH$ b) $CH_3 - C\overset{CH_3|}{\overset{|}{C}}H_3 - OH$ c) $CH_3 - CH_2 - CH_2 - CH_2OH$
d) $CH_3 - CH\overset{|}{C}H_3 - CH_2 - CH_3$

211. In compound 'X' all the bound angles are exactly 109^0 28' 'X' is.
a) Chloromethane b) Iodoform c) Carbon tetrachloride d) Chloroform

212. The IUPAC name of the compound having the formula $CH\equiv C—CH=CH_2$ is:

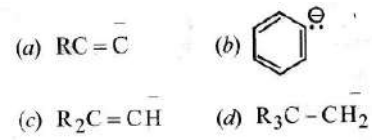
a) 3-butene -1-yne b) 1-butyn 3-ene c) but 1-yne -3-ene d) 1-butene-3-yne

213. The correct order of acidic strength for the following compounds will be



a) III>I>II b) I>III>II c) II>III>I d) I>II>III

214. The stability of carbanions in the following:



a) (a) > (b) > (c) < (d) b) (b) > (c) > (d) < (a) c) (d) > (b) > (c) < (a) d) (a) > (c) > (b) < (d)

215. Which of the following names is correct for

$CH_2\overset{|}{C}HO - CH\overset{|}{C}HO - CH_2\overset{|}{C}HO$?

a) 3-Formylpentane-1, 3-dial b) 1, 2, 3-Triformylpropane

c) 2-Formylmethylbutane-1, 4-dial d) Propane-l, 2, 3-tricarbaldehyde.

216. The IUPAC name for is

a) 1-chloro-2-nitro-4-methylbenzene b) 1-chloro-4-methyl- 2- nitrobenzene

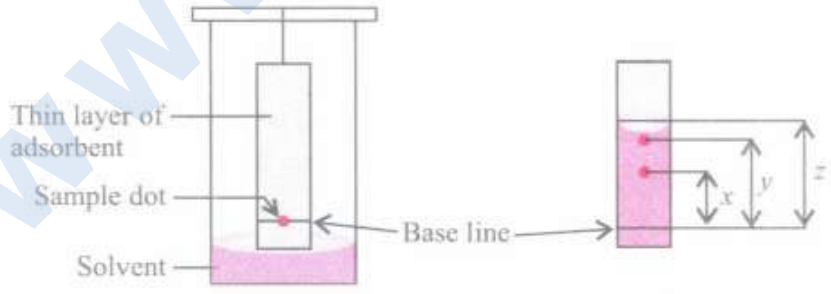
c) 2-chloro-1-nitro-5-methylbenzene d) m-nitro-p-chlorotoluene

217. A compound of molecular formula of C_7H_{16} shows optical isomerism, compound will be

a) 2, 3-Dimethylpentane b) 2, 2-Dimethylbutane c) 3-Methylhexane

d) None of the above

218. Given below is the developed chromatogram of a mixture of pigments.



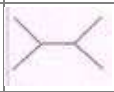
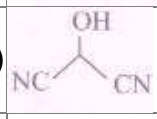
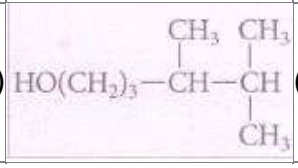
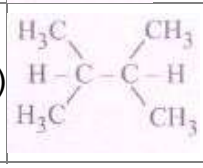
R_f values for x and y can be expressed as:

a) $\frac{x}{z}, \frac{y}{z}$ b) $\frac{x}{y}, \frac{y}{z}$ c) xz, yz d) $\frac{z}{x}, \frac{z}{y}$

219. Which of the following is an electrophilic reagent?

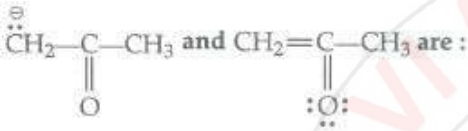
a) H_2O b) NH_3 c) OH^- d) NO_2^+

220. Match the column I with column II and mark the appropriate choice

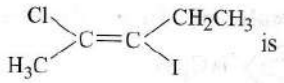
Column I		Column II	
(A)	$N \equiv C - CHOH - C \equiv N$	(i)	CH_3-$(CH_2)_6$-CH_3
(B)		(ii)	
(C)		(iii)	
(D)		(iv)	

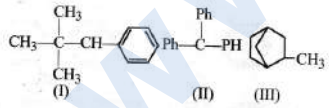
a) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)
b) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)
c) (A) → (i), (B) → (ii), (C) → (iv), (D) → (iii)
d) (A) → (ii), (B) → (iii), (C) → (i), (D) → (iv)

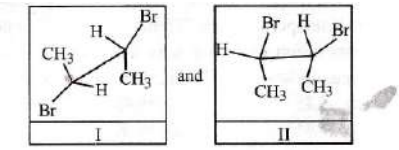
221. I-Butene and cyclobutane show
a) position isomerism b) ring-chain isomerism c) functional isomerism d) metamerism

222.  are :
a) resonating structures b) geometrical isomers c) tautomers d) optical isomers

223. The correct order of decreasing acidic strength of trichloroacetic acid (A) trifluoroacetic acid (B) acetic acid (C) and formic acid (D) is :
a) B > A > D > C b) B > D > C > A c) A > B > C > D d) A > C > B > D

224. IUPAC name of the compound

a) trans-3 -iodo-4-chioro-3 -pentene b) cis-2-chloro-3 -iodo-2-pentene
c) trans-2-ohloro-3 -iodo-2-pentene d) cis-3 -iodo-4-chloro-3 -pentene

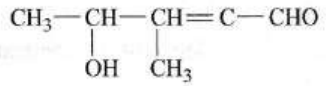
225. Consider the following compounds

Hyperconjugation occurs in:
a) II only b) III only c) I and III d) I only

226. Given

I and II are
a) A pair of optical isomers b) Identical c) A pair of conformers
d) A pair of geometrical isomers

227. IUPAC names of the given structures are
(i) E (ii)F

a) (i) hexane, (ii) 3-methylbutane b) (i) isopentane, (ii) 2,2-dimethylbutane
c) (i) 3-ethylbutane, (ii) isopentane d) (i) 3-methylpentane, (ii) 2-methylbutane.

228. The IUPAC name of

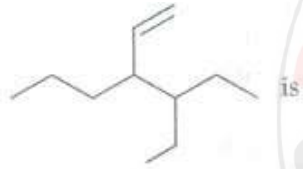


a) 4-hydroxy- 1 -methyl pentanal b) 4-hydroxy-2-methyl pent-2-en-1 -al
c) 2-hydroxy-4-methyl pent-3 -en-5-a l d) 2-hydroxy-3-methyl pent-2-en-5-al

229. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: sp^3 hybrid carbon atom is more electronegative than sp hybrid carbon atom.
Reason: sp^3 hybrid orbitals are more closer to the nucleus.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

230. The carbocation $CH_3\overset{+}{C}H_2CH_3$ is less stable than
a) $CH_3CH_2\overset{+}{C}H_2CH_3$ b) $\overset{+}{C}H_3$ c) $(CH_3)_3\overset{+}{C}$ d) $CH_3\overset{+}{C}H_2$

231. The correct IUPAC name of the compound



a) 3-ethyl 4-ethenylheptane b) 3-ethyl 4-propylhex-5-ene c) 3-(l-ethyl propyl) hex l-ene
d) 4-ethyl -3-propyl hex -1-ene

232. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Alkanes containing more than three carbon atoms exhibit chain isomerism.
Reason : In an alkane, all carbon atoms are sp^3 hybridised.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is fals d) If both assertion and reason are false

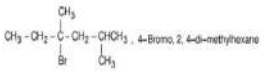
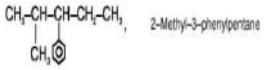
233. Paper chromatography is an example of
a) Column chromatography b) Adsorption chromatography c) Partition chromatography
d) Thin layer chromatography

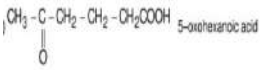
234. If there is no rotation of plane polarised light by a compound in a specific solvent, though to be chiral, it may mean that
a) the compound is certainly meso b) there is no compound in the solvent
c) the compound may be a racemic mixture d) the compound is certainly achiral

235. Separation of two substances by crystallisation depends upon their differences in
a) densities b) solubility c) melting points d) boiling points

236. Which nomenclature is not according to IUPAC system?

Br- CH_2 - CH = CH_2

a) 1-bromo prop 2-ene b)  c) 

d) 

237. 1.6 g of an organic compound gave 2.6 g of magnesium pyrophosphate. The percentage of phosphorus in the compound is

a) 45.38% b) 54.38% c) 37.76% d) 19.02%

238. Base strength of:

(A) H_3C-$\overset{-}{C}H_2$

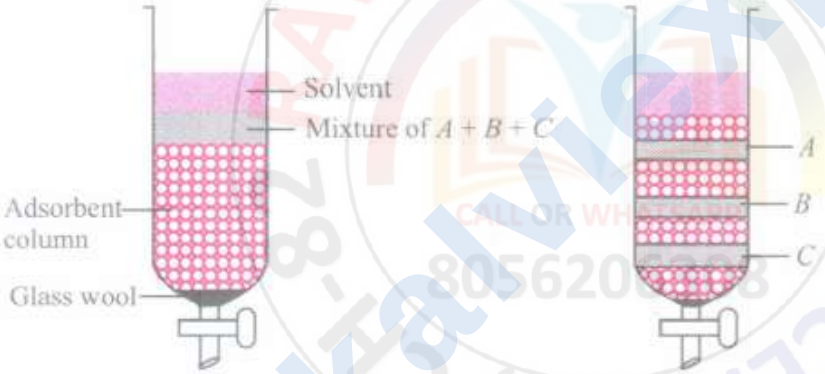
(B) $H_2C = \overset{-}{C}H$ and

(C) $H - C \equiv \overset{-}{C}$

is in the order of

a) (B)>(A)>(C) b) (C)>(B)>(A) c) (A)>(C)>(B) d) (A)>(B)>(C)

239. Given below is a column of adsorbent in which the mixture of compounds A + B + C is placed. When the solvent is poured through the column, the components are separated depending upon the degree of adsorption. Which of the given statements is correct?



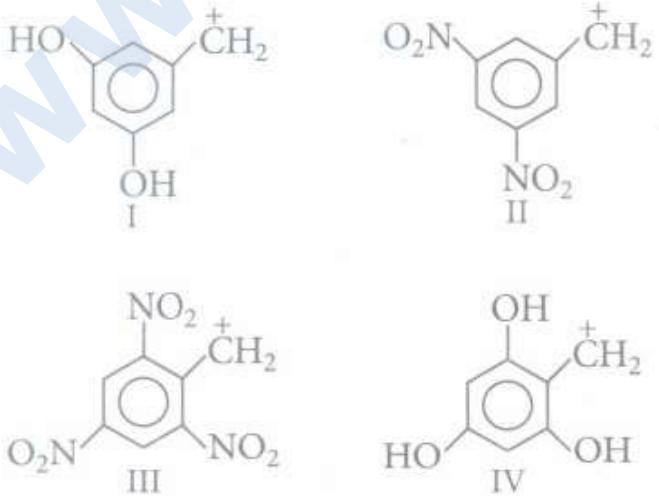
a) A is the most weakly adsorbed component hence remains near the top

b) A is the most strongly adsorbed component hence remains near the top.

c) C is the most strongly adsorbed component hence is found near the bottom.

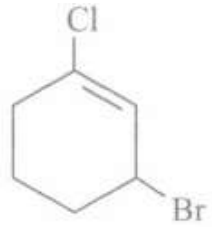
d) B is the most strongly adsorbed component hence is found in the centre of the column.

240. Arrange the following carbo cations in decreasing order of stability



a) II>I>III>IV b) III>IV>I>II c) II>III>I>IV d) IV>I>II>III

241. The IUPAC name of the compound shown below is



a) 2-bromo-6-chlorocyclohex-1-ene b) 6-bromo-2-chlorocyclohexene
c) 3-bromo-1-chlorocyclohexene d) 1-bromo-Bvchlorocyclohexene.

242. Which one of the following pairs represents stereoisomerism?
a) Structural isomerism and Geometrical isomerism
b) Optical isomerism and Geometrical isomerism
c) Chain isomerismand Rotational isomerism
d) Linkage isomerism and Geometrical isomerism

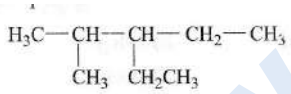
243. In Duma's method for estimation of nitrogen, 0.25 g of an organic compound gave 40 mL of nitrogen collected at 3 00 K temperature ^ e and j 25 mm pressure. If the aqueous tension at 300 K is the 25 mm, the percentage of nitrogen in the compound is:
a) 18.20 b) 16.76 c) 15.76 d) 17.36

244. The correct name of $CH_3CH_2 - \overset{||}{C}O - \overset{|}{C}HCN - CHO$ is
a) 2-cyano-3-oxopentanal b) 2- formyl-3-oxopentanenitrile c) 2-cyano-1,3 -pentadiene
d) 1,3-dioxo-2-cyanopentane

245. Correct the increasing order of acidity is as:
a) $H_2O, C_2H_2, H_2CO_3, phenol$ b) $C_2H_2, H_2O, H_2CO_3, pnenol$ c) $Phenol, C_2H_2, H_2CO_3, H_2O$
d) $C_2H_2, H_2O,$ *phenol and* H_2CO_3

246. Among the following compounds the one that is most reactive towards electrophilic nitration is:
a) Benzoic acid b) Nitrobenzene c) Toluene d) Benzene

247. For the compound



which of the following IUPAC names is correct?
a) 2-methyl-3-ethyl pentane b) 3-ethyl-2-methyl pentane c) 2 -ethyl-3 -methyl pentane
d) 3 -methyl-2-ethy1 pentane

248. Some meta-directing substituents in aromatic substitution are given. Which one is most deactivating?
a) $-SO_3H$ b) -COOH c) $-NO_2$ d) $-C \equiv N$

249. A sample of 0.50 g of an organic compound was treated according to Kjeldahl's method. The ammonia evolved was absorbed in 50 mL of 0.5 M H_2SO_4. The residual acid required 60 mL of 0.5 M solution of NaOH for neutralisation. What would be the percentage composition of nitrogen in the compound?
a) 50 b) 60 c) 56 d) 44

250. Which one of the following orders is correct regarding the -I-effect of the substituents?
a) $-NR_2 < -OR > -F$ b) $-NR_2 > -OR > -F$ c) $-NR_2 < -OR < -F$
d) $-NR_2 > -OR < -F$

251. The order of decreasing stability of the following carbanions is

(i) $(CH_3)C^-$

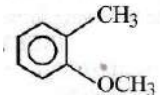
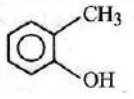
(ii) $(CH_3)CH^-$

(iii) $CH_3CH_2^-$

(iv) $C_6H_5CH_2^-$

a) (i) > (ii) > (iii) > (iv) b) (iv) > (iii)> (ii)> (i) c) (iv) > (i) > (Ii) > (iii) d) (iii)> (ii)> (i)> (iv)

252. Which one of the following is most reactive towards electrophilic reagent?

a)  b)  c) d)

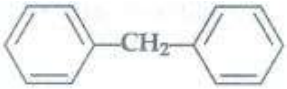
253. What is the minimum number of carbon atoms of an alkane must have to form an isomer?

a) 4 b) 3 c) 2 d) 1

254. The correct order of reactivity towards the electrophilic substitution of the compounds aniline (I), benzene (II) and nitrobenzene (III) is

a) I>II>III b) III>II>I c) II>III>I d) IIII

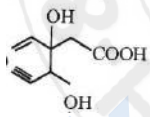
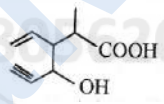
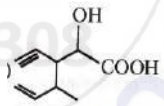
255. The molecular formula of diphenyl methane

 is $C_{13}H_{12}$

How many structural isomers are possible when one of the hydrogen is replaced by a chlorine atom?

a) 6 b) 4 c) 8 d) 7

256. Structure of the compound whose IUPAC name is 3--ethyl-2-hydroxy-4-methylhex-3-en-5-ynoic acid is :

a) b)  c)  d) 

257. Which of the following sets of groups contain only electrophiles?

a) $NH_2^-, NO_2^+, H_2O, NH_3$ b) $F^-, OH^-, NH_3, SO_3, SO_3$ c) $NO_2^+, AICI_3, SO_3, CH_3\overset{+}{C}=O$

d) $NO_2^+, AICI_3, SO_3, CH_3\overset{+}{C}=O$

258. Tautomerism will be exhibited by

a) $(CH_3)_3CNO$ b) $(CH_3)_2NH$ c) R_3CNO_2 d) RCH_2NO_2

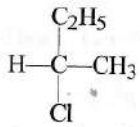
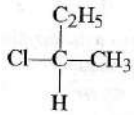
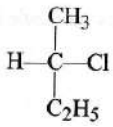
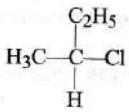
259. Geometrical isomers differ in

a) position of functional group b) position of atoms c) spatial arrangement of atoms
d) length of carbon chain

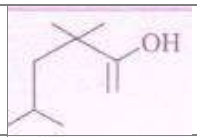
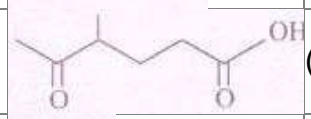
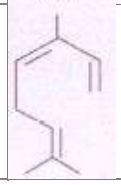
260. A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following

a) Hyperconjugation b) -I effect of $-CH_3$ groups c) +R effect of $-CH_3$ groups
d) -R effect of-CH_3 groups

261. CH_3-CHCI-CH_2-CH_3 has a chiral centre. Which one of the following represents its R-configuration

a)  b)  c)  d) 

262. Match the compounds given in column I with the IUPAC names given in column II and mark the appropriate choice

Column I		Column II	
(A)		(i)	3, 7- Dimethylocta -1, 3, 6- triene
(B)		(ii)	4-Methyl-5- oxohexanoic acid
(C)		(iii)	3, 3, 5-Trimethylhex-1-en-2-ol
(D)		(iv)	4-Hydroxy-4- methylpentan - 2-one

a) (A) → (ii), (B) → (i), (C) → (iii), (D) → (iv)
b) (A) → (iv), (B) → (ii), (C) → (i), (D) → (iii)
c) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)
d) (A) → (iii), (B) → (iv), (C) → (ii), (D) → (i)

263. Correct name for the given compound

$CH_3 - CH_2 - \underset{|}{C}CH_2CH_3H - CH_2 - \underset{|}{C}CH_3H - CH_2 - CH_3$ *is*

a) 3-ethyl-5-methylheptane b) 5-ethyl-3-methylheptane c) 1, 1-diethyl-3-methylpentane
d) 3-methyl-5, 5-diethylpentane.

264. In Lassaigne's test for N, S and halogens, the organic compound is
a) fused with sodium b) dissolved with sodamide c) extracted with sodamide
d) fused with calcium.

265. The Lassaigne's extract is boiled with conc. HNO_3 while testing for halogens. By doing so it.
a) decomposes Na_2S and NaCN, if formed b) helps in the precipitation of AgCl
c) increases the solubility product of AgCl d) increases the concentration of NO_3^- ions.

RAVI MATHS TUITION CENTRE , WHATSAPP - 8056206308

Time : 1 Mins **P BLOCK ELEMENTS 1** **Marks : 461**

1. The metal ion, that plays an important role in muscle contraction is:
   a) K^+ b) Na^+ c) Mg^{2+} d) Ca^{2+}
2. Which of the following does not show the anomalous behaviour of lithium?
   a) Lithium reacts with nitrogen to form a nitride
   b) Lithium carbonate decomposes on heating c) Lithium nitrate gives NO_2 on heating
   d) Lithium is the strongest reducing agent
3. Which of the following statements is correct?
   a) Sodium carbonate decomposes on heating
   b) Sodium bicarbonate is more soluble in water than potassium bicarbonate
   c) Sodium when heated with excess of O_2, gives peroxide.
   d) Lithium halides are highly ionic in nature
4. Which of the following is not true about alkali metals?
   a) Alkali metals do not occur free in nature b) Alkali metals are good oxidising agents
   c) Alkali metal salts impart colour to the flame d) Alkali metal salts are generally ionic
5. When chlorine is passed over by slaked lime at room temperature, the main reaction product is:
   a) $Ca(ClO_2)_2$ b) $CaCl_2$ c) $CaOCl_2$ d) $Ca(OCl)_2$
6. Amphoteric hydroxides react with both alkalies and acids. Which of the following Group 2 metal hydroxides is soluble in sodium hydroxide?
   a) $Be(OH)_2$ b) $Mg(OH)_2$ c) $Ca(OH)_2$ d) $Ba(OH)_2$
7. Which of the following materials conducts electricity?
   a) Crystalline potassium chloride b) Fused sulphates c) Molten sodium chloride
   d) Diamond
8. K_2CO_3 cannot be prepared by Solvay's process because:
   a) $KHCO_3$ is less soluble than $NaHCO_3$
   b) $KHCO_3$ is too soluble to be precipitated by KCl and NH_4HCO_3
   c) K_2CO_3 is more soluble to be precipitated by KCl d) K_2CO_3 is less soluble than Na_2CO_3
9. The alkali metals form salt-like hydrides by the direct synthesis at elevated temperatures. The thermal stability of these hydrides decrease in which of the following orders?
   a) $CsH > RbH > KH > NaH > LiH$ b) $KH > NaH > LiH > CsH > RbH$
   c) $NaH > LiH > KH > RbH > CsH$ d) $LiH > NaH > KH > RbH > CsH$
10. Which of the following compounds are not arranged in correct order as indicated?
    a) $SrCl_2 < CaCl_2 < MgCl_2 < BeCl_2$ (increasing order of hydrolysis)
    b) $SrCl_2 < CaCl_2 < MgCl_2 < BeCl_2$ (increasing lattice energy)

c) $CaSO_4 < MgSO_4 < BeSO_4$ (increasing stability)

d) $Be(OH)_2 < Mg(OH)_2 < Ca(OH)_2$ (increasing solubility)

11. BeO is insoluble but BaO is soluble as

a)

lattice energy of BeO is higher than BaO due to small size of Be^{2+} ion and its covalent nature

b) hydration energy of BeO is lower than BaO due to small size Be^{2+} ion

c) BeO is amphoteric in nature while BaO is basic

d) BeO forms hydrated salts while BaO forms anhydrous salts

12. In which of the following, the hydration energy is higher than the lattice energy?

a) $BaSO_4$ b) $MgSO_4$ c) $RaSO_4$ d) $SrSO_4$

13. A white solid X on heating gives a white solid Y and an acidic gas Z. Gas Z is also given out when X reacts with an acid. The compound Y is also formed if caustic soda is left open in the atmosphere. X, Y and Z are:

a)

X	Y	Z
$NaHCO_3$	Na_2CO_3	CO_2

b)

X	Y	Z
Na_2CO_3	NaOH	CO_2

c)

X	Y	Z
Na_2CO_3	$NaHCO_3$	CO_2

d)

X	Y	Z
NaOH	$NaHCO_3$	CO_2

14. Which of the following statements is not true about alkali metals?

a) All alkali metals form oxo salts such as carbonates, sulphates and nitrates

b) The basic character of oxides increases down the group

c)

Carbonates and sulphates of lithium are stable and their stability decreases down the group

d) Solubility of carbonates and sulphates increases down the group

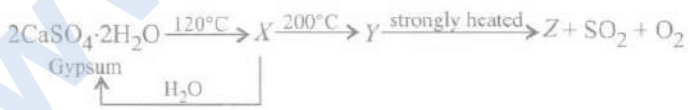
15. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Na_2CO_3	(i)	Caustic soda
(B)	NaOH	(ii)	Glauber's salt
(C)	$Na_2CO_3.10H_2O$	(iii)	Soda ash
(D)	$Na_2SO_4.10H_2O$	(iv)	Washing soda

a) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii) b) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii)

c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i) d) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (ii)

16. Identify X, Y and Z



a)

X	Y	Z
Plaster of Paris($CaSO_4.1/2H_2O$)	Burnt plaster($CaSO_4$)	Quick lime(CaO)

b)

X	Y	Z
Calcium sulphate($CaSO_4$)	Plaster of Paris($CaSO_4.1/2H_2O$)	Quick lime(CaO)

c)

X	Y	Z
Quick lime(CaO)	Plaster of Paris($CaSO_4.1/2H_2O$)	Lime water($Ca(OH)_2$

d)

X	Y	Z
Plaster of Paris($CaSO_4.1/2H_2O$)	Burnt plaster($CaSO_4$)	Slaked lime($Ca(OH)_2$)

17. In which of the following processes, fused sodium hydroxide is electrolysed at a $330^\circ C$ temperature for extraction of sodium?
a) Castner's process b) Down's process c) Cyanide process d) Both 'b' and 'c'

18. Which of the following is not the point of difference between Be and other alkaline earth metals?
a) It has a tendency to form covalent bonds
b) It dissolves in alkalies with evolution of hydrogen
c) Its oxides and hydroxides are amphoteric d) Its carbide gives acetylene on hydrolysis

19. A certain compound X imparts a golden yellow flame. When zinc powder is heated with concentrated solution of X, H_2 gas is evolved. X combines with CO_2 to give a salt Y. Y is a hydrated salt which on reaction with HCl or excess of CO_2 gives another salt Z which is an important part of baking powder. Identify X, Y and Z.

a)

X	Y	Z
HCl	NaOH	$NaHCO_3$

b)

X	Y	Z
KOH	K_2CO_3	$KHCO_3$

c)

X	Y	Z
NaCl	Na_2CO_3	NaOH

d)

X	Y	Z
NaOH	Na_2CO_3	$NaHCO_3$

20. A metal M reacts with nitrogen to give nitride which on reaction with water produces ammonia gas. Metal M can be
a) Na b) K c) Li d) Rb

21. When $BeCl_2$ is hydrolysed, white fumes of gas are given out. The intensity of fumes intensifies when a rod dipped in moist ammonia is brought near the mouth of the test tube. The gas which comes out during hydrolysis is
a) Cl_2 b) HCl c) NH_4OH d) NH_4Cl

22. Enzymes that utilize AIP in phosphate transfer require an alkaline earth metal (M) as the cofactor, M is:
a) Mg b) Ca c) Sr d) Be

23. A certain compound (X) when treated with copper sulphate solution yields a brown precipitate. On adding hypo solution, the precipitate turns white. The compound is:
a) K_2CO_3 b) KI c) KBr d) K_3PO_4

24. The right order of the solubility of sulphates of alkaline earth metals in water is:
a) Be > Ca > Mg > Ba > Sr b) Mg > Be > Ba > Ca > Sr c) Be > Mg > Ca > Sr > Ba
d) Mg > Ca > Ba > Be > Sr

25. Which of the following is not true about s-block elements?
a) They have large atomic sizes b) They have lower ionisation enthalpies
c) They have variable oxidation state d) They form basic oxides

26. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:

List-I (substances)	List-II (Composition)
(a) Plaster of Paris	(i) $CaSO_4.\ 2H_2O$
(b) Epsomite	(ii) $CaSO_4.\ 1/2\ H_2O$
(c) Kieserite	(iii) $MgSO_4 \cdot 7H_2O$
(d) Gypsum	(iv) $MgSO_4 \cdot H_2O$

a)

	(a)	(b)	(c)	(d)
(a)	(iv)	(iii)	(ii)	(i)

b)

	(a)	(b)	(c)	(d)
(b)	(iii)	(iv)	(i)	(ii)

c)

	(a)	(b)	(c)	(d)
(c)	(ii)	(iii)	(iv)	(i)

d)

	(a)	(b)	(c)	(d)
(d)	(iv)	(ii)	(iii)	(i)

27. Alkali metals react with water vigorously to form hydroxides and dihydrogen. Which of the following alkali metals reacts with water least vigorously?
a) Li b) Na c) K d) Cs

28. Crystalline sodium chloride is a bad conductor of electricity while molten NaCl and its aqueous solution conduct electricity. This is because
a) crystalline sodium chloride contains molecules only
b) the ions present in it are not free to move in solid state
c) sodium chloride is a covalent crystal d) solid substances do not conduct electricity

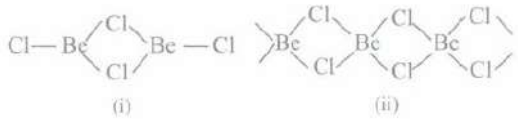
29. The reducing power of a metal depends on various factors. Suggest the factor which makes Li, the strongest reducing agent in aqueous solution
a) Sublimation enthalpy b) Ionisation enthalpy c) Hydration enthalpy
d) Electron-gain enthalpy

30. Assertion: Superoxides of alkali metals are paramagnetic.
Reason: Superoxides contain O_2 ion which has one unpaired electron.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

31. Which of the following statements is not correct regarding preparation of NaOH?
a) NaOH is prepared by electrolysis of sodium chloride in Castner-Kellner cel
b) Sodium metal discharged at cathode combines with mercury to form sodium amalgam
c) Chlorine is evolved at anode d) Amalgam is heated to separate Na and Hg

32. Which of the following statements is false?
a) Ca^{2+} ions are not important in maintaining the regular beating of the heart.
b) Mg^{2+} ions are important in the green parts of the plants.
c) Mg^{2+}ions form a complex with ATP. d) Ca^{2+} ions are important in blood clotting.

33. The following two figures represent



a) (i) $BeCl_2$ is a dimer in vapour phase; (ii) $BeCl_2$ is chain structure in solid state
b) (i) $BeCl_2$ is in solid state; (ii) $BeCl_2$ is in vapour phase
c) (i) $BeCl_2$ is monomer in solid state; (ii) $BeCl_2$ is linear polymer in vapour phase
d) (i) $BeCl_2$ is linear monomer; (ii) $BeCl_2$ is three dimensional dimer

34. The normal oxide contains _____ ion, peroxide contains _____ ion and superoxide contains _____ ion.
a) O^{2-}, O_2^{2-}, O_2^{-} b) O^{2-}, O_2^{-}, O_2^{2-} c) O^{-}, O_2^{-}, O_3^{-} d) O^{-}, O^{2-}, O_2^{2-}

35. The pair of amphoteric oxides is:
a) BeO, ZnO b) Al_2O_3, Li_2O c) BeO, BO_3 d) BeO, MgO

36. Magnesium reacts with an element (X) to form an ionic compound. If the ground state electronic configuration of (X) is $1s^2\ 2s^2\ 2p^3$, the simplest formula for this compound is:
a) Mg_2X b) MgX_2 c) Mg_2X_3 d) Mg_3X_2

37. Which of the following elements is extracted commercially by the electrolysis of an aqueous solution or its compound?
a) Cl b) Br c) Al d) Na

38. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Quick lime	(i)	Setting fractured bones
(B)	Plaster of Paris	(ii)	A constituent of chewing gum
(C)	Slaked lime	(iii)	Manufacture of bleaching powder
(D)	Limestone	(iv)	Manufacture of dyestuffs

a) (A) ⟶ (i), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (iii) b) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii)
c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶ (iv) d) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (i)

39. Assertion: $CaCO_3$ is prepared by passing carbon dioxide gas through slaked lime.
Reason: Passing excess of CO_2 through slaked lime leads to the formation of quick lime.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

40. Superoxides of alkali metals act as oxidising agents while normal oxides are basic in nature. The oxide which is paramagnetic in nature due to presence of unpaired electron is:
a) Na_2O_2 b) KO_2 c) Na_2O d) K_2O_2

41. Assertion: Be is readily attacked by acids.
Reason: Be shows diagonal relationship to Na.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

42. By adding gypsum to cement
a) setting time of cement becomes less b) setting time of cement increases
c) colour of cement becomes light d) shining surface is obtained

43. All the following substances react with water, The pair that gives the same gaseous product is:
a) K and CO_2 b) Na and Na_2O_2 c) Ca and CaH_2 d) Ba and BaO_2

44. Which among the following is kinetically inert towards water?
a) Na b) Be c) Ca d) K

45. Which of the following metals is required as cofactor by all enzymes utilising ATP in phosphate transfer?
a) K b) Ca c) Na d) Mg

46. In context with beryllium, which one of the following statements is correct?
a) It is rendered passive by nitric acid. b) It forms Be_2C. c) Its salts rarely hydrolyze.
d) Its hydride is electron-deficient and polymeric.

47. Which one of the following atoms will have the smallest size?
a) Mg b) Na c) Be d) Li

48. The formula for calcium chloride is
a) $Ca(ClO_4)_2$ b) $Ca(ClO_3)_2$ c) $CaClO_2$ d) $Ca(ClO_2)_2$

49. Ca^{2+} is isoelectronic with
a) Na b) Mg^{2+} c) Ba^{2+} d) Ar

50. An oxide of alkaline earth metals [X] reacts with C and Cl_2 to give a compound Y. Y is found in polymeric chain structure and is electron deficient molecule. The compound Y is:
$BeO + C + Cl_2 \rightarrow Y + CO$
a) BeO b) $BeCl_2$ c) $Be(OH)_2$ d) $BeCO_3$

51. When sodium is dissolved in liquid ammonia, a solution of deep blue colour is obtained. The colour of the solution is due to
a) ammoniated electron b) sodium ion c) sodium amide d) ammoniated sodium ion.

52. Two metals X and Y belong to the second group of periodic table. X forms insoluble oxide but soluble sulphate. Y forms a soluble oxide but insoluble sulphate. Hydroxide of metal X is soluble in NaOH while that of metal Y is insoluble in NaOH. What are metals X and Y?
a) X=Be, Y=Ba b) X=Mg, Y=Ca c) X=Ca, Y=Sr d) X=Ba, Y=Mg

53. The ease of adsoration of the hydrated alkali metal ions on an ion-exchange resins follows the:
a) $Li^+ < K^+ < Na^+ < Rb^+$ b) $Rb^+ < K^+ < Na^+ < Li^+$
c) $K^+ < Na^+ < Rb^+ < Li^+$ d) $Na^+ < Li^+ < K^+ < Rb^+$

54. The function of "Sodium pump" is a biological process operating in each and every cell of all animals. Which of the following biologically important ions is also a constituent of this pump:
a) Mg^{2+} b) K^+ c) Fe^{2+} d) Ca^{2+}

55. The properties of Li are similar to those of Mg. This is because:
a) both have nearly the same size. b) both has their charge to size ratio nearly the same.
c) both have similar electronic configurations d) both are found together in nature

56. The difference in number of water molecules in gypsum and plaster of paris is
a) 5/2 b) 2 c) 1/2 d) 3/2

57. A compound of sodium does not give CO_2 when heated but it gives CO_2 when treated with dilute acids. A crystalline compound is found to have 37.1% Na and 14.52% H_2O. Hence, compound is
a) $NaHCO_3.10H_2O$ b) $NaHCO_3.5H_2O$ c) $Na_2CO_3.10H_2O$ d) $Na_2CO_3.H_2O$

58. Which of the following has the largest size?
a) Na b) Na^+ c) Na^- d) Can't be Predicied

59. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric filed?
a) Na b) K c) Rb d) Li

60. Beryllium shows diagonal relationship with aluminium. Which of the following similarity is incorrect?

a) Be_2C like Al_4C_3 yields methane on hydrolysis b) Be like Al is rendered passive by HNO_3
c) $Be(OH)_2$ like $Al(OH)_3$ is basic d) Be forms beryllates and Al forms aluminates

61. Which of the carbonates given below is unstable in air and is kept in CO_2 atmosphere to avoid decomposition?
a) $BeCO_3$ b) $MgCO_3$ c) $CaCO_3$ d) $BaCO_3$

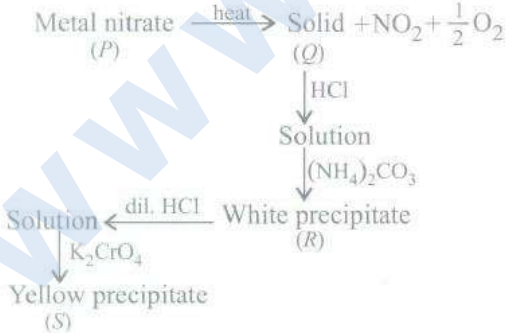
62. The stability of K_2O, K_2O_2 and KO_2 is in order $K_2O < K_2O_2 < KO_2$. This increasing stability as the size of metal ion increases is due to stabilisation of:
a) larger cation by smaller anions through lattice energy effects
b) larger cation by larger anions through lattice energy effects
c) smaller cations by smaller anions through melting point
d) smaller cations by larger anions through melting point

63. First ionisation energy of alkali metals is very low but second ionisation energy is very high because?
a) alkali metals acquire noble gas configuration after losing one electron
b) a large amount of energy is required to remove electron from a cation
c) alkali metals can form only univalent ions
d) first group elements can lose only one electron

64. When a substance (A) reacts with water it produces a combustible gas (B) and a solution of substance (C) in water. When another substance (D) reacts with this solution of (C), it also produces the same gas (B) on warming but (D) can also produce gas (B) on reaction with dilute sulphuric acid at room temperature. (A) imparts a deep golden yellow colour to a smokeless flame of Bunsen burner. Then, A, B, C and D, respectively are:
a) Na, H_2, NaOH, Zn b) K, H_2, KOH, Al c) Ca, H_2, $Ca(OH)_2$, Sn
d) CaC_2, C_2H_2, $Ca(OH)_2$, Fe

65. The E^0 for Cl^-/Cl_2 is 1.36, for I^-/I^2 is +0.53, for Ag^+/Ag is +0.79, Na^+ is -2.71 and for Li^+/Li is -3.04 V Arrange the following species in decreasing order of reducing strength. I^-, Ag, Cl^-Li, Na
a) Li > Cl > Ag > I^- > Na b) Li > Na > I^- > Ag > Cl^- c) Cl^- > Ag > I^- > Na > Li
d) Na > Li > Ag > Cl^- > I^-

66. What are (P), (Q), (R) and (S)?



a)

P	Q	R	S
$Be(NO_3)_2$	BeO	$BeCO_3$	$BeCrO_4$

b)

P	Q	R	S
$NaNO_3$	Na_2O	Na_2CO_3	Na_2CrO_4

c)

P	Q	R	S
$Ba(NO_3)_2$	BaO	$BaCO_3$	$BaCrO_4$

d)

P	Q	R	S
KNO_3	K_2O	K_2CO_3	K_2CrO_4

67. The solubility of metal halides depends on their nature, lattice enthalpy and hydration enthalpy of the individual ions. Amongst fluorides of alkali metals, the lowest solubility of LiF in water is due to
a) ionic nature of lithium fluoride b) high lattice enthalpy
c) high hydration enthalpy for lithium ion d) low ionisation enthalpy of lithium atom

68. The suspension of slaked lime in water is known as:
a) Lime water b) Quick lime c) Milk of lime d) Aqueous solution of slaked lime.

69. Metals form basic hydroxides. Which of the following metal hydroxide is the least basic?
a) $Mg(OH)_2$ b) $Ca(OH)_2$ c) $Sr(OH)_2$ d) $Ba(OH)_2$

70. The sequence of ionic mobility in aqueous solution is:
a) $K^+ > Na^+ > Rb^+ > Cs^+$ b) $Cs^+ > Rb^+ > K^+ > Na^+$ c) $Rb^+ > K^+ > Cs^+ > Na^+$
d) $Na^+ > K^+ > Rb^+ > Cs^+$

71. The metal ion, that plays an important role in muscle contraction, is
a) Be^{2+} b) Mg^{2+} c) Ca^{2+} d) Ba^{2+}

72. Solubility of the alkaline earth's metal sulphates in water decreases in the sequence:
a) $Ca > Sr > Ba > Mg$ b) $Sr > Ca > Mg > Ba$ c) $Ba > Mg > Sr > Ca$
d) $Mg > Ca > Sr > Ba$

73. The compound A on heating gives a colorless gas and a rescue that is dissolve in water obtain B. Excess of CO_2 is bubbled through aqueous solution of B. C is formed which is recovered in the solid form. Solid C on gentle heating gives back A. The compound 'X' is?
a) $CaSI_42H_2O$ b) $CaCO_3$ c) Na_2CO_3 d) K_2CO_3

74. Which of the following is arranged according to increasing basic strength?
a) CaO < MgO < SrO < BaO < BeO b) BaO < SrO < CaO < MgO < BeO
c) BeO < MgO < CaO < BaO < SrO d) BeO < MgO < CaO < SrO < BaO

75. Baking soda is
a) $NaHCO_3$ b) $NaHCO_3.6H_2O$ c) Na_2CO_3 d) $Na_2CO_3.10H_2O$

76. Metal carbonates decompose on heating to give metal oxide and carbon dioxide. Which of the metal carbonates is most stable thermally?
a) $MgCO_3$ b) $CaCO_3$ c) $SrCO_3$ d) $BaCO_3$

77. Which of the following elements does not form hydride by direct heating with dihydrogen?
a) Be b) Mg c) Sr d) Ba

78. When washing soda is heated :
a) CO is released b) CO + CO_2 is released c) CO_2 is released
d) water vapour is released

79. A metal X reacts with water to produce a highly combustible gas Y, and a solution Z. Another metal P reacts with Z to give the same gas Y.
X, Y, Z and P respectively are
a) Zn, H_2, $Zn(OH)_2$, Al b) Na, H_2, NaOH, Zn c) K, H_2, KOH, Al d) Li, H_2, LiOH, K

80. An element X burns in nitrogen to give a compound Y which on reaction with water gives a compound Z and a gas with a pungent smell. Z can be used during construction and white washing. When excess of CO_2 is bubbled through Z, a compound P is formed which on heating decomposes to give a colourless, odourless gas. Identify X, Y, Z and P.

a)

X	Y	Z	P
Ca	Ca_3N_2	$Ca(OH)_2$	$Ca(HCO_3)_2$

b)

X	Y	Z	P
Mg	MgO	$Mg(OH)_2$	$MgCO_3$

c)

X	Y	Z	P
Ca	Ca_3N_2	$Ca(OH)_2$	$CaCO_3$

d)

X	Y	Z	P
Ca	CaO	$Ca(OH)_2$	$Ca(HCO_3)_2$

81. The formula of soda ash is
a) $Na_2CO_3.10H_2O$ b) $Na_2CO_3.2H_2O$ c) $Na_2CO_3.H_2O$ d) Na_2CO_3

82. Property of the alkaline earth metals that increases with their atomic number is:
a) Solubility of their hydroxides b) Solubility of their sulphates in water.
c) Ionization energy d) Electronegativity

83. Which of the following statements is incorrect?
a) Pure sodium metal dissolves in liquid ammonia to give blue solution.
b) NaOH reacts with glass to give sodium silicate
c) Aluminum reacts with excess NaOH to give $Al(OH)_3$.
d) $NaHCO_3$ on heating gives Na_2CO_3.

84. 20.0 gm of a magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 gm magnesium oxide. What will be the percentage purity of magnesium carbonate in the sample? (At. wt. of Mg = 24)
a) 96 b) 60 c) 84 d) 75

85. The compound (A) on heating gives a colourless gas and a residue that is dissolved in water to obtain (B). Excess of CO_2 is bubbled through aqueous solution of (B), (C) is formed which is recovered in the solid form. Solid (C) on gentle heating gives back (A). The compound is:
a) $CaCO_3$ b) Na_2CO_3 c) K_2CO_3 d) $CaSO_4 \cdot 2H_2O$

86. Assertion: The fluorides of alkaline earth metals are relatively less soluble than chlorides.
Reason: Fluorides have high lattice energies.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

87. Which of the following oxides is most acidic in nature?
a) BaO b) BeO c) MgO d) CaO

88. The violet flame shown by potassium in Bunsen flame is due to jumping of the electron from:
a) 1s to 4p b) 1s to 5p c) 4p to 4s d) 5p to 4s

89. The decreasing order of the second ionization potential of Mg, Ca and Ba is
a) Mg > Ca > Ba b) Ca > Ba > Mg c) Ba > Mg > Ca d) Mg > Ba > Ca

90. Alkali metals are not found in free state due to their highly reactive nature. This is due to
a) their large size and low ionisation enthalpy
b) their large size and high ionisation enthalpy
c) their low ionisation enthalpy and high electron gain enthalpy
d) their tendency to impart colour to the flame

91. When plaster of Paris comes in contact with water it sets into a hard mass. The composition of the hard mass is

a) $CaSO_4 \cdot H_2O$ b) $CaSO_4.Ca(OH)_2$ c) $CaSO_4.2H_2O$ d) $CaSO_4.2Ca(OH)_2$

92. Which of the following oxides is not expected to react with sodium hydroxide?
a) CaO b) SiO_2 c) BeO d) B_2O_3

93. The alkali metals dissolve in ammonia to give a deep blue solution which is conducting in nature.
$M+(x+y)NH_3 \longrightarrow [M(NH_3)_x]^{2+} + 2[e(NH_3)_y]^-$
Which of the following is not true about the solutions of alkali metals in liquid ammonia
a) The blue colour is due to ammoniated electron b) The solution is paramagnetic
c) The blue colour changes to brown on standing
d) In concentrated solution blue colour changes to bronze and becomes diamagnetic

94. Which of the following is not a use of baking soda?
a) In medicines as antacid b) As a component of baking powder
c) In removing permanent hardness of water d) In fire extinguishers

95. In the replacement reaction:
$\geq CI + MF \longrightarrow \geq CF + MI$
The reaction will be most favourable if M happens to be:
a) Na b) K c) Rb d) Li

96. In the synthesis of sodium carbonate, the recovery of ammonia is done by treating NH_4Cl with $Ca(OH)_2$. The by-product obtained in this process is
a) $CaCl_2$ b) NaCl c) NaOH d) $NaHCO_3$

97. A solution of a compound X in dilute HCl on treatment with a solution of $BaCl_2$ gives a white precipitate of a compound Y which is insoluble in conc. HNO_3 and conc. HCl. Compound X imparts golden yellow colour to the flame.

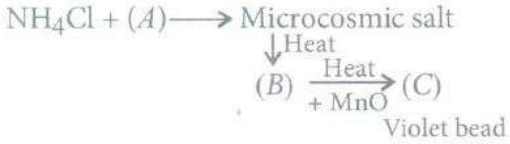
$$\underset{(imparts\ golden\ yellow\ colour)}{X(Solution\ in\ dilute\ HCl)} + BaCl_2 \longrightarrow \underset{White\ ppt}{Y} \xrightarrow[Conc.HCl]{Conc.HNO_3+} Insoluble$$

What are compounds X and Y?
a) X is $MgCl_2$ and Y is $BaSO_4$ b) X is $CaCl_2$ and Y is $BaSO_4$
c) X is Na_2SO_4 and Y is $BaSO_4$ d) X is $MgSO_4$ and Y is $BaSO_4$

98. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:
Plaster of paris
a) $CaSO_4.2H_2O$ b) $CasO_4.\frac{1}{2}H_2O$ c) $MaSO_4.7H_2O$ d) $MgSO_4.H_2O$

99. The raw materials in solvay process are:
a) NaCl, NH_3, $CaCO_3$ b) NaOH, CO_2 c) NaCl, $CaCO_3$, NH_3 d) NH_3, H_2O, NaCl

100. Which of the following is not a similarity of beryllium with aluminium?
a) It becomes passive when treated with cone HNO_3
b) It forms polymeric covalent hydrides c) Carbonate of Be is extremely stable
d) Salts of Be do not impart colour to the flame

101. 

(A), (B) and (C) respectively are

a) Na_3PO_4, $NaPO_3$, $(Mn)_3(PO_4)_2$ b) Na_2HPO_4, Na_3PO_4, $Mn_3(PO_4)_2$

c) Na_2HPO_4, $NaPO_3$, $Mn(PO_3)_2$ d) Na_2HPO_4, $NaPO_3$, $NaMnPO_4$

102. Sulphates of Be and Mg are readily soluble in water but sulphates of Ca, Sr and Ba are insoluble. This is due to the fact

a) the greater hydration enthalpies of Be^{2+} and Mg^{2+} overcome the lattice enthalpy

b) high lattice enthalpy of Be^{2+} and Mg^{2+} makes them soluble in water

c) solubility decreases from $BeSO_4$ to $BaSO_4$ due to increase in ionic size

d) $BeSO_4$ and $MgSO_4$ are ionic in nature while other sulphates are covalent

103. Assertion: Elements of group 1 are called 'alkali metals'.

Reason: All the alkali metals react with water.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

104. What is the biological importance of Na+ and K^+ ions in cell fluids like blood plasma?

a) They participate in transmission of nerve signals

b) They regulate the number of red and white blood corpuscles in the cell

c) They can be present in any amount in the blood since they are absorbed by the cells

d) They regulate the viscosity and colour of the blood

105. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Li	(i)	Role in biological systems
(B)	K	(ii)	Golden yellow flame
(C)	Na	(iii)	Photoelectric cell
(D)	Cs	(iv)	Carbonate decomposes on heating

a) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii) b) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (iv)

c) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iv) d) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii)

106. Arrange the following elements in the order of the increasing electropositive character.

Li, Na, K, Rb, Cs

a) Li > Na > K > Rb > Cs b) Li < Na < K < Rb < Cs c) Li > Na < K < Rb < Cs

d) Na > Li > K < Rb < Cs

107. Assertion Lithium resembles magnesium diagonally placed in next group.

Reason: The size of Li^+ and Mg^{2+} are different and their electropositive character is same.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

108. In all oxides, peroxides and superoxides, the oxidation state of alkali metals is:

a) +1 and -1 b) +1 and +2 c) +1 only d) +1, -1 and +2

109. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:
Gypsum
a) $CaSO_4.2H_2O$ b) $CasO_4.\frac{1}{2}H_2O$ c) $MaSO_4.7H_2O$ d) $MgSO_4.H_2O$

110. A metal salt solution forms a yellow precipitate with potassium chromate in acetic acid, a white precipitate with dilute sulphuric acid but does not give precipitate with sodium chloride or iodide. The white precipitate obtained when sodium carbonate is added to the metal salt solution will consist of:
a) lead carbonate b) basic lead carbonate c) barium carbonate d) strontium carbonate

111. Which is the characteristic flame colouration of Li?
a) Yellow b) Violet c) Blue d) Crimson red

112. The product obtained as a result of a reaction of nitrogen with CaC_2 is:
a) $CaCN_3$ b) Ca_2CN c) $Ca(CN)_2$ d) CaCN

113. All alkali halides are soluble in water except LiF The low solubility of LiF in water is due to its (i) the low solubility of CsI is due to (ii). LiF is soluble in (ii) solvents.
a)

(i)	(ii)	(iii)
low lattice enthalpy	large hydration enthalpy	polar solvents

b)

(i)	(ii)	(iii)
high lattice enthalpy	smaller hydration enthalpy	non - polar solvents

c)

(i)	(ii)	(iii)
high hydration enthalpy	high lattice enthalpy	non - polar solvents

d)

(i)	(ii)	(iii)
smaller hydration enthalpy	high lattice enthalpy	polar solvents

114. When alkaline earth metals dissolve in ammonia, they form coloured solution like alkali metals. Which of the following observations regarding the reaction are correct?
(i) Dilute solutions are bright blue in colour due to solvated electrons.
(ii) These solutions decompose to form amides and hydrogen.
(iii) From this solution the ammoniates $[M(NH_3)_6]^{2+}$ can be recovered by evaporation.
a) Only (i) and (ii) b) Only (i), (ii) and (iii) c) Only (ii) and (iii) d) Only (i)

115. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Na^+	(i)	Chlorophyll
(B)	K^+	(ii)	Bones and teeth
(C)	Ca^{2+}	(iii)	Regulating flow of water across cell membrane
(D)	Mg^{2+}	(iv)	Activation of enzyme within cell fluids

a) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (iv) b) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)
c) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv) d) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (i)

116. Fill up the blanks with appropriate choices. Lithium and magnesium react slowly with water. Their hydroxides are _____ soluble in water. Carbonates of Li and Mg _____ easily on heating. Both LiCl and $MgCl_2$ are _____ in ethanol and are _____ They crystallise from their aqueous solutions as _____

a) more, do not decompose, soluble, hygroscopic, hydrates
b) less, decompose, soluble, deliquescent, hydrates
c) freely,sublime, insoluble,deliquescent,anhydrous
d) freely, decompose, soluble, hygroscopic, crystals

117. In Solvay ammonia process, sodium bicarbonate is precipitated due to

a) presence of NH_3 b) reaction with CO_2 c) reaction with brine solution
d) reaction with NaOH

118. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Na	(i)	Crimson red
(B)	K	(ii)	Yellow
(C)	Sr	(iii)	Apple green
(D)	Ba	(iv)	Violet

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv) b) (A) ⟶ (ii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (iii)
c) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i) d) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii)

119. Which nitrate will decompose to give NO_2 on heating?

a) $NaNO_3$ b) KNO_3 c) $RbNO_3$ d) $LiNO_3$

120. Assertion: Lithium salts are mostly hydrated.
Reason: The hydration enthalpies of alkali metal ions decrease with increase in ionic size.

a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

121. Assertion: Lithium fluoride is most covalent in nature.
Reason: Small anion can be easily distorted.

a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

122. The alkali metals are low melting. Which of the following alkali metals is expected to melt if the room temperature rises to 30°C?

a) Na b) K c) Rb d) Cs

123. The first ionisation enthalpies of the alkaline earth metals are higher than that of alkali metals but second ionisation enthalpies are smaller, why?

a)
In alkali metals, second ionisation enthalpy involves removal of electron from noble gas electronic configuration while in alkaline earth metals, second electron is removed from ns^1 configuration.
b) Alkaline earth metals have very high melting point as compared to alkali metals
c) Electrons in s-orbital are more closely packed in alkaline earth metals than alkali metals
d) Due to smaller size alkaline earth metals do not form divalent ions very easily

124. An example of a double salt is:
a) Bleaching powder b) $K_4[Fe(CN)_6]$ c) Hypo d) Potash alum

125. Which of the following will have lowest value of K_{sp} at room temperature?
a) $Be(OH)_2$ b) $Mg(OH)_2$ c) $Ca(OH)_2$ d) $Ba(OH)_2$

126. Slaked lime reacts with chlorine to give:
a) $CaCl_2$ b) CaO c) $Ca(OCl)_2$ d) $CaCO_3$

127. The increasing order of basic character of oxides MgO, SrO, K_2O, and Cs_2O is:
a) $MgO < SrO < K_2O < Cs_2O$ b) $SrO < MgO < Cs_2O < K_2O$ c) $Cs_2O < K_2O < SrO < MgO$
d) $K_2O < Cs_2O < SrO < MgO$

128. Nuclear attraction is often the deciding control factor for the association of neutral molecules to a given metal ion. Which one of the following represents the correct order of stability of the ions?
$[Be(H_2O)_4]^{2+}$, $[Mg(H_2O)_4]^{2+}$, $[Ca(H_2O)_4]^{2+}$ and $[Sr(H_2O)_4]^{2+}$
a) $[Be(H_2O)_4]^{2+} > [Sr(H_2O)_4]^{2+} > [Mg(H_2O)_4]^{2+} > [Ca(H_2O)_4]^{2+}$
b) $[Ca(H_2O)_4]^{2+} > [Mg(H_2O)_4]^{2+} > [Be(H_2O)_4]^{2+} > [Sr(H_2O)_4]^{2+}$
c) $[Sr(H_2O)_4]^{2+} > [Ca(H_2O)_4]^{2+} > [Mg(H_2O)_4]^{2+} > [Be(H_2O)_4]^{2+}$
d) $[Be(H_2O)_4]^{2+} > [Mg(H_2O)_4]^{2+} > [Ca(H_2O)_4]^{2+} > [Sr(H_2O)_4]^{2+}$

129. Calcium chloride is used as a dehydrating agent because:
a) it has a strong affinity for water b) it has water of crystalline attached to it
c) it loses water when exposed to air d) it has a high melting point.

130. Assertion: Beryllium and magnesium do not impart characteristic colour in flame.
Reason: Both Beryllium and magnesium have high I.E.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

131. A solid compound 'X' on heating gives CO_2, gas and residue. The residue mixed with water forms 'Y'. residue. On passing an excess of CO_2, through 'Y' in water, a clear solution 'Z', is obtained. On boiling 'Z', compound 'X' reformed. The compound 'X' is?
a) $Ca(HCO_3)_2$ b) $CaCO_3$ c) Na_2CO_3 d) K_2CO_3

132. Compared with the alkaline earth metals, the alkali metals exhibit
a) smaller ionic radii b) higher boiling points c) greater hardness
d) lower Ionisation energies

133. Which one of the alkali metals, forms only the normal oxide, M_2O on heating in air?
a) Rb b) K c) Li d) Na

134. Which of the following statements is true about $Ca(OH)_2$?
a) It is used in the preparation of bleaching powder b) It is a light blue solid
c) It does not possess disinfectant property d) It is used in the manufacture of cement

135. Gypsum is added to portland cement to:
a) fasten the process of setting b) slow down the process of setting
c) improve the colour of the cement d) increase the melting point of cement

136. Which of the following compounds has the lowest rnelting point?
a) $CaCl_2$ b) $CaBr_2$ c) CaI_2 d) CaF_2

137. Which of the following statement is false?
a) Strontium decomposes water readily than beryllium
b) $BaCO_3$ melts at a higher temperature than $CaCO_3$
c) Barium hydroxide is more soluble in water than $Mg(OH)_2$
d) Beryllium hydroxide is more basic than bariun hydroxide

138. Which one of the alkali metals, forms only, the normal oxide, M_2O on heating in air?
a) Rb b) K c) Li d) Na

139. Assertion: The melting and boiling points of the alkali metals are low.
Reason: Alkali metals have weak metallic bonding.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

140. Which of the following reactions is not a part of Solvay's process for preparation of sodium carbonate?
a) $2NH_3 + H_2O + CO_2 \longrightarrow (NH_4)_2CO_3$) b) $(NH_4)_2CO_3 + H_2O + CO_2 \longrightarrow 2NH_4HCO_3$
c) $2NH_4HCO_3 \longrightarrow (NH_4)_2CO_3 + H_2O + CO_2$ d) $NH_4HCO_3 + NaCl \longrightarrow NH_4Cl + NaHCO_3$

141. Which of the following is known as fusion mixture?
a) Mixture of $Na_2CO_3 + NaHCO_3$ b) $Na_2CO_3 \cdot 10H_2O$ c) Mixture of $K_2CO_3 + Na_2CO_3$
d) $NaHCO_3$

142. Which one is the correct statement with reference to the solubility of $MgSO_4$ in water?
a) SO_4^{2-} ions mainly contribute towards hydratior energy
b) Sizes of Mg^{2+} and SO_4^{2-} are similar
c) Hydration energy of $MgSO_4$ is higher in comparison to its lattice energy
d) Ionic potential (charge/radius ratio) of Mg^{2+}

143. Which of the following increasing orders is not correct as per the property indicated against it?
a) CsCl < RbCl < KCl < NaCl < LiCl (Lattice energy)
b) LiOH < NaOH < KOH (Solubility in water)
c) $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$ (Size of hydrated ion)
d) NaI < NaBr < NaCl < NaF (Lattice energy)

144. Which of the following alkali metals when burnt in air forms a mixture of oxide as well as nitride?
a) K b) Na c) Li d) Cs

145. Be and Al exhibit diagonal relationship. Which of the following statements about them is/are not true?
(i) Both react with HCl to liberate H_2.
(ii) They are made passive by HNO_3.
(iii) Their carbides give acetylene on treatment with water.
(iv) Their oxides are amphoteric
a) (iii) and (iv) b) (i) and (iii) c) (i) only d) (iii) only

146. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:
Epsomite

a) $CaSO_4.2H_2O$ b) $CasO_4.\frac{1}{2}H_2O$ c) $MaSO_4.7H_2O$ d) $MgSO_4.H_2O$

147. Which one of the following has minimum value of size of cation/anion ratio?
a) NaCl b) KCl c) $MgCl_2$ d) CaF_2

148. Alkali metals cannot be extracted by reduction of their oxides and other compounds because:
a) alkali metals are strong reducing agents b) alkali metals have low ionisation enthalpy
c) alkali metals have high lattice enthalpy d) alkali metals are strongly basic in nature

149. Sodium is made by the electrolysis of a molten mixture about 40% NaCl and 60% $CaCl_2$ because:
a) Ca^{2+} can reduce NaCl to Na b) Ca^{2+} can displace Na from NaCl
c) $CaCl_3$ helps in conduction of electricity
d) This mixture has a lower melting point than NaCl

150. Which one of the following has minimum value of size of cation/anion ratio?
a) NaCl b) KCL c) $MgCl_2$ d) CaF_2

151. Which of the following atoms will have the smallest size?
a) Mg b) Na c) Be d) Li

152. Lithium is the strongest reducing agent though it has highest ionisation energy in its group. Which of the following factors is responsible for making Li the strongest reducing agent?
a) Large heat of atomisation b) Smaller size c) Large sublimation energy
d) Large amount of hydration enthalpy

153. Assertion: For biological functions in human body, barium is not required.
Reason: Barium is a divalent ion.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

154. Which one of the following properties of alkali metals increases in magnitude as the atomic number rises?
a) Ionic radius b) Melting point c) Electronegativity d) First ionization energy

155. When sodium is dropped in small amount of water it catches fire. Which one of the following burns in the process?
a) Na b) H_2O c) H_2 d) NaOH

156. The decreasing order of ionization enthalpy in alkali metals is:
a) Na> Li > K > Rb b) Rb < Na < K < Li c) Li > Na > K> Rb d) K < Li < Na < Rb

157. On reaction with dihydrogen the alkali metals
a) form hydrides which are ionic solids with high melting points
b) form hydrides which are molecular solids with low melting points
c) form hydrides which are ionic solids with low melting points
d) form hydrides which are non-stoichiometric

158. Match column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Li	(i)	M_2O_2
(B)	Na	(ii)	MO_2
(C)	Rb	(iii)	M_2O

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii) b) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (i)
c) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (ii) d) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (i)

159. Some of the Group 2 metal halides are covalent and soluble in organic solvents. Among the following metal halides, the one which is soluble in ethanol is
a) $BeCl_2$ b) $MgCl_2$ c) $CaCl_2$ d) $SrCl_2$

160. A substance which gives brick red flame and breaks down on heating to give oxygen and a brown gas is
a) magnesium nitrate b) calcium nitrate c) barium nitrate d) strontium nitrate

161. A chemical 'A' is used for the preparation of washing soda to recover ammonia. When CO2 is bubbled through an aqueous solution of 'A', the solution turns milky. It is used in white washing due to disinfectant nature. What is the chemical formula of 'A'?
a) $Ca(HCO_3)_2$ b) CaO c) $Ca(OH)_2$ d) $CaCO_3$

162. The ease of adsorption of the hydrated alkali metal ions on an ion exchange resins follows the order:
a) $Li^+ < K^+ < Na^+ < Rb^+$ b) $Rb^+ < K^+ < Na^+ < Li^+$ c) $K^+ < Na^+ < Rb^+ < Li^+$
d) $Na^+ < u^+ < K^+ < Rb^+$

163. Assertion: The carbonate of lithium decomposes easily on heating to form lithium oxide and CO_2.
Reason: Lithium being very small in size polarises large carbonate ion leading to the formation of more stable Li_2O and CO_2.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

164. Complete the following equations:
(i) $Na_2O_2 + 2H_2O \longrightarrow \underline{(W)} + H_2O_2$
(ii) $2KO_2 + 2H_2O \longrightarrow \underline{(X)} + \underline{(Y)} + O_2$
(iii) $Na_2O + CO_2 \longrightarrow \underline{(Z)}$

a)

W	X	Y	Z
4Na	K_2O	H_2O	Na_2O_2

b)

W	X	Y	Z
4Na	K_2O	H_2O_2	Na_2CO_3

c)

W	X	Y	Z
4NaOH	2KOH	H_2O	Na_2O_2

d)

W	X	Y	Z
2NaOH	2KOH	H_2O_2	Na_2CO_3

165. Which of the following alkaline earth metal sulphates has hydration enthalpy higher than the lattice enthalpy?
a) $CaSO_4$ b) $BeSO_4$ c) $BaSO_4$ d) $SrSO_4$

166. The correct order of increasing thermal stability of K_2CO_3, $MgCO_3$, $CaCO_3$ and $BeCO_3$ is:
a) $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$ b) $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$
c) $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$ d) $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$

167. Bleaching powder is obtained by the action of chlorine gas and
a) dilute solution of $Ca(OH)_2$ b) concentrated solution of $Ca(OH)_2$ c) dry CaO
d) dry slaked lime

168. The solubility of alkali metal salts in water is due to the fact that the cations get hydrated by water molecules. The degree of hydration depends upon the size of the cation. If the trend of relative ionic radii is $Cs^+ > Rb^+ > K^+ > Na^+ > Li^+$. What is the relative degree of hydration?
a) $CS^+_{(aq)} > Rb^+_{(aq)} > K^+_{(aq)} > Na^+_{(aq)} > Li^+_{(aq)}$ b) $Li^+_{(aq)} > Na^+_{(aq)} > K^+_{(aq)} > Rb^+_{(aq)} > Cs^+_{(aq)}$
c) $Na^+_{(aq)} > K^+_{(aq)} > Rb^+_{(aq)} > C^+_{(aq)} > Li^+_{(aq)}$ d) $Cs^+_{(aq)} > Na^+_{(aq)} > Li^+(aq) > K^+_{(aq)} > Rb^+_{(aq)}$

169. A white solid X reacts with dil. HCl to give colourless gas which is used in fire extinguishers. The solid X is
a) NaCl b) CH_3COONa c) Na_2CO_3 d) $NaHCO_3$

170. Assertion: $BeSO_4$ and $MgSO_4$ are insoluble in water.
Reason: Be^{2+} and Mg^{2+} have low hydration enthalpies.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

171. In the given chemical reactions,
$2P + H_2O + CO_2 \rightarrow Q \xrightarrow{H_2O+CO_2} 2R \xrightarrow{NaCl} S + NH_4Cl$ Identify S.
a) Na_2CO_3 b) NaOH c) $NaHCO_3$ d) NH_3

172. On heating which of the following releases CO_2 most easily?
a) Na_2CO_3 b) $MgCO_3$ c) $CaCO_3$ d) K_2CO_3

173. Which one of the following is present as an active ingredient in bleaching powder for bleaching action?
a) $CaOCl_2$ b) $Ca(OCl)_2$ c) CaO_2Cl d) $CaCl_2$

174. Bleaching powder reacts with a few drops of concentrated HCl to give:
a) Chlorine b) Hypochlorous acid c) Calcium oxide d) Oxygen

175. Which one of the following properties of alkali metals increases in magnitude as the atomic number rises?
a) Ionic radius b) Melting point c) Electronegativity d) First ionisation energy

176. The low solubility of LiF and that of CsI in water are respectively due to which of the properties of the alkali metal ions?
a) Higher hydration enthalpy of Li^+, higher lattice enthalpy of Cs^+
b) Smaller hydration enthalpy of Li^+, higher lattice enthalpy of Cs^+
c) Smaller lattice enthalpy of Li^+, higher hydration enthalpy of Cs^+
d) Higher lattice enthalpy of Li^+, smaller hydration enthalpy of Cs^+

177. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Quick lime	(i)	CaH_2
(B)	Slaked lime	(ii)	$Ba(OH)_2$
(C)	Baryta water	(iii)	$Ca(OH)_2$
(D)	Hydrolith	(iv)	CaO

a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv) b) (A) → (iii), (B) → (ii), (C) → (i), (D) → (iv)
c) (A) → (i), (B) → (iii), (C) → (iv), (D) → (ii) d) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)

178. Dead burnt plaster is
a) $CaSO_4$ b) $CaSO_4.\frac{1}{2}H_2O$ c) $CaSO_4.H_2O$ d) $CaSO_4.2H_2O$

179. The element A burns in nitrogen to give an ionic compound B. The compound B reacts with water to give C and D. A solution of C becomes milky on bubbling carbon dioxide. What is the nature of compound (D)?
a) Acidic b) Basic c) Amphoteric d) Neutral

180. Which of the following statements is correct regarding alkaline earth metals?
a) Alkaline earth metals are weaker reducing agents than alkali metals
b) Alkaline earth metal salts are paramagnetic in nature
c) Alkaline earth metal salts are more soluble than corresponding alkali metal salts
d) Solubility of sulphates of alkaline earth metals increases from top to bottom in the group

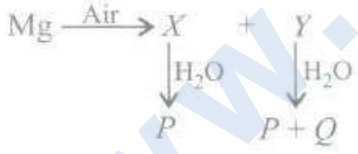
181. Which of the following statement is false?
a) Strontium decomposes water readily than beryllium.
b) $BaCO_3$ melts at a higher temperature than $CaCO_3$
c) Barium hydroxide is more soluble in water than $Mg(OH)_2$
d) Beryllium hydroxide is more basic than barium hydroxide.

182. One word answers are given for the following. Mark the example which is not correct
a) Alkali metal with lowest melting point - Cs
b) Alkaline earth metal with highest hydration enthalpy - Ba^{2+}
c) Alkaline earth metal which imparts brick red colour to the flame - Ca^{2+}
d) Oxide of alkaline earth metal which is amphoteric in nature - BeO

183. Which one of the following is present as an active ingredient in bleaching powder for bleaching action?
a) $Ca(OCl)_2$ b) CaO_2Cl c) $CaCl_2$ d) $CaOCl_2$

184. Equimolar solutions of the following were prepared in water separately. Which one of the solutions will record the highest pH?
a) $SrCl_2$ b) $BaCl_2$ c) $MgCl_2$ d) $CaCl_2$

185. What happens when magnesium is burnt in air and the products X and Yare treated with water?



a)

X	Y	P	Q
MgO	$Mg(OH)_2$	$Mg(OH)_2$	N_2

b)

X	Y	P	Q
MgO	Mg_3N_2	$Mg(OH)_2$	NH_3

c)

X	Y	P	Q
$Mg(OH)_2$	MgO	$Mg(OH)_2$	N_2

d)

X	Y	P	Q
MgO	$Mg(OH)_2$	N_2	$Mg(OH)_2$

186. The correct order of the mobility of the alkali metal ions in aqueous solution is:
a) $Li^+ > Na^+ > K^+ > Rb^+$ b) $Na^+ > K^+ > Rb^+ > u^+$ c) $K^+ > Rb^+ > Na^+ > Li^+$
d) $Rb^+ > K^+ > Na^+ > u^+$

187. Which is the correct sequence of solubility of carbonates of alkaline earth metals?
a) $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$ b) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$
c) $CaCO_3 > BaCO_3 > SrCO_3 > MgCO_3$ d) $BaCO_3 > CaCO_3 > SrCO_3 > MgCO_3$

188. Lithium salts are mostly hydrated like $LiCl \cdot 2H_2O$ due to
a) maximum ionisation enthalpy b) maximum degree of hydration of Li^+
c) maximum hygroscopic nature d) maximum chemical reactivity

189. The following metal ion activates many enzymes, participates in the oxidation of glucose to produce AIP and with Na, is responsible for the transmission of nerve signals.
a) Potassium b) Iron c) Copper d) Calcium

190. The average composition of portland cement is
a) CaO: 40 - 50%, SiO_2: 30 - 40% , Al_2O_3 Fe_2O_3 : 10 - 20%
b)
CaO: 50 - 60%, SiO_2 : 20 - 25%, Al_2O_3 : 5 - 10%, MgO : 2 - 3%, Fe_2O_3 : 1 - 2% and SO_3: 1-2%
c) SiO_2: 40 - 50%, CaO: 30 - 40%, Al_2O_3 : 10 - 20% d) CaO: 50%, SiO_2 : 50%

191. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:
Kieserite
a) $CaSO_4.2H_2O$ b) $CasO_4.\frac{1}{2}H_2O$ c) $MaSO_4.7H_2O$ d) $MgSO_4.H_2O$

192. Assertion: Alkaline earth metal oxides are quite stable to heat.
Reason: Enthalpies of formation of alkaline earth metal oxides are quite high.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

193. When sodium reacts with excess of oxygen, the oxidation number of oxygen changes from:
a) 0 to -1 b) 0 to -2 c) -1 to -2 d) No change

194. Among CaH_2, BeH_2, BaH_2, the order of ionic character is:
a) $BeH_2 < BaH_2 < CaH_2$ b) $CaH_2 < BeH_2 < BaH_2$ c) $BeH_2 < CaH_2 < BaH_2$
d) $BaH_2 < BeH_2 < CaH_2$

195. Which of the following is not present in portland cement?
a) $Ca_3Al_2O_6$ b) Ca_3SiO_5 c) Ca_2SiO_4 d) $Ca_3(PO_4)_2$

196. The ionisation energy of alkali metals decreases from Li to Cs because
a) the atomic size increases from Li to Cs
b) the distance between nucleus and outermost orbital decreases from Li to Cs
c) electropositive character decreases down the group
d) melting point decreases from Li to Cs

197. Which of the following metal ions play an important role in muscle contraction?
a) K^+ b) Na^+ c) Mg^{2+} d) Ca^{2+}

198. Identify the correct statement.
a) Gypsum is obtained by heating plaster of Paris
b) Plaster of Paris can be obtained by hydration gypsum
c) Plaster of Paris is obtained by partial oxidation gypsum
d) Gypsum contains a lower percentage of calcium than plaster of Paris

199. In the case of alkali metals, the covalent character decreases in the order:

a) MF > MCl > MBr > MI b) MF > MCl > MI > MBr c) MI > MBr > MCl > MF
d) MCl > MI > MBr > MF

200. Washing soda has formula
a) $Na_2CO_3 \cdot 7H_2O$ b) $Na_2CO_3 \cdot 10H_2O$ c) $Na_2CO_3 \cdot 3H_2O$ d) Na_2CO_3

201. Which of the following is known as fusion mixture?
a) Mixture of $Na_2CO_3 + NaHCO_3$ b) $Na_2CO_3 \cdot 10H_2O$
c) Mixture of $K_2CO_3 + Na_2CO_3$ d) $NaHCO_3$

202. An aqueous solution of sodium carbonate absorbs NO and NO_2 to give:
a) CO_2 + $NaNO_3$ b) CO_2 + $NaNO_2$ c) $NaNO_2$ + CO d) $NaNO_3$ + CO

203. A metal M readily forms its sulphate MSO_4 which is water soluble. It forms its oxide MO which becomes inert on heating. It forms its insoluble hydroxide $M(OH)_2$ which is soluble in NaOH solution. What would be M?
a) Be b) Ba c) Ca d) Mg

204. Which of the bicarbonates does not exist in solid state?
a) $NaHCO_3$ b) $KHCO_3$ c) $Ca(HCO_3)_2$ d) $RbHCO_3$

205. In Castner-Kellner cell for production of sodium hydroxide
a) Brine is electrolysed with Pt electrodes b) Brine is electrolysed using graphite electrodes
c) Molten sodium chloride is electrolysed
d) Sodium amalgam is formed at mercury cathode

206. The correct order of increasing thermal stability of
$K_2CO_3, MgCO_3, CaCO_3$ and $BeCO_3$ is
a) $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$
b) $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$
c) $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$
d) $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$

207. Dehydration of hydrates of halides of calcium, barium and strontium i.e., $CaCl_2 \cdot 6H_2O$, $BaCl_2 \cdot 2H_2O$, $SrCl_2 \cdot 6H_2O$, can be achieved by heating. These become wet on keeping in air. Which of the following statements is correct about these halides?
a) Act as dehydrating agent b) Can absorb moisture from air
c) Tendency to form hydrate decreases from calcium to barium d) All of the above

208. Which of the following has lowest thermal stability?
a) Li_2CO_3 b) Na_2CO_3 c) K_2CO_3 d) Rb_2CO_3

209. What is the formula of hydrated $BeCl_2$?
a) $BeCl_2 \cdot H_2O$ b) $BeCl_2 \cdot 2H_2O$ c) $BeCl_2 \cdot 3H_2O$ d) $BeCl_2 \cdot 4H_2O$

210. The mobilities of the alkali metal ions in aqueous solution are $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$ because
a) greater is the degree of hydration, lesser is the mobility in aqueous medium
b) larger the size of cation, greater is the mobility in aqueous medium
c) larger the size of cation, lesser is the mobility of ions in aqueous medium
d) lesser the degree of hydration, lesser is the mobility of ions in aqueous medium

211. What happens when H_2 is passed over lithium at 1073 K?

a) Covalent lithium hydride is formed b) Coloured complex is formed
c) Ionic lithium hydride is formed d) No reaction takes place

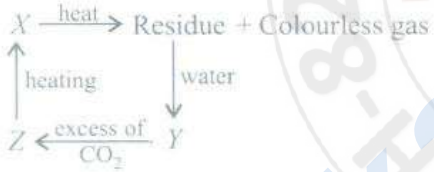
212. Which of the following statements is false?
a) Mg^{2+} ions form a complex with ATP b) Ca^{2+} ions are important in blood clotting
c) Ca^{2+} ions are not important in maintaining the regular beating of the heart
d) Mg^{2+} ions are important in the green parts of plants.

213. When kept open in air, the crystals of washing soda lose 9 molecules of water to form a monohydrate. $Na_2CO_3 .10H_2O \xrightarrow[to\ air]{exposed} Na_2CO_3.H_2O + 9H_2O$ This process is called
a) efflorescence b) deliquescence c) dehydration d) hydration

214. Identify W, X, Y, and Z respectively in the given reactions.

$CaCO_3 \xrightarrow{\triangle} W + X$
$W + H_2O \longrightarrow Y$
$Y + Z \longrightarrow NaOH + CaCO_3$
a) CaO, CO_2, $CaCO_3$, Na_2CO_3 b) CO_2, $Ca(OH)_2$, $Ca(HCO)_3$, $NaHCO_3$
c) CaO, CO_2, $Ca(OH)_2$, Na_2CO_3 d) CO_2, CaO, H_2CO_3, Na_2CO_3

215. Which of the following does not show diagonal relationship between beryllium and aluminium?
a) Both BeO and Al_2O_3 are amphoteric in nature
b) Both beryllium and aluminium form polymeric covalent hydrides
c) Both beryllium and aluminium form nitrides with nitrogen which evolve NH_3 with water
d) Both metal carbonates are highly stable

216. 

Identify X, Y and Z,

a)

X	Y	Z
$Ca(HCO_3)_2$	$CaCO_3$	$Ca(OH)_2$

b)

X	Y	Z
$CaCO_3$	$Ca(OH)_2$	$Ca(HCO_3)_2$

c)

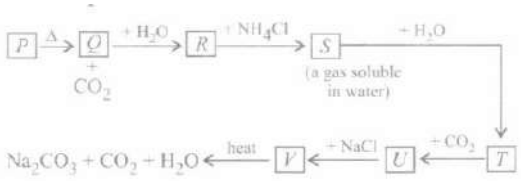
X	Y	Z
$CaCO_3$	CaO	$Ca(OH)_2$

d)

X	Y	Z
$CaCO_3$	CaO	$Ca(HCO_3)_2$

217. Assertion: Alkali metals are obtained by electrolysis of molten salt and not aqueous solution.
Reason: The discharge potential of H^+ ions is lower than alkali metal cation hence hydrogen is discharged at cathode instead of metal.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

218. Study the road map for preparation of washing soda and fill up the blanks.



a)

P	Q	R	S	T	U	V
$CaCO_3$	CaO	$Ca(OH)_2$	NH_3	NH_4OH	NH_4HCO_3	$NaHCO_3$

b)

P	Q	R	S	T	U	V
$CaCl_2$	CaO	$Ca(OH)_2$	HCl	HCl	$NaHCO_3$	HCl

c)

P	Q	R	S	T	U	V
$CaCl_2$	CaO	$CaCO_3$	NH_3	HCl	NH_4Cl	$NaHCO_3$

d)

P	Q	R	S	T	U	V
$CaCO_3$	CaO	$Ca(OH)_2$	HCl	Cl_2	$CaCl_2$	$NaHCO_3$

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Ravi Maths Tuition Centre

Time : 1 Mins **REDOX REACTION 1** **Marks : 673**

1. What will be the products of electrolysis of $AgNO_3$ solution in water with platinum electrodes?
   a) Ag is liberated at cathode and Ag is deposited in anode
   b) Ag is liberated at cathode and O_2 is liberated at anode.
   c) Ag is liberated at anode and water is liberated at cathode.
   d) Ag is liberated at cathode and silver oxide is liberated at anode.
2. In the reaction, $NaOH + H_2O \rightarrow NaOH + H2$
   a) H- is oxidised b) Na^+ is reduced c) both NaH and H_2O are reduced
   d) None of the above
3. Which of the following involves a redox reaction?
   a) Reaction of H_2SO_4 with NaOH
   b) Production of ozone from oxygen in the atmosphere by lightning
   c)
   Production of nitrogen oxides from nitrogen and oxygen in the atmosphere by lightning
   d) Evaporation of water
4. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
   Assertion: The only way to get F_2 from F^- is to oxidise electrolytically.
   Reason: The recovery of halogens from their halides requires an oxidation process.
   a)
   If both assertion and reason are true and reason is the correct explanation of assertion.
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion.
   c) If assertion is true but reason is false. d) If both assertion and reason are false.
5. $KMnO_4$ acts as an oxidising agent in alkaline medium, when alkaline $KMnO_4$ is treated with KI, iodine ion is oxidised to
   a) I_2 b) IO^- c) IO_3^- d) IO_4^-
6. Same amount of metal combines with 0.1 g of oxygen and 1 g of a halogen. Hence the equivalent mass of halogen is :
   a) 9 b) 35.5 c) 80 d) 127
7. The solution in a beaker turns blue if
   a) Cu electrode is placed in $ZnSO_4$ solution
   b) Cu electrode is placed in $AgNO_3$ solution
   c) Cu electrode is placed in $Al_2(SO_4)_3$ solution
   d) Cu electrode is placed in $FeSO_4$ solution
8. A solution of 0.IM $KMnO_4$ is used for the reaction $S_2O_3^{-2} + 2MnO_4^- + H_2O \rightarrow MnO_4^- + SO_4^{-2} + OH^-$. The volume of $KMnO_4$ required to react 0.158gm of $Na_2S_2O_3$ is (MW = 158)
   a) 13.33 ml b) 6.66 ml c) 3.33 ml d) 26.67 ml
9. (I) $H_2O_2 + O_3 \rightarrow H_2O + 2O_2$
   (II) $H_2O_2 + Ag_2O \rightarrow 2Ag + H_2O + O_2$
   Role of hydrogen peroxide in the above reaction is respectively:
   a) Oxidising in (I) and reducing in (II) b) Reducing in (I) and oxidizing in (II)
   c) Reducing in (I)and (II) d) Oxidising in (I) and (II)
10. Which of the following reactions takes place at anode?
    a) Reduction b) Oxidation c) Decomposition d) Dissolution

11. Consider the following reaction:
$HCHO + 2[Ag(NH_3)_2] + 30H^- \longrightarrow 2Ag + HCOO^- + 4NH_3 + 2H_2O$
Which of the following statements regarding oxidation and reduction is correct?
a) HCHO is oxidised to $HCOO^-$ and $[Ag(NH_3)_2]^+$ is reduced to Ag
b) HCHO is reduced to $HCOO^-$ and $[Ag(NH_3)_2]^+$ is oxidised to Ag.
c) $[Ag(NH_3)_2]^+$ is reduced to Ag while OH^- is oxidised to $HCOO^-$.
d) $[Ag(NH_3)_2]^+$ is oxidised to NH3 while HCHO is reduced to H_2O.

12. E^0 values of some redox couples are given below. On the basis of these values choose the correct option E^0 values:
$Br_2/Br^- = +1.90; Ag^+/Ag_{(s)} = +0.80; Cu^{2+}/Cu_{(s)} = +0.34; I_{2(s)}/I^- = +0.54V$
a) Cu will reduce Br^- b) Cu will reduce Ag c) Cu will reduce I^- d) Cu will reduce Br_2

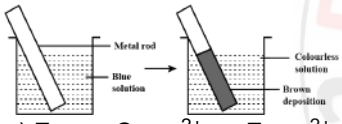
13. Which of the following is true about the given redox reaction?
$SnCl_2 + 2FeCl_3 \rightarrow SnCl_4 + 2FeCl_2$
a) $SnCl_2$ is oxidised and $FeCl_3$ acts as oxidising agent.
b) $FeCl_3$ is oxidised and acts as oxidising agent.
c) $SnCl_2$ is reduced and acts as oxidising agent.
d) $FeCl_3$ is oxidised and $SnCl_2$ acts as a oxidising agent.

14. In the preparation of HNO_3, we get NO gas by catalytic oxidation of ammonia. The moles of NO produced by the oxidation of two moles of NH_3 will be:
a) 2 b) 3 c) 4 d) 6

15. The oxidation number of Pt in $[Pt(C_2H_4)Cl_3]^-$ is:
a) +1 b) +2 c) +3 d) +4

16. The oxidation sate of -3 for phosphorus is in
a) hypophosphorous acid b) meta-phosphoric acid c) ortho-phosphoric acid
d) phosphorous acid

17. A redox reaction is shown in the diagrams. Identify the reaction.



a) $Zn_{(s)} + Cu_{(aq)}^{2+} \longrightarrow Zn_{(aq)}^{2+} Cu_{(s)}$ b) $Cu_{(s)} + 2Ag_{(aq)}^{+} \longrightarrow Cu_{(aq)}^{2+} + 2Ag_{(s)}$
c) $2Ag_{(s)} + Cu_{(aq)}^{2+} \longrightarrow 2Ag^{+}_{(aq)} + Cu_{(s)}$ d) $Cu_{(s)} + Zn^{2+}_{(aq)} \longrightarrow Cu^{2+}_{(aq)} + Zn_{(s)}$

18. When a piece of sodium metal is dropped in water, hydrogen gas evolved because
a) sodium is reduced and acts as an oxidising agent
b) water is oxidised and acts as a reducing agent
c) sodium loses electrons and is oxidised while water is reduced
d) water loses electrons and is oxidised to hydrogen.

19. The equivalent weight of $Na_2S_2O_3$ as reductant in the reaction, $Na_2S_2O_3 + H_2O + Cl_2 \rightarrow Na_2SO_4 + 2HCl + S$ is:
[Given: Molecular weight of $Na_2S_2O_3$ = M]
a) $\frac{M}{1}$ b) $\frac{M}{2}$ c) $\frac{M}{6}$ d) $\frac{M}{8}$

20. Which compound amongst the following has the highest oxidation number of Mn?
a) $KMnO_4$ b) K_2MnO_4 c) MnO_2 d) Mn_2O_3

21. Oxidation state of iron in $Fe(CO)_4$ is
a) +1 b) -1 c) +2 d) 0

22. The correct sequence of the oxidation state of underlined elements is
$Na_2[Fe(CN)_5NO]$, $K_2\underline{Ta}F_7$,Mg_2z07' $Na_2\underline{S}_4O_6$,$\underline{N}_3H$
a) +3, +5, +5, +2.5, $-\frac{1}{3}$ b) +5, +3, +5, +3, $+\frac{1}{3}$ c) +3, +3, +5, +5, $-\frac{1}{3}$
d) +5, +5, +3, +2.5,+ $\frac{1}{3}$

23. Given below are few statements regarding electrode potentials. Mark the correct statements.
(i) The potential associated with each electrode is known as electrode potential.
(ii) A negative E^0 means that the redox couple is a stronger reducing agent than H^+/H_2

couple.
(iii) A positive E^0 means that the redox couple is a weaker reducing agent than H^+/ H_2 couple.
a) (i) and (ii) b) (i) and (iii) c) (ii) and (iii) d) (i),(ii) and (iii)

24. MnO^-_4 ions are reduced in acidic condition to Mn^{2+} ions whereas they are reduced in neutral condition to MnO_2. The oxidation of 25 mL of a solution X containing Fe^{2+} ions required in acidic condition 20 mL of a solution Y containing $Mn0_4^-$ ions. What volume of solution Y would be required to oxidise 25 mL of solution X containing Fe^{2+} ions in neutral condition?
a) 11.4 mL b) 12.0 mL c) 33.3 mL d) 35.0 mL

25. Oxidation number of Cl in $NOClO_4$ is
a) +7 b) -7 c) +5 d) -5

26. Fluorine is best oxidising agent because
a) it is most electronegative. b) it has highest reduction potential.
c) it has highest oxidation potential. d) it has smallest size.

27. Which of the following is correct representation of a given molecular equation in ionic form?
$K_2Cr_2O_7 + 7H_2SO_4 + 6FeSO_4 \rightarrow 3Fe_2(SO_4)_3 + Cr_2(SO_4)_3 + K_2SO_4 + 7H_2O$
a) $Cr_2O_7^{2-} + 14H^+ + 6Fe^{2+} \rightarrow 6Fe^{3+} + 2Cr^{3+} + 7H_2O$
b) $2K^+ + Cr_2O_7^{2-} + 7SO_4^{2-} + 6Fe_{2+} \rightarrow 3Fe^{3+} + SO_7^{2-} + Cr^{3+} + K^+ + 7H_2O$
c) $Cr_2O_7^{2-} + 2K^+ + 7H^+ + 6Fe^{2+} \rightarrow 6Fe^{3+} + 6Cr^{3+} + K^+$
d) $Cr_2O_7^{2-} + 7H^+ + 6Fe^{2+} \rightarrow 3Fe^{2+} + 2Cr^{3+} + 2K^+ + 7H_2O$

28. Given below is a redox reaction. Which of the following types the reaction belongs to?
+2+6-2 0 0 +2+6+-2
$CuSO_{4(aq)} + Zn_s \rightarrow Cu_s + ZnSO_{4(aq)}$
a) Combination reaction b) Decomposition reaction c) Metal displacement reaction
d) Non-metal displacement reaction

29. In the redox reaction,
$Pb_3O_4 + 8HCl \rightarrow 3PbCl_2 + Cl_2 + 4H_2O$
a) three numbers of Pb^{2+} ions get oxidised to Pb^{4+} state
b)
one number Pb^{4+} ion gets reduced to Pb^{2+} and two numbers of Pb^{2+} ions remain unchanged in their oxidation state
c)
one number Pb^{2+} ion gets oxidised to Pb^{4+} and two numbers of Pb^{4+} ions remain unchanged in their oxidation states
d) three numbers of Pb^{4+} ions get reduced to Pb^{2+} state.

30. Thiosulphate reacts differently with iodine and bromine in the reactions given below
$2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2} + 2I^-$; $S_2O_3^{2-} + 2Br_2 + 5H_2O \rightarrow 2SO_4^{2-} + 2Br^- + 10H^+$
Which of the following statement justifies the above dual behaviour of thiosulphate?
a) Bromine is a stronger oxidant than iodine
b) Bromine is a weaker oxidant than iodine
c)
Thiosulphate undergoes oxidation by bromine and reduction by iodine in these reactions
d) Bromine undergoes oxidation and iodine undergoes reduction in these reactions

31. Which of the following are the common oxidising agents used in redox titrations?
a) $K_2Cr_2O_7$, $KMnO_4$, Iodine b) $FeSO_4$, $KMnO_4$, Sodium thiosulphate
c) Oxalic acid, $KMnO_4$, $CuSO_4$ d) Mohr's salt, KI, Sodium sulphate

32. Using the standard electrode potential, find out the pair between which redox reaction is not feasible.
E^0 values :
$Fe^{3+}/Fe^{2+} = +0.77; I_2/I^- = +0.54; Cu^{2+}/Cu = +0.34; Ag^+/Ag = +0.80V$
a) Fe^{3+} and I^- b) Ag^+ and Cu c) Fe^{3+} and Cu d) Ag and Fe^{3+}

33. Write the following ions in order of decreasing capacity to accept electrons. H^+, Mg^{2+}, K^+, Ag^+, Zn^{2+}
a) $Ag^+ > H^+ > Zn^{2+} > Mg^{2+} > K^+$ b) $H^+ > Zn^{2+} > Mg^{2+} > K^+ > Ag^+$
c) $K^+ > Mg^{2+} > Zn^{2+} > H^+ > Ag^+$ d) $Mg^{2+} > Zn^{2+} > K^+ > Ag^+ > H^+$

34. Match the column I with column II and mark the appropriate choice.

	Column I (Compound)		**Column II (Oxidation stateof Fe)**
(A)	$K_3[Fe(OH)_6]$	(i)	+8/3
(B)	$K_2[FeO_4]$	(ii)	+2
(C)	$FeSO_4.(NH_4)_2\ SO_4.6H_2O$	(iii)	+2
(D)	Fe_3O_4	(iv)	+6

a) (A) → (iii), (B) → (i), (C) → (ii), (D) → (iv)
b) (A) → (iii), (B) → (iv), (C) → (ii), (D) → (i)
c) (A) → (i), (B) → (iii), (C) → (ii), (D) →(iv)
d) (A) → (iv), (B) → (ii), (C) → (i), (D)→ (iii)

35. The largest oxidation number exhibited by an element depends on its outer electronic configuration. With which of the following outer electronic configurations the element will exhibit largest oxidation number?
a) $3d^14s^2$ b) $3d^34s^2$ c) $3d^54s^1$ d) $3d^54s^2$

36. In the reaction: $Cl_2 + OH^- \rightarrow Cl^- + ClO_4^- + H_2O$
a) Chlorine is oxidised. b) Chlorine is reduced.
c) Chlorine is oxidised as well as reduced. d) Chlorine is neither oxidised nor reduced.

37. Which of the following is not a rule for calculating oxidation number?
a) For ions, oxidation number is equal to the charge on the ion.
b) The oxidation number of oxygen is -2 in all of its compounds.
c) The oxidation number of fluorine is -1 in all of its compounds.
d)
Oxidation number of hydrogen is + 1 except in binary hydrides of alkali metals and alkaline earth metals where it is -1.

38. In which of the following compounds, an element exhibits two different oxidation states?
a) NH_2OH b) NH_4NO_3 c) N_2H_4 d) N_3H

39. Zn gives H_2 gas with H_2SO_4 and HCl but not with HNO_3 because
a) Zn acts as an oxidising agent when it reacts with HNO_3
b) HNO_3 is weaker. acid than H_2SO_4 and HCl
c) In electrochemical series, Zn is above hydrogen
d) NO^-_3 is reduced in preference to hydronium ion

40. The element that does not show positive oxidation state is
a) O b) N c) Cl d) F

41. Fill up the table from the given choice.

Element	**Oxidation number**
Oxygen	-2 in most compounds _(i)_ in H_2O_2 and_(ii)_ in OF_2
Halogen	-1 for _(iii)_ in all its compounds
Hydrogen	_(iv)_ in most of its compounds _(v)_ in binary metallic hydrides
Sulphur	_(vi)_ in all sulphides

a)

(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**	**(vi)**
+1	+1	Cl	+1	-1	+2

b)

(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**	**(vi)**
-1	+2	F	+1	-1	-2

c)

(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**	**(vi)**
-1	+1	F	+1	+2	+2

d)

(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**	**(vi)**
+1	+2	Cl	+1	+1	+6

42. How many moles of $KMnO_4$ are needed to oxidised a mixture of 1 mole of each $FeSO_4$ & FeC_2O_4 in acidic medium
a) 4/5 b) 5/4 c) 3/4 d) 5/3

43. What is Eo_3 in the following reaction, $2O_3 \rightarrow 3O_2$
a) 16 b) 48 c) 32 d) 8

44. Oxidation number of sulphur in peroxomonosulphuric acid (H_2SO_5) is
a) +6 b) +7 c) +8 d) 0

45. The charge on cobalt in $[Co(CN)_6]^{3-}$ is
a) +3 b) -3 c) +6 d) -6

46. Which of the following statements is not correct about the given reaction?
$$K_4[Fe(CN)_6] \xrightarrow{Oxidation} Fe^{3+} + CO_2 + NO_3^-$$
a) Fe is oxidised from Fe^{2+} to Fe^{3+}. b) Carbon is oxidised from C^{2+} to C^{4+}.
c) N is oxidised from N^{3-} to N^{5+}. d) Carbon is not oxidised.

47. Which of the following statements is correct regarding redox reactions?
a) An increase in oxidation number of an element is called reduction.
b) A decrease in oxidation number of an element is called oxidation.
c)
A reagent which lowers the oxidation number of an element in a given substance is reductant.
d)
A reagent which increases the oxidation number of an element in a given substance is reductant.

48. Which of the following acts as a self-indicator?
a) $K_2Cr_2O_7$ b) $KMnO_4$ c) Oxalic acid d) Iodine

49. Which of the following is an atom of tritium?
a) b) c) d)

50. $Cr(OH)_3 + H_2O_2 \xrightarrow{alkali} CrO_4^{2-} + H_2O$ the number of OH^- required to balance the above equation
a) 1 b) 3 c) 4 d) 6

51. Correct order of tendency to loss of electrons
a) Zn > Cu > Ag b) Zn < Cu < Ag c) Zn > Cu < Ag d) Cu> Zn > Ag

52. The oxidation number of phosphorus in $Mg_2P_2O_7$ is
a) +5 b) -5 c) +6 d) -7

53. The standard E^0 values of few redox couples are Zn^{2+}/Zn = -0.76 V, Ag^+/Ag = + 0.80 V,Cu^{2+}/Cu = 0.34 V.Choose the correct option.
a) Ag can oxidise Zn and Cu b) Ag can reduce Zn^{2+} and Cu^{2+}.
c) Zn can reduce Ag^+ and Cu^{2+}. d) Cu can reduce Zn^{2+} and Ag^+.

54. In the reaction; $As_2S_3 + HNO_3 \rightarrow H_3AsO_4 + H_2SO_4 + NO$, the element oxidised is/are:
a) As only b) S only c) N only d) As and S both

55. Thiosulphate reacts differently with iodine and bromine in the reactions given below:
$$2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I_-$$
$$S_2O_3^{2-} + 2Br_2 + 5H_2O \rightarrow 2SO_4^{2-} + 2Br^- + 10H^+$$
Which of the following statements justifies the above dual behaviour of thiosulphate?
a) Bromine is a stronger oxidant than iodine
b) Bromine is a weaker oxidant than iodine.
c)
Thiosulphate undergoes oxidation by bromine and reduction by iodine in these reactions.
d) Bromine undergoes oxidation and iodine undergoes reduction in these reactions.

56. Arrange the following metals in which they displace each other from the solutions of their salts in decreasing order. Al, Cu, Fe, Mg and Zn.
$[E^0_{Al^{3+}/Al} = -1.66V,\ E^0_{Cu^{2+}/Cu} = +0.34V,\ E^0_{Fe^{2+}/Fe} = -0.44V,\ E^0_{Mg^{2+}/Mg} = -2.36V,\ and\ E^0_{Zn^{2+}/Zn} = -0.$
a) Cu, Fe, Zn, Al, Mg b) Fe, Zn, Cu, Al, Mg c) Mg, Cu, Fe, Zn, Al
d) Mg, Al, Zn, Fe, Cu

57.

	List-I	List-II
A)	+3 Oxidation state	1) Nitrogen
B)	+ 1 Oxidation state	2) Nitrous oxide

C) 0 Oxidation state 3) Nitrate ion
D) + 5 Oxidation state4) Hydroxylamine
5) Nitrite ion

The correct match is

a)	b)	c)	d)
ABCD	**ABCD**	**ABCD**	**ABCD**
1 4 3 2	5 2 4 3	4 5 3 1	5 2 1 3

58. What are the oxidation states of phosphorus in the following compounds?
H_3PO_2, H_3PO_4, $Mg_2P_2O_7$, PH_3, HPO_3
a) +1, +3, +3, +3, +5 b) +3, +3, +5, +5, +5 c) +1, +2, +3, +5, +5
d) +1, +5, +5, -3, +5

59. The number of moles of MnO_4^- and $Cr_2O_7^{2-}$ separately required to oxidise 1 mole of FeC_2O_4 each in acidic medium respectively are:
a) 0.5, 0.6 b) 0.6, 0.4 c) 1.2, 0.5 d) 0.6, 0.5

60. The eq.wt of iodine in, $I_2 + 2S_2O_3^{2-} \rightarrow 2I^- + S_4O_6^{2-}$ is equal to:
a) mol.wt b) mol.wt/2 c) mol. wt/4 d) none of these

61. Oxidation number of iodine in IO_3^-, IO_4^-, KI and I_2 respectively is
a) -2, -5, -1, 0 b) +5, +7, -1, 0 c) +2, +5, +1, 0 d) -1,+1,0,+1

62. What is the oxidation state of P in $Ba(H_2pO_2)_2$?
a) +3 b) +2 c) +1 d) -1

63. The oxidation number of phosphorus in $Ba(H_2PO_2)_2$ is:
a) +3 b) +2 c) +1 d) -1

64. In estimation of Fe^{2+} by $KMnO_4$, HNO_3 cannot be used in place of H_2SO_4 because
a) HNO_3 oxidised Fe^{2+} b) HNO_3 reduces MnO_4^- c) HNO_3 reduces Fe^{2+}
d) HNO_3 oxidised Mn^{2+}

65. How many electrons are transferred from reductant to oxidant in the following redox process?
$As_2S_3 + HNO_3 \rightarrow H_3ASO_4 + H_2SO_4 + NO$
a) 2 b) 4 c) 24 d) 84

66. Oxidation numbers of Mn in its compounds $MnCl_2$, $Mn(OH)_3$, MnO_2 and $KMnO_4$ respectively are
a) +2, +4, +7, +3 b) +2, +3, +4, +7 c) +7, +3, +2, +4 d) +7, +4, +3, +2

67. Oxidation number of Cr in K_3CrO_8 is
a) +3 b) +5 c) +8 d) +6

68. In the reaction, $I_2 + 2KClO_3 \longrightarrow 2KIO_3 + Cl_2$
i) Iodine is oxidised ii) Chlorine is reduced iii) Iodine displaces chlorine iv) KCl03 is decomposed
The correct combination is
a) Only i & iv are correct b) Only iii & iv are correct c) i, ii, iii are correct
d) All are correct

69. In the conversion of Br_2 to BrO_3^-, the oxidation state of bromine changes from
a) 0 to + 5 b) -1 to + 5 c) 0 to - 3 d) + 2 to + 5

70. Given
$E^0_{Ag^+/Ag} = +0.80V$; $E^0_{Cu^{2+}/Cu} = +0.34V$; $E^0_{Fe^{3+}/Fe^{2+}} = +0.76V$; $E^0_{Ce^{4+}/Ce^{3+}} = +1.60V$ Which of the following statements is not correct?
a) Fe^{3+} does not oxidise Ce^{3+}. b) Cu reduces Ag^+ to Ag.
c) Ag will reduce Cu^{2+} to Cu. d) Fe^{3+} reduces Cu^{2+} to Cu.

71. In the conversion of K_2Cr 207 to K_2CrO_4 the oxidation number of the following changes
a) K b) Cr c) Oxygen d) None

72. The most stable oxidation state of chromium is
a) + 5 b) + 3 c) + 2 d) + 4

73. The oxidation number of Cr in CrO_5 which has the following structure is

a) +4 b) +5 c) +6 d) +3

74. n-factors for Cu_2S and CuS when they react with $KMnO_4$ in acidic medium are (neglecting the further oxidation of released SO_2)
a) 7,7 b) 6,6 c) 6,8 d) 8,6

75. The eq. mass of $KMnO_4$ in the reaction, $MnO_4^- + Mn^{2+} + H_2O \rightarrow MnO_2 + H^+$ (unbalanced) is
a) 52.7 b) 158 c) 31.6 d) 105.4

76. The reaction is balanced if, $5H_2O_2 + XClO_2 + 2OH^- \rightarrow XCl^- + YO_2 + 6H_2O$
a) X = 5, Y = 2 b) X = 2, Y = 5 c) X = 4, Y = 10 d) X = 5, Y = 5

77. For the reaction: $I^- + ClO^-_3 + H_2SO_4 \rightarrow Cl^- + HSO^-_4 + I_2$
The incorrect statement in the balanced equation is
a) stoichiometric coefficient of HSO^-_4 is 6 b) iodide is oxidized c) sulphur is reduced
d) H_2O is one of the products.

78. Co-ordination nurnber and oxidation state of Cr in $K_3[Cr(C_2O_4)_3]$ are, respectively
a) 3 and + 3 b) 3 and 0 c) 6 and + 3 d) 4 and + 2

79. Oxidation state of nitrogen is incorrectly given for

a)		b)	
Compound	Oxidation state	Compound	Oxidation state
$[Co(NH_3)_5Cl]Cl_2$	-3	NH_2OH	-1
c)		d)	
Compound	Oxidation state	Compound	Oxidation state
$(N_2H_5)_2SO_4$	+2	Mg_3N_2	-3

80. Which of the following chemical reactions depicts the oxidising behaviour of H_2SO_4?
a) $2PCl_5 + H_2SO_4 \rightarrow 2POCl_3 + 2HCl + SO_2Cl_2$
b) $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$ c) $NaCl + H_2SO_4 \rightarrow NaHSO_4 + HCl$
d) $2HI + H_2SO_4 \rightarrow I_2 + SO_2 + 2H_2O$

81. On electrolysis of dilute sulphuric acid using platinum electrodes, the product obtained at the anode will be :
a) Hydrogen b) Oxygen c) Hydrogen Sulphide d) Sulphur Dioxide

82. Oxidation number of Cr in CrO_5 is:
a) +5 b) -3 c) +6 d) +7

83. In the reaction, $2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I^-$: The eq. mass of $Na_2S_2O_3$ is equal to its
a) M b) M/2 c) 2 x M d) M/6

84. Based on the following reactions, arrange the metals in increasing order of their reduction potentials.
$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu;$
$Mg + Zn^{2+} \rightarrow Mg^{2+} + Zn;$
$Cu + 2Ag^{2+} \rightarrow Cu^{2+} + 2Ag$
a) Mg>Zn>Cu>Ag b) Mg < Zn < Cu < Ag c) Zn < cu < Ag < Mg d) Mg>Cu>Zn>Ag

85. $2CuI \rightarrow Cu + CuI_2$, the reaction is
a) disproportionation b) Neutralisation c) Oxidation d) Reduction

86. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Conversion of potassium ferrocyanide to potassium ferricyanide is an oxidation process.
Reason: Oxidation is the addition of oxygen/ electronegative element to a substance or removal of hydrogen/electropositive element from a substance.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

87. In which of the following compounds oxygen exhibits an oxidations state of + 2?
a) H_2O b) H_2O_2 c) OF_2 d) H_2SO_4

88. For the reaction, $N_2 + 3H_2 \rightarrow 2NH_3$ if E_1 and E_2 equivalent masses of NH_3 and N_2 respectively then $E_1 - E_2$ is
a) 1 b) 2 c) 3 d) 4

89. In the reaction or chlorine with dry slaked lime, the oxidation number of chlorine changes
(i) from -1 to +1 (ii) from -1 to +1 (iii) from zero to -1 (iv) from zero to + 1
The correct combination is
a) ii & iii are correct b) iii & iv are correct c) i & ii are correct d) All are correct

90. In which of the following reactions, the underlined substance has been reduced?
a) $\underline{CO}+CuO \rightarrow CO_2+Cu$ b) $\underline{CuO}+2HCl \longrightarrow CuCl_2+H_2O$ c) $\underline{4H_2O}+3Fe \longrightarrow 4H_2+Fe_3O_4$
d) $\underline{C}+4HNO_3 \longrightarrow CO_2+2H_2O+4NO_2$

91. What is the equivalent mass of $KBrO_3$ in the given reaction?
$BrO_3^- + 5Br^- + 6H^+ \longrightarrow 3Br_2 + 3H_2O$
a) M/8 b) M/3 c) M/5 d) M/6

92. Which of the following reactions is an example of auto reduction?
a) $Fe_3O_4 + 4CO \rightarrow 3Fe + 4CO_2$ b) $Cu_2O + C \rightarrow 2Cu + CO$
c) $Cu^{2+}_{(aq)} + Fe_{(g)} \rightarrow CU_{(s)} + Fe^{2+}_{(aq)}$ d) $Cu_2O + \frac{1}{2}Cu_2S \rightarrow 3Cu + \frac{1}{2}SO_2$

93. Which of the following is a disproportionation reaction?
a) $Cl_{2(g)} + 2OH^-_{(aq)} \rightarrow ClO^-_{(aq)} + Cl^-_{(aq)} + H_2O_{(l)}$ b) $Cl_{2(g)} + 2I^-_{(aq)} \rightarrow 2Cl^-_{(aq)} + I_{2(s)}$
c) $2Fe_{(s)} + 3H_2O_{(l)} \xrightarrow{\Delta} Fe_2O_{3(s)} + 3H_{2(g)}$ d) $2H_2O_{(l)} + 2F_{2(g)} \rightarrow 4HF_{(aq)} + O_{2(g)}$

94. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: HNO_2 can act both as a reducing agent and an oxidising agent.
Reason: In HNO_2, oxidation state of nitrogen is +3 which can change from -3 to +5.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false

95. What is the correct representation of reaction occurring when HCl is heated with MnO_2?
a) $MnO_4^- + 5Cl^- + 8H^+ \rightarrow Mn^{2+} + 5Cl^- + 5H_2O$
b) $MnO_2 + 2Cl^- + 4H^+ \rightarrow Mn^{2+} + Cl_2 + 2H_2O$
c) $2MnO_2 + 4Cl^- + 8H^+ \rightarrow 2Mn^{2+} + 2Cl_2 + 4H_2O$
d) $MnO_2 + 4HCl \rightarrow MnCl_4 + Cl_2 + H_2O$

96. In which of the following the oxidation state of chlorine is +5?
a) $HClO_4$ b) $HClO_3$ c) $HClO_2$ d) HCl

97. In a conjugate pair of reductant and oxidant, the reductant has:
a) higher ox. no. b) lower ox.no. c) same ox. no. d) either of these

98. Phosphorus on reaction with NaOH produces PH_3 and NaH_2PO_2. This reaction is an example of
a) oxidation b) reduction c) disproportionation d) displacement.

99. For the reaction : $F_2 + H_2O \xrightarrow[\text{temperature}]{\text{Ice cold}} HOF + HF$ Which one is not correct?
a) It is intramolecular redox reaction b) It is intermolecular redox reaction
c) It is auto redox reaction d) It is a disproportionation reaction

100. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: A metal having negative reduction potential when dipped in the solution of its own ions has a tendency to pass into solution.
Reason: Metals undergo reduction.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

101. A metal X displaces nickel from nickel sulphate solution but does not displace manganese from manganese sulphate solution. What is the correct order of their reducing powers?
a) Ni > Mn > X b) X > Mn > Ni c) Mn > X > Ni d) Mn > Ni > X

102. What will be the balanced equation in acidic medium for the given reaction?
$Cr_2O^{2-}_{7(aq)} + SO_{2(g)} \rightarrow Cr^{3+}_{(aq)} + SO^{2-}_{4(aq)}$
a) $Cr_2O^{2-}_{7(aq)} + 3SO_{2(g)} + 2H^{+}_{(aq)} \rightarrow 2Cr^{3+}_{(aq)} + 3SO^{2-}_{4(aq)} + H_2O_{(l)}$
b) $2Cr_2O^{2-}_{7(aq)} + 3SO_{2(g)} + 4H^{+}_{(aq)} \rightarrow 4Cr^{3+}_{(aq)} + 3SO^{2-}_{4(aq)} + 2H_2O_{(l)}$
c) $Cr_2O^{2-}_{7(aq)} + 3SO_{2(g)} + 14H^{+}_{(aq)} \rightarrow 2Cr^{3+}_{(aq)} + 3SO^{2-}_{4(aq)} + 7H_2O_{(l)}$
d) $Cr_2O^{2-}_{7(aq)} + 6SO_{2(g)} + 7H^{+}_{(aq)} \rightarrow 2Cr^{3+}_{(aq)} + 6SO^{2-}_{4(aq)} + 7H_2O_{(l)}$

103. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Inert electrolytes like KCl, KNO_3 are used in salt bridge.
Reason: Salt bridge provides an electric contact between the two solutions without allowing them to mix with each other.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

104. What mass of HNO_3 is needed to convert 5 g of iodine into iodic acid according to the reaction? (at mass of I = 127 u)
a) 12.4g b) 24.8g c) 0.24g d) 49.6g

105. The oxidation number of phosphorus in pyrophosphoric acid is:
a) +3 b) +1 c) +4 d) +5

106. Which of the following is not a redox reaction?
a) CuO+ $H_2 \longrightarrow$ Cu + H_2O b) Na + $H_2O \longrightarrow$ NaOH + 1/2 H_2 c) $CaCO_3 \longrightarrow$ CaO + CO_2
d) 2K + $F_2 \longrightarrow$ 2KF

107. Which of the following is not decomposition reactions?
a) $2HgO \rightarrow 2Hg + O_2$ b) $2H_2O \rightarrow 2H_2 + O_2$ c) $2KClO_3 \rightarrow 2KCl + 3O_2$
d) $CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(1)}$

108. When a manganous salt is fused with a mixture of KNO_3 and solid NaOH the oxidation number of Mn changes from +2 to ?
a) +4 b) +3 c) +6 d) +7

109. As the oxidation state for any metal increases, the tendency to show ionic nature:
a) Decreases b) Increases c) Remains same d) None of these

110. In which of the following compounds oxidation state of chlorine has two different values?
a) $CaCl_2$ b) NaCl c) $CaOCl_2$ d) CCl_4

111. The pair of compounds that can exist together is :
a) $FeCl_3$, $SnCl_2$ b) $HgCl_2$, $SnCl_2$ c) $FeCl_2$, $SnCl_2$ d) $FeCl_3$, KI

112. n-factor of H_3PO_2 during its diproportionation is $3H_3PO_2 \longrightarrow PH_3 + 2H_3PO_3$
a) 1 b) 2 c) 4/3 d) 3/4

113. Equivalent mass of N_2 in the change $N_2 \rightarrow NH_3$ is
a) 28/6 b) 28 c) 28/2 d) 28/3

114. Which one is not correct for the reaction $(CN)_2 + H_2O \rightarrow HCN + HOCN$?
a) It is an auto redox change
b) Oxidation number of C in $(CN)_2$, HCN and HOCN are +3, +2 and +4 respectively
c) Oxidation number of n in $(CN)_2$, HCN and HOCN are +3, +2 and +4 respectively
d) The resultant solution is acidic

115. For the redox reaction $MnO_4^- + C_2O_4^{2-} + H^+ \longrightarrow Mn^{2+} + CO_2 + H_2O$. The correct coefficients of the reactants for the balanced equation are:

a)

MnO_4^-	$C_2O_4^{2-}$	H^+
2	5	16

b)

MnO_4^-	$C_2O_4^{2-}$	H+
16	5	2

c)

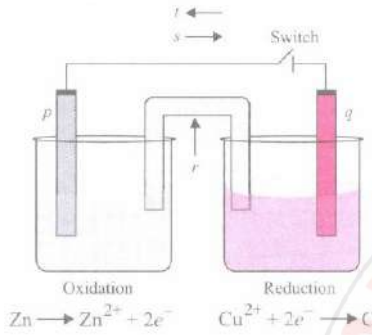
MnO_4^-	$C_2O_4^{2-}$	H+
5	16	5

d)

MnO_4^-	$C_2O_4^{2-}$	H+
2	15	5

116. Most stable oxidation state of gold is
a) +1 b) +3 c) +2 d) +4

117. Given below is the set up for Daniell cell. Label p, q, r, s, t in the given figure.



a)

p	q	r	s	t
Anode	Cathode	Salt bridge	Electron flow	Current flow

b)

p	q	r	s	t
Cathode	Anode	Salt bridge	Electron flow	Current flow

c)

p	q	r	s	t
Anode	Cathode	Salt bridge	Electron flow	Current flow

d)

p	q	r	s	t
Cathode	Anode	Salt bridge	Electron flow	Current flow

118. In acidic medium, H_2O_2 changes $Cr_2O_7^{2-}$ to CrO_5, which has two (__O__O__) bonds. The oxidation state of Cr in CrO_5 is:
a) +5 b) +3 c) +6 d) -10

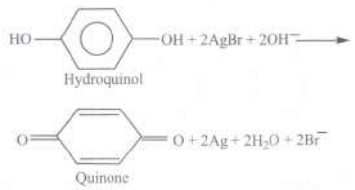
119. The oxidation number of 'Mn' in potassium permanganate is
a) +6 b) +7 c) +5 d) +8

120. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: ClO^-_4 does not show disproportionation reaction.
Reason: In ClO^-_4, chlorine is present in its highest oxidation state.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

121. A compound contains atoms of three-element A, B and C . If the oxidation number of A is +2. B is +5. and that of C is -2 the possible formula of the compound is
a) $A(BC_3)_2$ b) $A_3(BC_4)_2$ c) $A_3(B_4C)_2$ d) ABC_2

122. A mole of N_2H_4 loses 10 mol of electrons to form a new compound Y. Assuming that all the nitrogen appears in the new compound, what is the oxidation state of nitrogen in Y? (There is no change in the oxidation number of hydrogen.)
a) -1 b) -3 c) +3 d) +5

123. Select the incorrect statement for developing of an exposed cameta film involving the reaction



a) Hydroquinol acts as reductant b) Ag^+ acts as oxidant
c) Hydroquinol and AgBr undergoes redox change d) It is intramolecular change

124. The equivalent mass of iron in Fe_2O_3 would be
a) 18.6 b) 28 c) 56 d) 11

125. The number of electrons involved in the conversion of MnO^-_4 to MnO_2 is
a) 3 b) 4 c) 1 d) 2

126. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: All halogens undergo disproportionation reaction in alkaline medium.
Reason: All halogens exhibit variable oxidation states.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

127. Which of the following reactions will not take place at cathode?
a) $Ag^+ \rightarrow Ag - e^-$ b) $Fe^{2+} \rightarrow Fe^{3+} + e^-$ c) $Cu^{2+} + 2e^- \rightarrow Cu$ d) $Al^{3+} \rightarrow Al - 3e^-$

128. Which is not true about the oxidation state of the following elements?
a) Sulphur +6 to -2 b) Carbon +4 to-4 c) Chlorine +7 to -1 d) Nitrogen +3 to-1

129. The oxidation state of molybdenum in its oxo complex species $[Mo_2O_4(C_2H_4)_2(H_2O_2)]^{2-}$ is
a) +2 b) +3 c) +4 d) +5

130. Oxidation number of chlorine in chlorine heptaoxide is
a) +1 b) +4 c) +6 d) +7

131. Which type of redox reaction is shown by the following reaction?
0 +1-1 +1-1 0
$Cl_{2(g)} + 2KBr_{(aq)} \rightarrow 2KCl_{(aq)} + Br_{2(l)}$
a) Non-metal displacement reaction b) Disproportionation reaction
c) sodium loses electrons and is oxidised while water is reduced
d) water loses electrons and is oxidised to hydrogen.

132. The oxidation number of chromium in potassium dichromate is:
a) +6 b) -5 c) -2 d) +2

133. A mixture of potassium chlorate, oxalic acid and sulpluric acid is heated. During the reaction which element undergoes maximum change in the oxidation number?
a) S b) H c) CL d) C

134. Which of the following oxidation numbers is not correctly matched?
a) Pin NaH_2PO_4 = +5 b) Ni in $[Ni(CN)_6]^{4-}$ = +2 c) P in $Mg_2P_2O_7$ = +6
d) Cr in $(NH_4)_2Cr_2O_7$ = +6

135. A solution contains mixture of H_2SO_4, $H_2C_2O_4$. 20 ml of this solution requires 40 ml of M/10 NaOH for neutralization and 20 ml of N/10 $KMnO_4$ for oxidation. The molarity of $H_2C_2O_4$, H_2SO_4 are:
a) 0.1, 0.1 b) 0.1, 0.05 c) 0.05, 0.01 d) 0.05, 0.05

136. Carbon is in the lowest oxidation state in
a) CH_4 b) CCl_4 c) CF_4 d) CO_2

137. Indicate whether the following conversions represent an oxidation, a reduction or none (neither oxidation nor reduction).
(i) $HClO_3$ to $HClO_4$

(ii) NH^+_4 to NH_3
(iii) NO_2 to N_2O_4
(iv) HSO^-_3 to SO^{2-}_4
(v) H_2O_2 to H_2O

a)

(i)	(ii)	(iii)	(iv)	(v)
Oxidation	Reduction	None	None	Oxidation

b)

(i)	(ii)	(iii)	(iv)	(v)
Oxidation	None	None	Oxidation	Reduction

c)

(i)	(ii)	(iii)	(iv)	(v)
Reduction	Oxidation	Reduction	None	Reduction

d)

(i)	(ii)	(iii)	(iv)	(v)
Oxidation	Reduction	None	Reduction	Reduction

138. Arrange the following metals in increasing order of their reducing power.
[Given:
$E^0_{K^+/K} = -2.93V,\ E^0_{Ag^+/Ag} = +0.80V,\ E^0_{AI^{3+}/AI} = -1.66V,\ E^0_{Au^{3+}/Au} = +1.40V,\ E^0_{Li^+/Li} = -3.05V$]
a) Li < K < AI < Ag < Au b) Au < Ag < AI < K < Li c) K < AI < Au < Ag < Li
d) AI < Ag < Au < Li < K

139. In the reaction: $I_2 + 2S_2O^{2-}_3 \rightarrow 2I^- + S_4O^{2-}_6$
a) I_2 is reducing agent. b) I_2 is oxidising agent and $S_2O^{2-}_3$ is reducing agent.
c) $S_2O^{2-}_3$ is oxidising agent. d) I_2 is reducing agent and $S_2O^{2-}_3$ is oxidising agent.

140. The oxidation number of 'N' in NH_2OH is
a) 1/3 b) 0 c) -1 d) 1

141. In which of the following reactions, there is no change in valency
a) $4KClO_3 \rightarrow 3KClO_4 + KCl$ b) $SO_2 + 2H_2S \rightarrow 2H_2O + 3S$
c) $BaO_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O_2$ d) $3BaO + O_2 \rightarrow 2BaO_2$

142. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Displacement reactions of chlorine, bromine and iodine using fluorine are not generally carried out in aqueous solution.
Reason: Fluorine being highly reactive attacks water and displaces the oxygen of water.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

143. What is the oxidation state of F e in the product formed when acidified potassium ferrocyanide is treated with H_2O_2?
a) +2 b) +3 c) +1 d) +6

144. Write the stoichiometric coefficient for the following reaction:
$xI_2 + yOH^- \rightarrow IO^-_3 + zI^- + 3H_2O$

a)

x	y	z
6	3	5

b)

x	y	z
3	2	3

c)

x	y	z
3	6	5

d)

x	y	z
3	3	3

145. The values of X and Y in the following redox reaction are
$XCl_2 + 6OH^- \rightarrow ClO_3^- + YCl^- + 3H_2O$
a) X = 2, Y = 4 b) X = 5, Y = 3 c) X = 3, Y = 5 d) X = 4, Y = 2

146. Equivalent weight of FeC_2O_4 in the change, $FeC_2O_4 \rightarrow Fe^{3+} + 2CO_2$ is:
a) M/3 b) M/6 c) M/2 d) M/1

147. The anion nitrate is converted into ammonium ion. The equivalent mass of nitrate ion in the reaction would be
a) 6.20 b) 7.75 c) 10.5 d) 21.0

148. Oxidation number of carbon is zero in the compound

a) methyl chloride b) chloroform c) glucose d) carbon tetrachloride

149. Experimentally it was found that a metal oxide has formula $M_{0.98}O$. Metal M, is present as M^{2+} and M^{3+} in its oxide. Fraction of the metal which exits as M^{3+} would be
a) 6.05% b) 5.08% c) 7.01% d) 4.08%

150. In the reaction $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$, MnO_2 acts as:
a) oxidant b) reductant c) both d) can't be predicted

151. In the reaction:
$3Br_2 + 6CO^{2-}_3 + 3H_2O \longrightarrow 5Br^- + BrO^-_3 + 6HCO^-_3$
a) Bromine is reduced and carbonate ion is oxidised.
b) Bromine undergoes disproportionation. c) Bromine is reduced and water is oxidised
d) Only water is oxidised to carbonic acid

152. The oxidation number of an element in a compound is evaluated on the basis of certain rules. Which of the following rules is not correct in this respect?
a) The oxidation number of hydrogen is always +1.
b) The algebraic sum of all the oxidation numbers in a compound is zero
c) An element in the free or the uncombined state bears oxidation number zero
d) In all its compounds, the oxidation number of fluorine is - 1.

153. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Oxygen atom in both, O_2 and O_3 has an oxidation number of -2.
Reason: Oxygen is assigned an oxidation number -2 in all of its compounds.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

154. Which of the following arrangements represent increasing oxidation number of the central atom?
a) $CrO_2^-, ClO_3^-, CrO_4^{2-}, MnO_4^-$ b) $ClO_3^-, CrO_4^{2-}, MnO_4^-, CrO_2^-$
c) $CrO_2^-, ClO_3^-, MnO_4^-, CrO_4^{2-}$ d) $CrO_4^{2-}, MnO_4^-, CrO_2^-, ClO_3^-,$

155. Which represents the disproportionation reaction?
a) $2Cu^+ \rightarrow Cu^{2+} + Cu$ b) $3I_2$ -7 $5I^- + I^{5+}$ c) $H_2O + Cl_2 \rightarrow Cl^- + ClO^- + 2H^+$
d) All of these

156. Which of the following reactions does not involve the change in oxidation state of metal?
a) $VO^{-2} \rightarrow V_2O_3$ b) $K \rightarrow K^+$ c) $Cu^{2+} \rightarrow Cus$ d) $Cu^{2+} \rightarrow Cu$

157. Standard reduction potentials of the half reactions are given below
$F_2(g) + 2e^- \rightarrow 2\,F^-(aq); E^\circ = +2.85\ V$
$Cl_2(g) + 2e^- \rightarrow 2Cl^-(aq); E^\circ = +1.36\ V$
$Br_2(l) + 2e^- \rightarrow 2Br^-(aq); E^\circ = +1,06\ V$
$I_2(s) + 2e^- \rightarrow 2I^-(aq); E^\circ = +0.53\ V$
The strongest oxidising and reducing agents respectively are:
a) Cl_2 and Br^- b) Cl_2 and I_2 c) F_2 and I^- d) Br_2 and Cl^-

158. It is found that V forms a double salt, isomorphous with Mohr's salt. The oxidation number of V in this compound is
a) +3 b) +2 c) +4 d) -4

159. Which of the following equation depict the oxidising nature of H_2O_2?
a) $2MnO_4^- + 6H^+ + 5H_2O_2 \rightarrow 2Mn^{2+} + 8H_2O + 5O_2$
b) $2Fe^{3+} + 2H^+ + H_2O_2 \rightarrow 2Fe^{2+} + 2H_2O + O_2$ c) $2HI + H_2O_2 \rightarrow I_2 + 2H_2O$
d) $KIO_4 + H_2O_2 \rightarrow KIO_3 + H_2O + O_2$

160. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Decomposition of hydrogen peroxide is an example of disproportionation

reaction.

Reason: In a disproportionation reaction, an element in one. oxidation state is simultaneously oxidised and reduced.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false.

161. Various oxidation states of few elements are mentioned. Which of the options is not correctly matched?

a) Phosphorus: +3 to +5 b) Nitrogen: +1 to +5 c) Iodine: -1 to +7

d) Chromium: -3 to +6

162. Which change occurs when lead monoxide is converted into lead nitrate?

a) Oxidation b) Reduction c) Neither oxidation nor reduction

d) Both oxidation and reduction

163. Among the following, identify the species with an atom in + 6 oxidation state

a) MnO_4^- b) $Cr(CN)_6^{3-}$ c) NiF_6^{2-} d) CrO_2Cl_2

164. Mn^{3+} ions are unstable in solution and undergo disproportionation to give Mn^{2+}, MnO_2 and H^+ ions. What will be the balanced equation for the reaction?

a) $3Mn^{3+} + 4H_2O \rightarrow MnO_2 + Mn^{2+} + 8H^+$ b) $Mn^{3+} + 4H_2O \rightarrow MnO_2 + 4H^+$

c) $Mn + 2H_2O \rightarrow MnO_2 + 4H^+$ d) $2Mn^{3+} + 2H_2O \rightarrow MnO_2 + Mn^{2+} + 4H^+$

165. Consider the change in oxidation state of Bromine corresponding to different emf values as shown in the diagram below:

$BrO_4^- \xrightarrow{1.82 V} BrO_3^- \xrightarrow{1.5 V} HBrO \xrightarrow{1.595 V} Br_2 \xrightarrow{1.0652 V} Br^-$ Then the species undergoing disproportionation is:

a) BrO_3^- b) BrO_4^- c) Br_2 d) HBrO

166. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: In the reaction $2Cu_2O(s) + Cu_2S(s) \rightarrow 6Cu(s) + SO_{2(g)}$ copper acts as a reductant and sulphur acts as an oxidant.

Reason: The given reaction is not a redox reaction.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false.

167. Which of the following halides is most easily oxidised?

a) F^- b) Br^- c) I^- d) Cl^-

168. Which of the following is decomposition reaction?

a) $2HgO \rightarrow 2Hg + O_2$ b) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ c) $S + O_2 \rightarrow SO_2$

d) $Cl_2 + 2KBr \rightarrow 2KCl + Br_2$

169. Which of the following species has an atom with +6 oxidation state?

a) MnO_4^- b) $Cr(CN)_6^{3-}$ c) NiF_6^{2-} d) CrO_2Cl_2

170. The brown ring complex, $[Fe(H_2O)_5NO^+]SO_4$ has oxidation number of Fe as :

a) +1 b) +2 c) +3 d) zero

171. Find the oxidation number of Fe in $Na_2[Fe(CN)_5NO]$.

a) +2 b) +3 c) +1 d) 0

172. Mark the correct statement from the following:

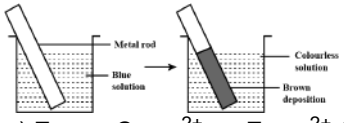
a) Copper metal can be oxidised by Zn^{2+} ions.

b) Oxidation number of phosphorus in P_4 is 4.

c) An element in the highest oxidation state acts only as a reducing agent.

d) The element which shows highest oxidation number of +8 is Os in OsO_4.

173. Identify the redox reaction taking place in a beaker.



a) $Zn_{(s)} + Cu_{(aq)}^{2+} \longrightarrow Zn_{(aq)}^{2+} Cu_{(s)}$ b) $Cu_{(s)} + 2Ag_{(aq)}^{+} \longrightarrow Cu_{(aq)}^{2+} + 2Ag_{(s)}$

c) $Cu_{(s)} + Zn^{2+}_{(aq)} \longrightarrow Cu^{2+}_{(aq)} + Zn_{(s)}$ d) $2Ag_{(s)} + Cu_{(aq)}^{2+} \longrightarrow 2Ag^{+}_{(aq)} + Cu_{(s)}$

174. Addition of iron or zinc to copper sulfate causes precipitation of copper owing to the _____

a) reduction of Cu^{2+} b) reduction of SO_4^{2-} c) reduction of Zn

d) hydrolysis of $CuSO_4$

175. Which of the following elements does not show disproportionation tendency?

a) Cl b) Br c) F d) I

176. The oxidation number of nitrogen in $(N_2H_5)^+$ is:

a) -2 b) +2 c) +3 d) -3

177. When SO_1 is Passed in a solution of potassium iodate, the oxidation state of iodine changes from

a) + 5 to 0 b) + 5 to -1 c) -5 to 0 d) -7. to - 1

178. Number of moles of MnO_4^- required to oxidize one mole of ferrous oxalate completely in acidic medium will be:

a) 7.5 moles b) 0.2 moles c) 0.6 moles d) 0.4 moles

179. In which. iron has the lowest oxidation state?

a) $Fe(CO)_5$ b) Fe_2O c) $K_4Fe(CN)_6$ d) $FeSO_4 \cdot (NH_4)_2SO_4\ 6H_2O$

180. Oxidation number of sulphur in peroxomonosulphuric acid (H_2SO_5) is

a) +4 b) +2 c) +6 d) -2

181. Oxidation number of carbon in CH_2Cl_2 is

a) 0 b) +1 c) +2 d) +4

182. When $KMnO_4$ is reduced with oxalic acid in acidic solution, the oxidation number of Mn changes from

a) +2 to +7 b) +4 to +7 c) +7 to +2 d) +6 to +2

183. What is the equivalent mass of KIO_3 in the given reaction?

$KIO_3 + 2KI + 6HCl \rightarrow 31Cl + 3KCl + 3H_2O$

a) 214 b) 428 c) 107 d) 53.5

184. Arrange the following in increasing order of oxidation state of Ni.

$K_2[Ni(CN)_4]$, $K_2[NiF_6]$,$Ni(CO)_4$

a) $Ni(CO)_4$, $K_2[Ni(CN)_4]$, $K_2[NiF_6]$ b) $K_2[Ni(CN)_4]$, $Ni(CO)_4$, $K_2[NiF_6]$

c) $Ni(CO)_4$, $K_2[NiF_6]$,$K_2[Ni(CN)_4]$ d) $K_2[NiF_6]$,$K_2[Ni(CN)_4]$, $Ni(CO)_4$

185. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: Decomposition of potassium chlorate is an example of redox reaction.

Reason: There is no change in the oxidation number of potassium in decomposition of potassium chlorate.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false

186. Which of the following will act as cathode when connected to standard hydrogen electrode which has E^0 value given as zero?

(i) Zn^{2+}/Zn, E^0 = - 0.76 V

(ii) Cu^{2+}/Cu, E^0 = + 0.34 V

(iii) $Al^{3+}IAl$, E^0 = -1.66 V

(iv) $Hg^{2+}IHg$, E^0 = + 0.885 V

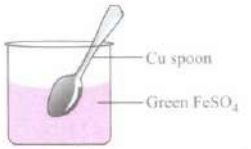
a) (i) and (ii) b) (ii) and (iv) c) (i) and (iii) d) (i), (ii), (iii) and (iv)

187. Match the column I with column II with the type of reaction and mark the appropriate choice.

	Column I		Column II
(A)	$3MG_{(s)} + N_{2(g)} \xrightarrow{\Delta} Mg_3N_{2(s)}$	(i)	Displacement
(B)	$NaH_s + H_2O_{(l)} \rightarrow NaOH_{(aq)} + H_{2(g)}$	(ii)	Decomposition
(C)	$3CIO^-_{(aq)} \rightarrow 2Cl^-_{(aq)} + CIO_{3(aq)}$	(iii)	Combination
(D)	$2KCIO_{3(s)} \rightarrow 2KCl_s + 3O_{2(g)}$	(iv)	Disproportionation

a) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)
b) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)
c) (A) → (ii), (B) → (i), (C) → (iii), (D) → (iv)
d) (A)→ (iii), (B) → (i), (C) → (iv), (D) → (ii)

188. If a spoon of copper metal is placed in a solution of $FeSO_4$, what will be the correct observation?



a) Copper is dissolved in $FeSO_4$ to give brown deposit. b) No reaction takes place.
c) Iron is deposited on copper spoon. d) Both copper and iron are precipitated.

189. Which of the following shows highest oxidation number in combined state?
a) Os b) Ru c) Both (1) and (2) d) Fe

190. Permanganate(VII) ion, MnO^-_4 oxidises I^- ion to I_2 and gives manganese(IV) oxide MnO_2 in basic medium. The skeletal ionic equation is given as

$$pMnO^-_{4(aq)} + qI^-_{(aq)} + xH_2O_{(l)} \rightarrow rMnO_{2(s)} + sI_{2(s)} + yOH^-_{(aq)}$$

The values of p, q. rand s are

a)				b)				c)				d)			
p	q	r	s	p	q	r	s	p	q	r	s	p	q	r	s
1	2	8	4	2	6	2	3	2	4	2	8	1	4	8	2

191. Which of the following is a decreasing order of oxidation states of the central atoms?
a) PCl_5, HIO_4, $Cl_2O_7^{2-}$, Cl_2O b) $Cl_2O_7^{2-}$,Cl_2O,HIO_4, PCl_5 c) HIO_4, $Cl_2O_7^{2-}$,PCl_5,Cl_2O
d) $Cl_2O_7^{2-}$,HIO_4,Cl_2O,PCl_5

192. In balancing the half-reaction, $S_2O_3^{2-} \rightarrow S(s)$, the number of electrons that must be added is:
a) 2 on the right b) 2 on the left c) 3 on the right d) 4 on the left

193. The atomic number of an element which shows the oxidation state of + 3 is
a) 13 b) 32 c) 33 d) 17

194. Oxidation number of Fe in Fe_3O_4 are:
a) +2 and +3 b) +1 and +2 c) +1 and +3 d) None

195. The number of mole of oxalate ions oxidiscd by one mole of MnO_4^- is
a) 5/2 b) 2/5 c) 1/5 d) 5

196. Oxidation numbers of $\mathrm{P\ in\ PO_4^{3-}}$, of S in $\mathrm{SO_4^{2-}}$ and that of $=\mathrm{Cr\ in\ Cr_2O_7^{2-}}$ are respectively :
a) +3,+6 and +5 b) +5, +3 and +6 c) -3 ,+6 and +6 d) +5, +6 and +6

197. The oxidation number of "V" in $Rb_4Na[HV_{10}O_{28}]$ is
a) +3 b) +5 c) +7 d) +6

198. The n-factor of FeS_2 during its oxidation as $FeS_2 \rightarrow Fe_2O_3 + SO_2$
a) 10 b) 11 c) 2 d) 8

199. The mass of 50% (mass/mass) solution of HCl required to react with 100g of $CaCO_3$ would be
a) 73 g b) 100 g c) 146 g d) 200 g

200. What is the oxidation number of carbon in C_3O_2 (carbon suboxide)?
a) +4/3 b) +10/4 c) +2 d) +2/3

201. The values of coefficients to balance the following reaction are

$$Cr(OH)_3 + ClO^- + OH^- \rightarrow CrO_4^{2-} + Cl^- + H_2O$$

a)

$Cr(OH)_3$	ClO^-	CrO^{2-}_4	Cl^-
2	3	3	3

b)

$Cr(OH)_3$	ClO^-	CrO^{2-}_4	Cl^-
2	4	3	2

c)

$Cr(OH)_3$	ClO^-	CrO^{2-}_4	Cl^-
2	4	4	2

d)

$Cr(OH)_3$	ClO^-	CrO^{2-}_4	Cl^-
2	3	2	3

202. Identify the correct statement with respect to the following reaction,

$$2K_2MnO_4 + Cl_2 \rightarrow 2KCl + 2KMnO_4$$

a) Oxidation of potassium manganate is taking place.
b) Reduction of potassium manganate is taking place.
c) Oxidation of Cl_2 is taking place. d) Cl_2 acts as reducing agent in the reaction.

203. Identify the compounds which are reduced and oxidised in the following reaction:
$3N_2H_4 + 2BrO^-_3 \longrightarrow 3N_2 + 2Br^- + 6H_2O$
a) N_2H_4 is oxidised and BrO^-_3 is reduced. b) BrO^-_3 is oxidised and N2H4is reduced.
c) BrO^-_3 is both reduced and oxidised. d) This is not a redox reaction.

204. The oxidation state of 1in $H_4IO_6^-$ is:
a) +1 b) -1 c) +7 d) +5

205. SO_2 acts as an oxidant while reacting with:
a) acidified $KMnO_4$ b) acidified $K_2Cr_2O_7$ c) H_2S d) acidified C_2H_5OH

206. When Cl_2 reacts with hot and concentrated sodium hydroxide solution, the oxidation number of chlorine changes from:
a) Zero to + 1 and Zero to - 5 b) Zero to -1 and Zero to +5
c) Zero to -1 and Zero to +3 d) Zero to + 1 and Zero to -3

207. The number of moles of $K_2Cr_2O_7$ reduced by one mole of Sn^{2+}ions is
a) 1/3 b) 1/6 c) 2/3 d) 3/4

208. Why is HCl not used to make the medium acidic in oxidation reactions of $KMnO_4$ in an acidic medium?
a) Both HCl and $KMnO_4$ act as oxidising agents
b) $KMnO_4$ oxidises HCl into Cl_2 which is alsoan oxidising agent
c) $KMnO_4$ is a weaker oxidising agent than HCl
d) $KMnO_4$ acts as a reducing agent in the presence of HCl

209. All elements commonly exhibit an oxidation state of
a) +1 b) -1 c) zero d) +2

210. Which of the following is a redox reaction?
a) Reaction of H_2SO_4 with NaOH
b) In atmosphere, formation of O_3 from O_2 by lightening
c) Formation of oxides of nitrogen from nitrogen and oxygen by lightening
d) Evaporation of H_2O

211. Which of the following is not an example of disproportionation reaction?
a) $4ClO^-_3 \longrightarrow Cl^- + 3ClO^-_4$ b) $2H_2O_2 \longrightarrow 2H_2O + O_2$
c) $2NO_2 + 2OH^- \longrightarrow NO^-_2 + NO^-_3 + H_2O$ d) $TiCl_4 + 2Mg \longrightarrow Ti + 2MgCl_2$

212. Oxidation number of P in PO_4^{3-}, of 5 in SO_4^{2-} and that of Cr in $Cr_2O_7^{2-}$ are respectively:
a) +3, +6 and +5 b) +5, +3 and +6 c) -3, +6 and +6 d) +5, +6 and +6

213. The more positive the value of E^0, the greater is the tendency of the species to get reduced. Using the standard electrode potential of redox couples given below find out which of the following is the strongest oxidising agent.
E^0 Values:

$$Fe^{3+}/Fe^{2+} = +0.77; I_2/I^- = +0.54; Cu^{2+}/Cu = +0.34; Ag^+/Ag = +0.80V$$

a) Fe^{3+} b) $I_{2(s)}$ c) Cu^{2+} d) Ag^+

214. In an oxidation process for a cell, $M_1 \rightarrow M_1^{n+} + ne^-$, the other metal ($M_2$) being univalent showing reduction takes up ----- electrons to complete redox reaction.
a) (n-1) b) 1 c) n d) 2

215. Among the properties (i) reducing (ii) oxidising (iii) complexing the set of properties shown by CN^- ion towards metal species is :
a) i,ii,iii b) ii,iii c) iii,i d) i,ii

216. Which of the following is redox reaction?
a) Evaporation of H_2O b) Both oxidation and reduction c) H_2SO_4 and NaOH
d) In atmosphere O_3 from O_2 by lighting

217. The E_0 values of redox complex of halogens are given. Based on these values mark the correct statement.
$E^0_{I_2/I^-} = +0.54 \;\; E^0_{Br_2/Br^-} = +1.08V, \;\; E^0_{Cl_2/Cl^-} = +1.36V,$
a) Chlorine can displace bromine and iodine from their salt solutions.
b) Chlorine can only displace iodine from its salt solution.
c) Bromine can displace chlorine from its salt solution.
d) Iodine can displace chlorine and bromine from their salt solutions.

218. Phosphorus has the oxidation state of + 3 in
a) Phosphorous acid b) Orthophosphoric acid c) Hypophosphorous acid
d) Metaphosphoric acid

219. Match the compounds given in column I with oxidation states of carbon given in column II and mark the appropriate choice.

	Column I		Column I
(A)	$C_6H_{12}O_6$	(i)	+3
(B)	$CHCl_3$	(ii)	-3
(C)	CH_3CH_3	(iii)	+2
(D)	$(COOH)_2$	(iv)	0

a) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)
b) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv)
c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i)
d) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iv)

220. The pair of compounds in which the metals are in their highest oxidation state is
a) MnO_2, $FeCl_3$ b) MnO_4^-, CrO_2Cl_2 c) $MnCl_2$, $CrCl_3$ d) $[NiCl_4]^{2-}$,$[CoCl_4]^-$

221. In which of the following compounds carbon is in highest oxidation state?
a) CH_3Cl b) CCl_4 c) $CHCl_3$ d) CH_2Cl_2

222. The electronic configuration of Cu (II) is $3d^9$ whereas that of Cu(I) is $3d^{10}$. Which of the following is correct?
a) Cu(II) is more stable in aqueous medium b) Cu(I) is more stable in solid state
c) Stability of Cu(I) an Cu(II) depends on nature of copper salts in solution state.
d) All of these

223. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: The transfer of electrons from zinc to copper takes place through metal wire connecting the two rods.
Reason: Electricity from solution in one beaker to other flows by migration of ions through the salt bridge.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

224. What is the change in oxidation number of carbon in the following reaction?
$CH_4(g) + 4Cl_2(g) \rightarrow CCl_4(1) + 4HCl(g)$
a) 0 to -4 b) +4 to +4 c) 0 to +4 d) -4 to +4

225. In the reaction $P_4 + 3OH^- + 3H_2O \rightarrow 3H_2PO_2^- + PH_3$ phosphorus is undergoing
a) oxidation b) reduction c) disproportionation d) hydrolysis

226. Which species is acting as a reducing agent in the following reaction?
$14H^+ + Cr_2O_7^{2-} + 3Ni \rightarrow 2Cr^{3+} + 7H_2O + 3Ni^{2+}$

a) $Cr_2O_7^{2-}$ b) Ni c) H^+ d) H_2O

227. The stoichiometric constants for the reaction $pCu + qHNO_3 \rightarrow rCu(NO_3)_2 + sNO + tH_2O$ p, q, r, s and t respectively are
a) 3,3,3,2,3 b) 3,2,3,2,4 c) 3,8,3,2,4 d) 2,3,3,3,2

228. Examples of few compounds in a particular oxidation state are given. Mark the example which is not correct.
a) Phosphorus in +1 oxidation state - H_3PO_2 b) Chlorine in +7 oxidation state - HClO
c) Chromium in +6 oxidation state - CrO_2Cl_2
d) Carbon in 0 oxidation state - $C_{12}H_{22}O_{11}$

229. Equivalent weight of As_2O_3 in the following equation $As_2O_3 + 2I_2 + 2H_2O \rightarrow As_2O_5 + 4HI$ [arsenic at. wt =75]
a) 49.5 b) 156.6 c) 94 d) 75

230. What will be the order of decreasing reducing nature for the given metals?
a) Zn > Na > Fe > Mg > Cu > Ag b) Cu > Fe > Mg > Zn > Na > Ag
c) Ag> Cu > Fe> Zn > Mg > Na d) Na> Mg > Zn > Fe > Cu > Ag

231. Which of the following is not an oxidising agent?
a) Oxygen b) Con. Sulphuric acid c) Chlorine d) Hydrogen

232. The oxide, which cannot act as a reducing agent is:
a) CO_2 b) ClO_2 c) NO_2 d) SO_2

233. Hot concentrated, sulphuric acid is a moderately strong oxidizing agent. Which of the following reactions do not show oxidizing behaviour?
a) $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$ b) $S + 2H_2SO_4 \rightarrow 3SO_2 + 2H_2O$
c) $C + 2H_2SO_4 \rightarrow CO_2 + 2SO_2 + 2H_2O$ d) $CaF_2 + H_2SO_4 \rightarrow CaSO_4 + 2HF$

234. Identify disproportionation reaction.
a) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ b) $CH_4 + 4Cl_2 \rightarrow CCl_4 + 4HCl$
c) $2F_2 + 2OH^- \rightarrow 2F^- + OF_2 + H_2O$ d) $2NO_2 + 2OH^- \rightarrow NO^-_2 + NO^-_3 + H_2O$

235. Which substance is serving as a reducing agent in the following reaction?
$14H^+ + Cr_2O_7^{2-} + 3Ni \rightarrow 2Cr^{3+} + 7H_2O + 3Ni^{2+}$?
a) H^+ b) $Cr_2O_7^{2-}$ c) H_2O d) Ni

236. The oxidation number and covalency of sulphur in the sulphur molecule (S_8) are, respectively :
a) 6 and 8 b) 0 and 8 c) 0 and 2 d) 6 and 2

237. In the reaction the stoichiometry coefficients of $Cr_2O_7^{2-}$, NO_2^- and H^+ respectively are
$Cr_2O_7^{2-} + NO_2^- + H^+ \rightarrow Cr^{3+} + NO_3^- + H_2O$
a) 1,3,8 b) 1,4,8 c) 1,3,12 d) 1,5,12

238. Oxidation number of carbon in C_3O_2, Mg_2C_3 are respectively:
a) $-\frac{4}{3}, +\frac{4}{3}$ b) $+\frac{4}{3}, -\frac{4}{3}$ c) $-\frac{2}{3}, +\frac{2}{3}$ d) $-\frac{2}{3}, +\frac{4}{3}$

239. In the reaction, $CH_3OH \rightarrow HCOOH$, the number of electrons that must be added to the right is:
a) 4 b) 3 c) 2 d) 1

240. The oxidation number of sulphur in S_8, S_2F_2 and H_2S are
a) 0, +1 and -2 b) +2, +1 and-2 c) 0, +1 and +2 d) -2, +1 and -2

241. Equivalent masses of NH_3 in the reactions are
(i) $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$ (ii) $2NH_3 \rightarrow N_2 + 3H_2$
a) 5 : 6 b) 6 : 5 c) 5 : 3 d) 3 : 5

242. Which compound among the following has lowest oxidation number of chlorine?
a) $HClO_4$ b) $HClO_3$ c) HCl d) HOCl

243. Equivalent weight of $Ba(MnO_4)_2$ in acidic medium (M = molar mass)
a) M b) M/3 c) M/5 d) M/10

244. Which of the following colour changes shown during redox titrations is not correct?
a)
$Cr_2O^{2-}_7$ oxidises the indicator diphenylamine to produce blue colour showing end point.
b) Iodine formed by oxidation of I^- ions gives blue colour with starch showing end point.

c) $KMnO_4$ in the form of MnO^-_4 ions gives pink colour showing end point.
d) Thiosulphate ions ($S_2O^{2-}_3$) give blue colour showing end point.

245. Using the following Latimer diagram for bromine,
pH = 0; $BrO_4^- \overset{1.82V}{\rightarrow} BrO_3^- \overset{1.50V}{\rightarrow} HBrO \overset{1.595V}{\rightarrow} Br_2 \overset{1.06552V}{\rightarrow} Br^-$ the species undergoing disproportionation is
a) Bro^-_4 b) Bro^-_3 c) HBrO d) Br_2

246. Loss of an electron is called:
a) oxidation b) reduction c) combustion d) neutralisation

247. What is equivalent mass of $(NH_4)_2Cr_2O_7$ in the change $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$?
a) $\frac{M}{2}$ b) $\frac{M}{3}$ c) $\frac{M}{4}$ d) $\frac{M}{6}$

248. The oxidation state of Fe in $K_4[Fe(CN)_6]$ is
a) +2 b) +3 c) +4 d) +6

249. How many moles of electrons are involved in the reduction of one mole of MnO_4^- ion in alkaline medium to MnO_3^-?
a) 2 b) 1 c) 3 d) 4

250. Hydroxyl amine reduces iron (III) according to following equation
$NH_2OH + Fe_2(SO_4)_3 \rightarrow N_2(g) + H_2O + FeSO_4 + H_2SO_4$
Which statement is correct
a) n-factor for Hydroxyl amine is 2 b) equivalent weight of $Fe_2(SO_4)_3$ is M/2
c) 6 meq of $Fe_2(SO_4)_3$ is contained in 3 millimoles of ferric sulphate d) all of these

251. 0.5 g mixture of oxalic acid ($H_2C_2O_4$) and some sodium oxalate ($Na_2C_2O_4$) with some impurities requires 40 ml of 0.1M NaOH for complete neutralization and 6ml of 0.2 M $KMnO_4$ for complete oxidation. Calculate the % of $Na_2C_2O_4$ in the mixture
a) 90% b) 26.8% c) 40% d) 50%

252. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: In titrations involving potassium permanganate no indicator is used.
Reason: MnO_4^- acts as the self-indicator.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false.

253. The element that always exhibits a negative oxidation state in its compounds is
a) Nitrogen b) Oxygen c) Fluorine d) Chlorine

254. Which of the following is the strongest oxidizing agent?
a) F_2 b) Cl_2 c) Br_2 d) I_2

255. Which of the following is not an example of redox reaction?
a) $CuO + H_2 \rightarrow Cu + H_2O$ b) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$ c) $2K + F_2 \rightarrow 2KF$
d) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

256. The oxidation state of sulphur in the anions SO_3^{2-}, $S_2O_4^{2-}$ and $S_2O_6^{2-}$ follow the order
a) $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$ b) $SO_3^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$ c) $S_2O_4^{2-} < S_2O_6^{2-} < SO_3^{2-}$
d) $S_2O_6^{2-} < S_2O_4^{2-} < SO_3^{2-}$

257. Consider the following reaction,

$$\begin{matrix} CHO \\ | \\ CHO \end{matrix} + OH^- \rightarrow \begin{matrix} COO^- \\ | \\ CH_2OH \end{matrix}$$

Select the incorrect statement.
a) It is not a disproportionation reaction. b) It is intramolecular redox reaction.
c) OH^- is a reducing as well as oxidising agent
d) $\begin{matrix} CHO \\ | \\ CHO \end{matrix}$ is a reducing as well as oxidising agent.

258. $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$. If the atomic mass of iron is 56. then its equivalent mass will be :
a) 42 b) 21 c) 63 d) 84

259. The Number of electrons involved in the reduction of $Cr_2O_7^{2-}$ ion in acidic solution to Cr^{3+} is
a) 3 b) 4 c) 2 d) 6

260. **Assertion**: In the species, $S_4O_6^{2-}$ each of the two extreme sulphurs exhibits oxidation state of +5 and the two middle sulphurs as zero.
Reason: The average of four oxidation numbers of sulphurs of the $S_4O_6^{2-}$ is 2.5.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

261. The following redox reaction is balanced by which set of coefficients?
$aZn + bNO_3^- + cH^+ \rightarrow dNH_4^+ + eH_2O + fZn^{2+}$
a) 1 1 10 1 3 1 b) 2 2 10 2 3 2 c) 4 2 10 1 3 4 d) 4 1 10 1 3 4

262. The most common oxidation state of an element is -2. The number of electrons present in its outermost 21 shell is
a) 2 b) 4 c) 6 d) 8

263. Fluorine exhibits only -1 oxidation state, while iodine ex luoits oxidation states of -1, +1, +3, +5 and +7. This is due to:
a) Fluorine being a gas b) available d-orbitals in iodine
c) non-availability of d-orbitals in iodine d) iodine is a solid

264. Arrange the oxides of nitrogen in increasing order of oxidation state of N from + 1 to +5.
a) $N_2O < N_2O_3 < NO_2 < N_2O_5 < NO$ b) $N_2O < NO < N_2O_3 < NO_2 < N_2O_5$
c) $N_2O_52 < N_2O_3\,2O$ d) $NO_2O_2 < N_2O_3\,2O_5$

265. Oxidation number and valency of oxygen in OF_2 are
a) +1, 2 b) +2, 2 c) + 1, 1 d) + 2, 1

266. In which reaction is hydrogen acting as an oxidising agent?
a) with iodine to give hydrogen iodide b) with lithium to give lithium hydride
c) with nitrogen to give ammonia d) with sulphur to give hydrogen sulphide

267. Which combination is odd with respect to oxidation number?
a) H_2SO_4, $H_2S_2O_8$, $K_2Cr_2O_7$, SF_6 b) $K_2Cr_2O_7$, K_2CrO_4, CrO_5, CrO_2Cl_2
c) NH_3, NH_4^+, N_3H, NO_2^- d) CaH_2, NaH, LiH, MgH_2

268. Which of the following is not a correct statement about electrochemical series of reduction potentials?
a) The standard electrode potential of hydrogen is 0.00 volts.
b) Active non-metals have positive reduction potentials.
c) Active metals have negative reduction potentials.
d) Metals which have positive reduction potentials are good reducing agent.

269. Follow reaction describes the rusting of iron $4Fe + 3O_2 \rightarrow 4Fe^{3+} + 60^{2-}$. Which one of the following statement is incorrect
a) This is an example of a redox reaction b) Metallic iron is reduced to Fe^{3+}
c) Fe^{3+} is an oxidising agent d) Metallic iron is a reducing agent

270. The oxidation states of metal in the compounds $Fe_{0.94}O$ and $[Cr(PPh_3)_3(CO)_3]$ respectively are
a) $\frac{200}{94}$, 0 b) 0, $\frac{200}{94}$ c) 2,1 d) 1, $\frac{200}{94}$

271. Which substance serves as a reducing agent in the following reactions,
$14H^+ + Cr_2O_7^{2-} + 3Pb \rightarrow 2Cr^{3+} + 7H_2O + 3Pb^{2+}$?
a) H_2O b) Pb c) H^+ d) $Cr_2O_7^{2-}$

272. Which of the following statements is not true?

a) In a chemical reaction, oxidation is always accompanied by reduction.
b) When a negative ion changes to neutral species, the process is oxidation.
c) Oxidising agent has a tendency to lose electrons.
d) Conversion of MnO_4^{2-} to MnO_4^- is oxidation.

273. In the reaction $MnO_4^- + SO_3^{2-} + H^+ \rightarrow Mn^{2+} + SO_4^{2-}$ the number of H^+ ions involved is
a) 2 b) 6 c) 8 d) 16

274. In the reaction $3Mg + N_2 \rightarrow Mg_3N_2$
a) Magnesium is reduced b) Magnesium is oxidized c) Nitrogen is oxidized
d) Nitrogen is reduced

275. A compound contains atoms X, Y and Z. The oxidation number of X is +2, Y is +5 and Z is -2.
The possible formula of the compound is
a) XYZ_2 b) $Y_2(XZ_3)_2$ c) $X_3(YZ_4)_2$ d) $X_3(Y_4Z)_2$

276. An element A in a compound ABD has oxidation numbr A^{n-}. It is oxidised by $Cr_2O_7^{2-}$ in acidic medium. In the experiment 1.68×10^{-3} mole of $K_2Cr_2O_7$ were used for 3.26×10^{-3} mole of ABD. The new oxidation number of A after oxidation is
a) 3 b) 3 - n c) n - 3 d) + n

277. Which of the following can act as oxidising as well as reducing agent?
a) H_2O_2 b) SO_3 c) H_2SO_4 d) HNO_3

278. For decolourisation of 1 mole of acidified $KMnO_4$ the moles of H_2O_2 required are
a) 1/2 b) 3/2 c) 5/2 d) 7/2

279. Which of the following is the best description of the behaviour of bromine in the reaction given below?
$H_2O + Br_2 \longrightarrow HOBr + HBr$
a) Proton accepter only b) Both oxidized and reduced c) Oxidised only
d) Reduces only

280. In present of dil. H_2SO_4, the equivalent mass of $KMnO_4$ is
a) M/5 b) M/6 c) M/10 d) M/2

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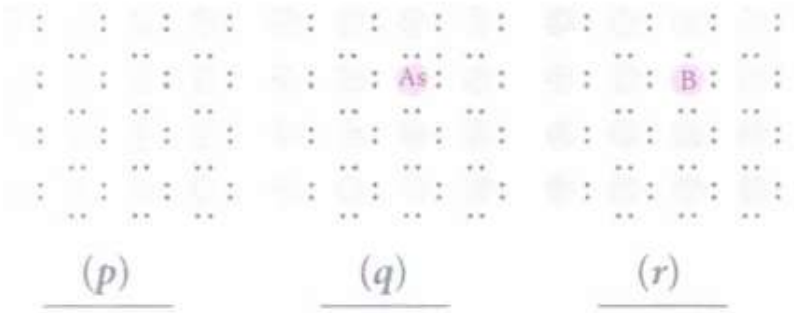
Time : 1 Mins **SOLID STATE 1** **Marks : 860**

1. Zinc oxide loses oxygen on heating according to the reaction,
   $ZnO \xrightarrow{heat} Zn^{2+} + \frac{1}{2}O_2 + 2e^-$
   It becomes yellow on heating because
   a) Zn^{2+}ions and electrons move to interstitial sites and F-centres are created
   b) oxygen and electrons move out of the crystal and ions become yellow
   c) Zn^{2+} again combine with oxygen to give yellow oxide
   d) $Zn^{2+}$are replaced by oxygen
2. A compound is formed by two elements Y and Z. The element Z forms ccp and atoms Yoccupy 1/3 rd of tetrahedral voids. The formula of the compound is
   a) Y_2Z_3 b) YZ c) YZ_3 d) Y_2Z
3. In a close packed structure of mixed oxides, the lattice is composed of oxide ions, one-eighth of tetrahedral voids are occupied by divalent cations while one-half of octahedral voids are occupied by trivalent cations. The formula of the oxide is
   a) A_2BO_4 b) AB_2O_3 c) A_2BO_3 d) AB_2O_4
4. A compound formed by elements X and crystallizes in a cubic structure in which the X atoms are at the corners of a cube and the Y atoms are at the facecentres. The formula of the compound is :
   a) XY_3 b) X_3Y c) XY d) XY_2
5. The unit cell of aluminium is a cube with an edge length of 405 pm. The density of aluminium is 2.70 g cm^{-3}. What is the structure of unit cell of aluminium?
   a) Body-centred cubic cell b) Face-centred cubic cell
   c) End-centred cubic cell d) Simple cubic cell
6. Which of the following primitive cells show the given parameters?
   $a \neq b \neq c$, $\alpha = \beta = \gamma = 90°$
   a) Cubic b) Tetragonal c) Orthorhombic d) Hexagonal

7. Which kind of defects are introduced by doping?
   a) Dislocation defects b) Schottky defects c) Frenkel defects
   d) Electronic defects
8. A unit cell of $BaCl_2$ (fluorite structure) is made up of
   a) four Ba^{2+} ions and four Cl^- ions b) four Ba^{2+} ions and eight Cl^- ions
   c) eight Ba^{2+} ions and four Cl^- ions d) four Ba^{2+} ions and six Cl^- ions
9. Assertion: Packing efficiency of body centred cubic structure is 68%.
   Reason : 68% is the maximum packing efficiency any crystal can have
   a)
   If both assertion and reason are true and reason is the correct explanation of assertion.
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion
   c) If assertion is true but reason is false.
   d) If both assertion and reason are false
10. The density of a metal which crystallises in bcc lattice with unit cell edge length 300 pm and molar mass 50 g mol^{-1} will be:
    a) 10 g cm^{-3} b) 14.2 g cm^{-3} c) 6.15 g cm^{-3} d) 9.32 g cm^{-3}
11. Assertion: Iron, cobalt, nickel and CrO_2 are called ferromagnetic substances.
    Reason : Ferromagnetic substances are weakly attracted by magnetic field
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false.
    d) If both assertion and reason are false
12. Which of the following oxides behaves as conductor or insulator depending upon temperature?
    a) TiO b) SiO_2 c) TiO_3 d) MgO

13. Observe the given figure carefully and fill in the blanks by choosing the correct option.



a)

(P)	(Q)	(R)
Perfect crystal	p-type semiconductor	n-typEe semiconductor

b)

(P)	(Q)	(R)
Doped crystal	n-type semiconductor	p-type semiconductor

c)

(P)	(Q)	(R)
Perfect crystal	n-type semiconductor	p-type semiconductor

d)

(P)	(Q)	(R)
n-type semiconductor	Perfect crystal	p-type semiconductor

14. When Zn converts from melted state to its solid state, it has hcp structure, then find the number of nearest atoms?
    a) 6 b) 8 c) 12 d) 4

15. The major binding force in diamond, silicon and quartz is
    a) electrostatic force b) electrical attraction c) covalent bond force
    d) van der Waals force

16. A metal crystallises into a lattice containing a sequence of layers as AB AB AB _____What percentage of voids are left in the lattice?
    a) 72% b) 48% c) 26% d) 32%

17. Fe_3O_4 is ferrimagnetic at room temperature but at 850 K, it becomes
    a) diamagnetic b) ferrimagnetic c) paramagnetic. d) anti-ferromagnetic.

18. The fraction of octahedral or tetrahedral voids occupied depends upon the radii of the ions occupying the voidsThe edge lengths of the unit cells in terms of the radius of spheres constituting fcc, bee and simple cubic unit cell are respectively
a) $2\sqrt{2r}, \frac{4r}{\sqrt{3}}, 2r$ b) $\frac{4r}{\sqrt{3}}, 2\sqrt{2r}, 2r$ c) $2r, 2\sqrt{2r}, \frac{4r}{\sqrt{3}}$ d) $2r, \frac{4r}{\sqrt{3}}, 2\sqrt{2r}$

19. Which of the following structures is not correctly matched?
a)

NaCl type	Cl^- ions in ccp structure. Na^+ ions in half octahedral holes.

b)

ZnS type	S^{2-} ions in ccp structure. Zn^{2+} ions in alternate tetrahedral voids.

c)

CaF_2 type	Ca^{2+} ions in eep structure. F^- ions in all tetrahedral voids.

d)

Na_2O type	O^{2-} ions in ccp structure. Na^+ ions in all tetrahedral holes

20. With which one of the following elements silicon should be doped so as to give p-type of semiconductor?
a) Selenium b) Boron c) Germanium d) Arsenic

21. Alkali halides do not show Frenkel defect because
a) cations and anions have almost equal size
b) there is a large difference in size of cations and anions
c) cations and anions have low coordination number
d) anions cannot be accommodated in voids

22. Assertion: Glass panes fixed to windows or doors of old buildings are slightly thicker at the bottom than at the top.
Reason : Glass is a pseudo solid or supercooled liquid.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false.

d) If both assertion and reason are false

23. A metal has a fcc lattice. The edge length of the unit cell is 404 pm. The density of the metal is 2.72 g cm^{-3}. The molar mass of the metal is: (N_A Avogadro's contant = 6.02 x 10^{23} mol^{-1})

a) 27 g mol^{-1} b) 20 g mol^{-1} c) 40 g mol^{-1} d) 30 g mol^{-1}

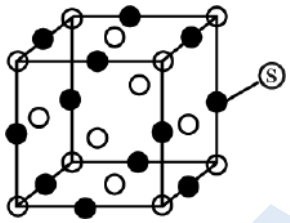
24. The ionic radii of A^+ and B^- ions are 0.98 x 10^{-10} l m and 1.81 x 10^{-10} m. The coordination number of each ion in AB is :

a) 8 b) 2 c) 6 d) 4

25. How many lithium atoms are present in a unit cell with edge length 3.5 $\mathring{A}$ and density 0.53 g cm^{-3} ? (Atomic mass of Li = 6.94)

a) 2 b) 1 c) 4 d) 6

26. For the structure given below the site marked as S is a



a) tetrahedral void b) cubic void c) octahedral void d) none of these.

27. Which of the following statements is not correct about molecular crystals?

a) They are generally soft and easily compressible

b)

They are good conductors of electricity as the electrons are delocalised in the bonds.

c) They have low melting and boiling points

d) They consist of polar or non-polar molecules

28. The distance between Na^+ and Cl^- ions in NaCl with a density 3.165 g cm^{-3} is

a) 497 pm b) 248.5 pm c) 234 pm d) 538.5 pm

29. Which of the following shows correct range of conductivity?
(i) Conductors: 10^4 to 10^7 ohm^{-1} m^{-1}
(ii) Insulators: 10^{-6} to 10^4 ohm^{-1} m^{-1}
(iii) Semiconductors: 10^{-10} to 10^{-6} ohm^{-1} m^{-1}
a) (i) and (ii) b) (i) only c) (ii) and (iii) d) (i), (ii) and (iii)

30. Which among the following will show anisotropy?
a) Glass b) NaBr c) Plastic d) Rubber

31. Match the types of packing given in column I with the items given in column II

Column-I		**Column-II**	
i)	Square close packing in two dimensions	(p)	Triangular voids
ii)	Hexagonal close packing in two dimensions	(q)	Pattern of spheres is repeated in every fourth layer
iii)	Hexagonal close packing in three dimensions	(r)	Coordination number = 4
iv)	Cubic close packing in three dimensions	(s)	Pattern of sphere is repeated in alternate layers

a) (i) → (p), (ii) → (r), (iii) → (q), (iv) → (s)
b) (i) → (q), (ii) → (s), (iii) → (p), (iv) → (r)
c) (i) → (r), (ii) → (p), (iii) → (s), (iv) → (q)
d) (i) → (r), (ii) → (p), (iii) → (q), (iv) → (s)

32. Assertion: At low temperature, particles of matter occupy fixed positions and exist in solid state.
Reason: Under a given set of conditions of temperature and pressure, the state of a substance depends upon the net effect of thermal energy and intermolecular forces.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) If both assertion and reason are false

33. The second order Bragg diffraction of X-rays with λ = 1.00 Å from a set of parallel planes in a metal occurs at an angle 60°. The distance between the scattering planes in the crystal is :
    a) 2.00Å b) 1.00Å c) 0.575Å d) 1.15Å

34. In cube of any crystal A-atom placed at every corners and B-atom placed at every centre of face. The formula of compound is :
    a) AB b) AB_3 c) A_2B_2 d) A_2B_3

35. Which of the following statements is not correct regarding diamond and graphite?
    a)
    In diamond, each carbon atom is covalently bonded to four other carbon atoms.
    b)
    In graphite, each carbon atom is covalently bonded to three other carbon atoms in the same plane
    c)
    The C- Cbond length in graphite isintermediate between single and double bond distance.
    d)
    Diamond is a layered structure, the two layers joined by van der Waals' forces

36. Which of the following point defects are shown by $AgBr_{(s)}$ crystals?
    (I) Schottky defect
    (II) Frenkel defect
    (III) Metal excess defect
    (IV) Metal deficiency defect
    a) (I) and (II) b) (III) and (IV) c) (I) and (III) d) (II) and (IV)

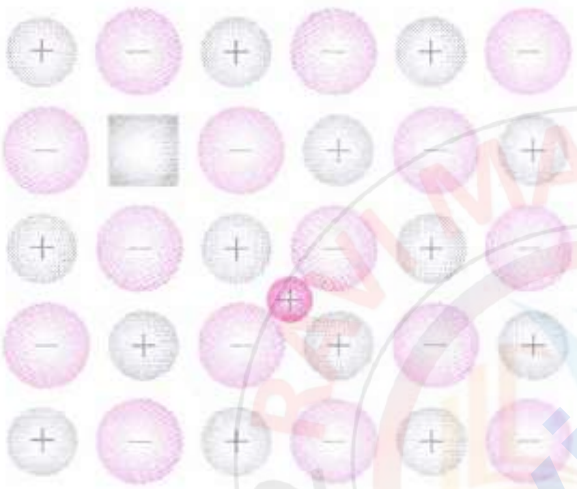
37. Copper crystallises in face-centred cubic lattice with a unit cell length of 361 pm. What is the radius of copper atom in pm?
    a) 157 b) 181 c) 108 d) 128

38. A metal crystallises into two cubic phases, face centred cubic (fcc) and body centred cubic (bcc), whose unit cell lengths are 3.5 Å and 3.0 Å, respectively. The ratio of densities of fee and bee is:
    a) 1.259: 1 b) 1: 1.259 c) 3: 2 d) 1.142: 1

39. Which of the following statements is not true about the voids?
    a)
    Octahedral void is formed at the centre of six spheres which lie at the apices of a regular octahedron.
    b) There is one octahedral site for each sphere
    c) There are two tetrahedral sites for each sphere.
    d)
    Octahedral voids are formed when the triangular voids in second layer exactly overlap with similar voids in the first layer.
40. How many chloride ions are surrounding sodium ion in sodium chloride crystal?
    a) 4 b) 8 c) 6 d) 12
41. The number of atoms contained in a facc unit cell of a monoatomic substance is
    a) 4 b) 6 c) 8 d) 3
42. Coordination numbers of Cs^+ and Cl^- in CsCl crystal are
    a) 8,8 b) 4,4 c) 6,6 d) 8,4
43. The number of octahedral void(s) per atom present in a cubic close-packed structure is
    a) 1 b) 3 c) 2 d) 4
44. For orthorhombic system axial ratios are and the axial angles are $a \neq b \neq c$
    a) $\alpha = \beta = \gamma \neq 90^\circ$ b) $\alpha = \beta = \gamma = 90^\circ$ c) $\alpha = \gamma = 90^\circ, \beta \neq 90^\circ$
    d) $\alpha \neq \beta \neq \gamma = 90^\circ$
45. Which of the following forms a molecular solid when solidified?
    a) Calcium fluoride b) Silicon dioxide c) Carbon dioxide d) Sodium chloride
46. Graphite is a good conductor of electricity due to the presence of_____
    a) cations b) anions c) lone pair of electrons d) free valence electrons
47. A metal crystallizes with a face-centred cubic lattice. The edge of the unit cell is 408 pm. The diameter of the metal atom is:
    a) 288 pm b) 408 pm c) 144 pm d) 204 pm
48. To get n-type of semiconductor, germanium should be doped with
    a) gallium b) arsenic c) aluminium d) boron.
49. Assertion: Diode is a combination of n-type and p-type semiconductors.
    Reason: The solar cell is an efficient photo-diode used for conversion of light energy into electrical energy

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) If both assertion and reason are false

50. Which is the defect represented by the given figure?



a) Schottky defect b) Frenkel defect c) Vacancy defect d) Interstitial defect

51. In face centred cubic unit cell, edge length is
a) $\frac{4}{\sqrt{3}}r$ b) $\frac{4}{\sqrt{2}}r$ c) 2r d) $\frac{\sqrt{3}}{2}r$

52. The number of atoms in 100 g of a fcc crystal with density d = 10 g/cm^3 and cell edge equal to 100 pm, is equal to:
a) 2 x 10^{25} b) 1 x 10^{25} c) 4 x 10^{25} d) 3 x 10^{25}

53. Cation and anion combine in a crystal to form following type of compound:
a) ionic b) metallic c) covalent d) dipole-dipole.

54. In face-centred cubic lattice, a unit cell is shared equally by how many unit cell?
a) 2 b) 4 c) 6 d) 8

55. Which of the following represents correct order of conductivity in solids?
a) $K_{metais} > > K_{insuiators} < K_{semiconductors}$ b) $K_{metais} < < K_{insuiators} < K_{semiconductors}$
c) K_{metais}; $K_{semiconductors} > K_{insuiators}$ = zero
d) $K_{metais} < K_{semiconductors} > K_{insuiators} \neq$ zero

56. Which of the following is not a characteristic of a crystalline solid?

a) Definite and characteristic heat of fusion b) Isotropic nature

c)

A regular periodically repeated pattern of arrangement of constituent particles in the entire crystal

d) A true solid

57. Graphite cannot be classified as _____ .

a) conducting solid b) network solid c) covalent solid d) ionic solid

58. Edge length of unit cell of chromium metal is 287 pm with bcc arrangement. The atomic radius is of the order

a) 124.27 pm b) 287 pm c) 574 pm d) 143.5 pm

59. In the following figure, the blank X is known as ___ and why?

a) Electron trap, because an electron is present here.

b) Metal deficient centre, since negative charge is present here.

c) F-centre, since it imparts colour to the crystal.

d) F-centre, since it is responsible for positive charge on the crystal

60. Monoclinic sulphur is an example of monoclinic crystal system. What are the characteristics of the crystal system?

a) $a \neq b \neq c, \alpha = \beta = \gamma = 90^o$ b) $a \neq b \neq c, \alpha \neq \beta \neq \gamma \neq 90^o$ c) $a = b \neq c, \alpha = \beta = \gamma = 90^o$

d) $a \neq b \neq c, \alpha = \beta = \gamma = 90^o, \beta \neq 90^o$

61. Which of the solids show the following properties?

(i) Electrical conductivity

(ii) Malleability

(iii) Ductility

(iv) Fairly high melting point

a) Ionic solids b) Covalent solids c) Metallic solids d) Molecular solids

62. A solid AB has a rock salt structure. If radius of cation A^+ is 120 pm, what is the minimum value of radius of B^- anion?
a) 120 pm b) 240 pm c) 290 pm d) 360 pm

63. The coordination number of metal crystallising in a hexagonal close packing is
a) 12 b) 4 c) 8 d) 6

64. An electron trapped in an anion site in a crystal is called
a) F-centre b) Frenkel defect c) Schottky defect d) interstitial defect

65. Lithium metal crystallizes in a body-centred cubic crystal. If the length of the side of the unit cell of lithium is 351pm, the atomic radius of lithium will be:
a) 151.8pm b) 75.5pm c) 300.5pm d) 240.8pm

66. Experimentally it was found that a metal oxide has formula $M_{0.98}O$. Metal M, is present as M^{2+} and M^{3+} in its oxide. Fraction of the metal which exists as M^{3+} would be:
a) 5.08% b) 7.01% c) 4.08% d) 6.05%

67. If NaCl is doped with 10^{-4} mol % of $SrCl_2$, the concentration of cation vacancies will be : ($N_A = 6.02 \times 10^{23}$ mol^{-1})
a) 6.02×10^{16} mol^{-1} b) 6.02×10^{17} mol^{-1} c) 6.02×10^{14} mol^{-1}
d) 6.02×10^{15} mol^{-1}

68. Match the column I with column II and mark the appropriate choice

Column-I(Structure)		Column II (Packing efficiency)	
A)	Simple cubic structure	(i)	68%
B)	Face centred cubic structure	(ii)	74%
C)	Body centred cubic structure	(iii)	52%

a) (A) → (iii), (B) → (ii), (C) → (i) b) (A) → (i), (B) → (ii), (C) → (iii
c) (A) → (ii), (B) → (i), (C) → (iii) d) (A) → (iii), (B) → (i), (C) → (ii)

69. A given metal crystallizes out with a cubic structure having edge length of 361 pm. If there are four metal atoms in one unit cell, what is the radius of one atom?
a) 80 pm b) 108 pm c) 40 pm d) 127 pm

70. In a face-centered cubic lattice, a unit cell is shared equally by how many unit cells?
a) 2 b) 4 c) 6 d) 8

71. The intermetallic compound LiAg crystallizes in cubic lattice in which both lithium and sliver have coordination number of eight. The crystal class is
a) face-centred cube b) simple cube c) body-centred cube d) none of these

72. If we mix a pentavalent impurity in a crystal lattice of germanium, what type of semiconductor formation will occur?
a) n-type semiconductor b) p-type semiconductor c) both (a) and (b)
d) None of these

73. When electrons are trapped into the crystal in anion vacancy, the defect is known as
a) Schottky defect b) Frenkel defect c) Stoichiometric defect d) F-centres

74. A compound MpXq has cubic close packing (eep) arrangement of X. Its unit cell structure shown below. The empirical formula of the compound is:
a) MX b) MX_2 c) M_2X d) M_5X_{14}

75. Match the column I with column II and mark the appropriate choice.

Column-I (Radius ratio)		Column-II (Coordination number)	
A)	0.155 - 0.225	(i)	4
B)	0.225 - 0.414	(ii)	8
C)	0.414 - 0.732	(iii)	3
D)	0.732 - 1.0	(iv)	6

a) (A)→ (i), (B)→ (ii), (C)→ (iv), (D)→ (iii)
b) (A)→ (Ii), (B)→ (iv), (C)→ (i), (D)→ (iii)
c) (A)→ (iv), (B)→ (iii), (C)→ (i), (D)→ (ii)
d) (A)→ (iii), (B)→ (i), (C)→ (iv), (D)→ (ii)

76. Which of the following solids is not an electrical conductor?
(I) $Mg_{(s)}$
(II) $TiO_{(s)}$
(III) $I_{2(s)}$
(IV) $H_2O_{(s)}$
a) (I) only b) (II) Only c) (III) and (IV) d) (II), (III) and (IV)

77. If 'a' stands for the edge length of the cubic systems: simple cubic, body centred cubic and face centred cubic, then the ratio of radii of the spheres in these system will be respectively

a) $\frac{1}{2}a : \frac{\sqrt{3}}{4}a, \frac{1}{2\sqrt{2}}a$ b) $\frac{1}{2}a : \sqrt{3}a, \frac{1}{\sqrt{2}}a$ c) $\frac{1}{2}a : \frac{\sqrt{3}}{4}a, \frac{\sqrt{3}}{2}a$ d) $1a : \sqrt{3}a, \sqrt{2}a$

78. If three elements X, Y and Z crystallise in a ccp lattice with X atoms at the corners, Y atoms at the cube centre and Z atoms at the edges, the formula of the compound will be
a) XYZ b) XYZ_2 c) XYZ_3 d) X_2Y_2Z

79. Lithium has a bee structure. Its density is 530 kg m^{-3} and its atomic mass is 6.94 g mol^{-1}. Calculate I the edge length of a unit cell of lithium metal? I (NA = 6.02 X 10^{23} mol^{-1})
a) 527 pm b) 264 pm c) 154 pm d) 352 pm

80. Which of the following is not true about the ionic solids?
a) Bigger ions form the close packed structure
b)
Smaller ions occupy either the tetrahedral or the octahedral voids depending upon their size
c) Occupation of all the voids is not necessary
d)
The fraction of octahedral or tetrahedral voids occupied depends upon the radii of the ions occupying the voids

81. Examples of few solids are given below. Find out the example which is not correctly matched.
a) Ionic solids - NaCl, ZnS b) Covalent solids - H_2, I_2
c) Molecular solids - $H_2O_{(s)}$ d) Metallic solids - Cu, Sn

82. The edge length of sodium chloride unit cell is 564 pm. If the size of Cl^- ion is 181 pm. The size ofNa^+ ion will be
a) 101 pm b) 181 pm c) 410 pm d) 202 pm

83. If a is the length of the side of a cube, the distance between the body centered atom and one corner atom in the cube will be :
a) $\frac{2}{\sqrt{3}}a$ b) $\frac{4}{\sqrt{3}}a$ c) $\frac{\sqrt{3}}{4}a$ d) $\frac{\sqrt{3}}{2}a$

84. Total volume of atoms present in a fcc unit cell of a metal with radius r is:
a) $\frac{12}{3}\pi r^3$ b) $\frac{16}{3}\pi r^3$ c) $\frac{20}{3}\pi r^3$ d) $\frac{24}{3}\pi r^3$

85. A metal crystallizes with a face-centered cubic lattice. The edge length of the unit cell is 408 pm.The diameter of the metal atom is
a) 288 pm b) 408 pm c) 144 pm d) 204 pm

86. In a Schottky defect,
    a) an ion moves to interstitial position between the lattice points
    b) electrons are trapped in a lattice site c) some lattice sites are vacant
    d) some extra cations are present in interstitial spaces

87. Assertion : Semiconductors are the solids with conductivities in the intermediate range from 10^{-6} to 10^{4} ohm^{-1} m^{-1}
    Reason: In case of semiconductors, the gap between the valence band and conduction band is small.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false.
    d) If both assertion and reason are false

88. In NaCl structure,
    a) all octahedral and tetrahedral sites are occupied
    b) only octahedral sites are occupied c) only tetrahedral sites are occupied
    d) neither octahedral nor tetrahedral sites are occupied

89. The percentage of empty space in a body centred cubic arrangement is _____ .
    a) 74 b) 68 c) 32 d) 26

90. Solid X is a very hard solid which is electrical insulator in solid as well as in molten state and has extremely high melting point. What type of solid is it?
    a) Ionic solid b) Covalent solid c) Metallic solid d) Molecular solid

91. The density of mercury is 13.6 g/mL. The diameter of an atom of mercury assuming that each atom is occupying a cube of edge length equal to the diameter of the mercury atom is approximately:
    a) 3.01 Å b) 2.54 Å c) 0.29 Å d) 2.91 Å

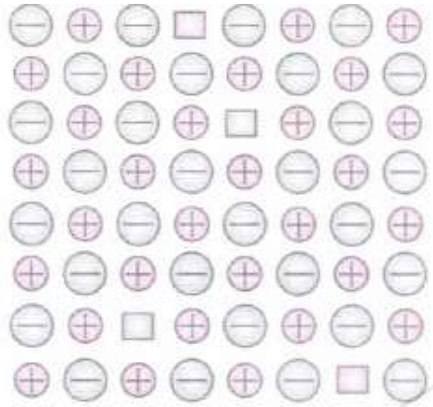
92. The edge length of a face-centred unit cubic cell is 50g pm. If the radius of the cation is 100 pm, the radius of the anion is.
    a) 288 pm b) 398 pm c) 154 pm d) 618 pm

93. Iodine molecules are held in the crystals lattice by

a) London forces b) dipole-dipole interactions c) covalent bonds
d) coulombic forces

94. In the fluorite structure, the coordination number of Ca^{2+} ion is :
a) 4 b) 6 c) 8 d) 3

95. Which of the following defects is represented in the given figure?



a) Impurity defect b) Frenkel defect c) Schottky defect
d) Metal excess defect

96. What is the coordination number in a square close packed structure in two dimensions?
a) 2 b) 3 c) 4 d) 6

97. The appearance of colour in solid alkali metal halides is generally due to
a) Schottky defect b) Frenkel defect c) Interstitial position d) F-centres

98. Match the column I with column II and mark the appropriate choice

Column-I		Column-II	
A)	Fe in solid state	(i)	Electrolytic conductor
B)	NaCl in molten state	(ii)	p-type semiconductor
C)	CO_2 in solid state	(iii)	Electronic conductor
D)	Si doped with aluminium	(iv)	Non-polar insulator

a) (A) → (iv), (B) → (ii), (C) → (i), (D) → (iii)
b) (A) → (ii), (B) → (iii), (C) → (i), (D) → (iv)
c) (A)→ (iii), (B)→ (i), (C)→ (iv), (D)→ (ii)
d) (A) → (i), (B) → (iv), (C) → (iii), (D) → (ii)

99. The radii of Na^+ and cr ions are 95 pm and 181 pm respectively. The edge length of NaCl unit cell is
a) 276 pm b) 138 pm c) 552 pm d) 415 pm

100. Which is the incorrect statement?

a) $FeO_{0.98}$ has non-stoichiometric metal deficiency defect

b) Density decreases in case of crystals with Schottky's defect

c)

NaCl(s) is insulator, silicon is semiconductor, silver is conductor, quartz is piezoelectric crystal

d) Frenkel defect is a dislocation defect

101. An element crystallises in a structure having a fcc unit cell of an edge 200 pm. If 200 g of this element contains 24×10^{23} atoms then its density is:

a) 41.66 g cm^{-3} b) 313.9 g cm^{-3} c) 8.117 g cm^{-3} d) 400 g cm^{-3}

102. The conductivity of intrinsic semiconductors can be increased by adding a suitable impurity. This process is called (P). This can be done with an impurity which is (Q) rich or deficient as compared to the semiconductor. Such impurities introduce(R) defects in them. Electron rich impurities result in (S) type semiconductors while electron deficit impurities result in (T) type semiconductors

a)

P	Q	R	S	T
doping	proton	point	p	n

b)

P	Q	R	S	T
doping	electron	non-stoichiometric	p	n

c)

P	Q	R	S	T
energy gap	charged	impurity	n	p

d)

P	Q	R	S	T
doping	electron	electronic	n	p

103. A metal X crystallises in a face-centred cubic arrangement with the edge length 862 pm. What is the shortest separation of any two nuclei of the atom?

a) 406 pm b) 707 pm c) 862 pm d) 609.6 pm

104. Assertion: A tetrahedral void is surrounded by four spheres and an octahedral void is surrounded by six spheres.

Reason: The number of tetrahedral voids is double the number of close packed spheres and number of octahedral voids is equal to number of close packed spheres

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) If both assertion and reason are false

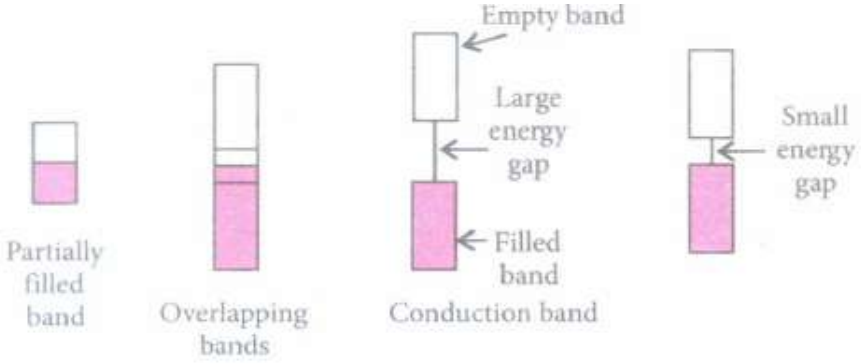
105. Assertion: Frenkel defect is also called dislocation defect.
Reason: Frenkel defect is shown by ionic substances in which cation and anion are of almost similar sizes.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) If both assertion and reason are false

106. In *ABC ABC* packing if the number of atoms in the unit cell is n then the number of tetrahedral voids in the unit cell is equal to
a) n b) $n/2$ c) $n/4$ d) $2n$

107. A unit cell of sodium chloride has four formula units. The edge length of the unit cell is 0.564 nm. What is the density of sodium chloride?
a) 3.89 g cm^{-3} b) 3.89 g cm^{-3} c) 3 g cm^{-3} d) 1.82 g cm^{-3}

108. Which of the following statements is true about semiconductors?
a) Impurity of lower group creates n-type semiconductors.
b) Impurity of higher group creates p-type semiconductors
c) Extrinsic semiconductors are formed by doping impurity
d) Intrinsic semiconductors become conductors when temperature is raised

109. Three types of bands are shown in the figures given below showing the position of the valence band and conduction band. The figures A, B and C represent



a)

A	B	C
Non-Metal	Metal	Semiconductor

b)

A	B	C
Semiconductor	Insulator	Conductor

c)

A	B	C
Metal	Insulator	Semiconductor

d)

A	B	C
Insulator	Conductor	Semiconductor

110. Which of the following is an amorphous solid?
a) Graphite (C) b) Quartz glass (SiO_2) c) Chrome alum
d) Silicon carbide (SiC)

111. If the distance between Na^+ and Cl in NaCl crystal is 265 pm, the edge length of the unit cell will be
a) 265 pm b) 795 pm c) 132.5 pm d) 530 pm

112. The edge length of fee cell is 508 pm. If radius of cation is 110 pm, the radius of anion is
a) 110 pm b) 220 pm c) 285 pm d) 144 pm

113. In the solid state, MgO has the same structure as that of sodium chloride. The number of oxygens surounding each magnesium in MgO is
a) 6 b) 1 c) 2 d) 4

114. A solid with high electrical and thermal conductivity from following is
a) Si b) Li c) NaCl d) Ice

115. Which of the following is a network solid?
a) $SO_{2(Solid)}$ b) I_2 c) Diamond d) $H_2O_{(Ice)}$

16. Assertion: Substances like Fe_3O_4 and $MgFe_2O_4$ lose ferrimagnetism on heating and become paramagnetic.
Reason: Magnetic moments of the domains in these substances are aligned in parallel and antiparallel directions in unequal numbers.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) If both assertion and reason are false

17. An element has a body centered cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is:
a) $\frac{4}{\sqrt{2}} \times 288\text{pn}$ b) $\frac{\sqrt{3}}{4} \times 288\text{pm}$ c) $\frac{\sqrt{2}}{4} \times 288\text{pm}$ d) $\frac{4}{\sqrt{3}} \times 288\text{pm}$

18. The fraction of the total volume occupied by the atoms present in a simple cube is
a) $\frac{\pi}{4}$ b) $\frac{\pi}{6}$ c) $\frac{\pi}{3\sqrt{2}}$ d) $\frac{\pi}{4\sqrt{2}}$

19. Which of the following oxides shows electrical properties like metals?
a) SiO_2 b) MgO c) $SO_{2(s)}$ d) CrO_2

20. Fill in the blanks by choosing the correct option. Metals often occur in --x condition. Individual crystals are randomly oriented so a metallic sample 8. may appear to be ~ even though a single crystal is___Z___.

a)

x	y	z
crystalline	isotropic	anisotropic

b)

x	y	z
polycrystalline	isotropic	anisotropic

c)

x	y	z
anisotropic	isotropic	crystalline

d)

x	y	z
crystalline	anisotropic	isotropic

21. The vacant space in bee lattice unit cell is :

a) 48% b) 23% c) 32% d) 26%

122. Which of the following solids is the structure of CsCl crystal?
a) Body centred cubic b) Simple cubic c) Face centred cubic
d) Edge centred cubic

123. Fill in the blanks by choosing an appropriate option. A sample of ferrous oxide has actual formula $Fe_{0.93}O_{1.00}$ In this sample (i) fraction of metal ions are Fe^{2+} ions. (ii) type of non-stoichiometric defect is present in this sample:

a)

(i)	(ii)
0.849	Metal deficiency

b)

(i)	(ii)
0.790	Metal deficiency

c)

(i)	(ii)
0.145	Metal excess

d)

(i)	(ii)
0.93	Vacancy defect

124. An element with atomic mass 100 has a bee structure and edge length 400 pm. The density of element is:
a) 10.37 g cm^{-3} b) 5.19 g cm^{-3} c) 7.29 g cm^{-3} d) 2.14 g cm^{-3}

125. The intermetallic compound LiAg crystallizes in a cubic lattice in which both lithium and silver atoms have coordination number of eight. To what crystal class does the unit cell belong
a) Simple cubic b) Face - centred cubic c) Body-centred cubic d) None

126. The sharp melting point of crystalline solids is due to
a)
a regular arrangement of constituent particles observed over a short distance in the crystal lattice
b)
a regular arrangement of constituent particles observed over a long distance in the crystal lattice
c) same arrangement of constituent particles in different directions
d) different arrangement of constituent particles in different directions

127. Structure of a mixed oxide is cubic close-packed (c.c.p). The cubic unit cell of mixed oxide is composed of oxide ions. One fourth of the tetrahedral voids are occupied by divalent metal A and the octahedral voids are occupied by a monovalent metal B. The formula of the oxide is:

a) ABO_2 b) A_2BO_2 c) $A_2B_3O_4$ d) AB_2O_2

128. Which of the following conditions favours the existence of a substance in the solid state?
a) High temperature b) Low temperature c) High thermal energy
d) Weak cohesive forces

129. Mark the incorrect pair from the following
a) Schottky defect - Equal number of cations and anions are missing
b)
Frenkel defect - Dislocation of cation from its normal site to an interstitial site
c) Impurity defect - $CdCl_2$ in AgCl crystal to create cationic vacancy.
d) Metal excess defect - $Fe_{0.93}O$

130. A crystal lattice with alternative +ve and -ve ions has radius ratio 0.524. The coordination number of lattice is
a) 4 b) 6 c) 8 d) 12

131. Iron exhibits bee structure at room temperature. Above 900°C, it transforms to fcc structure. The ratio of density of iron at room temperature to that at 900°C(assuming molar mass and atomic radii of iron remains constant with temperature) is :
a) $\frac{3\sqrt{3}}{4\sqrt{2}}$ b) $\frac{4\sqrt{3}}{3\sqrt{2}}$ c) $\frac{\sqrt{3}}{\sqrt{2}}$ d) $\frac{1}{2}$

132. Which of the following metal oxides is antiferromagnetic in nature?
a) MnO_2 b) TiO_2 c) NO_2 d) CrO_2

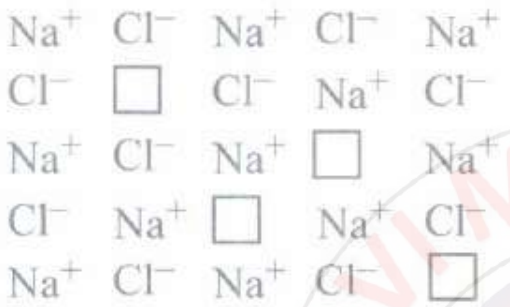
133. When molten zinc is converted into solid state it acquires hep structure. The number of nearest neighbours will be
a) 6 b) 12 c) 8 d) 4

134. The density and edge length values for a crystalline element with fcc lattice are 10 g cm^{-3} and 400 pm, respectively. The number of unit cells in 32 g of this crystal is:
a) 8×10^{23} b) 5×10^{22} c) 8×10^{22} d) 5×10^{23}

135. Assertion: SiC has higher melting point than NaCl.
Reason : SiC has stronger electrostatic forces of attraction.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) If both assertion and reason are false

136. What type of crystal defect is shown in the figure given below?



a) Frenkel defect b) Schottky defect c) Interstitial defect
d) Cation excess defect

137. A crystal is formed by two elements X and Y in cubic structure. X atoms are at the corners of a cube while Y atoms are at the face centre. The formula of the compound will be
a) XY b) XY_2 c) X_2Y_3 d) XY_3

138. Which of the following will have metal deficiency defect?
a) NaCl b) FeO c) KCl d) ZnO

139. For orthorhombic system axial ratios are a ≠ b≠ c and the axial angles are:
a) $\alpha = \beta = y \neq 90°$ b) $\alpha = \beta = \gamma = 90°$ c) $\alpha = \gamma = 90°, \beta \neq 90°$ d) $\alpha \neq \beta \neq \gamma \neq 90°$

140. p-type semiconductors are formed when Si or Ge are doped with
a) group 14 elements b) group 15 elements c) group 13 elements
d) group 18 elements

141. In the cubic close packing, the unit cell has
a) 4 tetrahedral voids each of which is shared by four adjacent unit cells
b) 4 tetrahedral voids within the unit cell
c) 8 tetrahedral voids each of which is shared by four adjacent unit cells.
d) 8 tetrahedral voids within the unit cells

42. Match the column I with column II and mark the appropriate choice .
    a) (A)→(iii), (B)→(i), (C)→(ii), (D)→(iv),(E)→(v)
    b) (A)→(i), (B)→(ii), (C)→(iii), (D)→(iv), (E)→(v)
    c) (A)→(iv), (B)→(i), (C)→(iii), (D)→(ii), (E)→(v)
    d) (A)→(v), (B)→(iv), (C)→(iii), (D)→(ii), (E)→(i)

43. NaCl type crystal (with coordination no. 6: 6) can be converted into CsCl type crystal (with coordination no. 8: 8) by applying
    a) high temperature b) high pressure c) high temperature and high pressure
    d) low temperature and low pressure.

44. The correct statement regarding defects in crystalline solids is :
    a) Frenkel defects decrease the density of crystalline solids
    b) Frenkel defect is a dislocation defect
    c) Frenkel defect is found in halides of alkaline metals
    d) Schottky defects have no effect on the density of crystalline solids.

45. Which type of semiconductor is formed when germanium is doped in the gallium as indicated in the figure?
    a)

p-type semiconductor	Ge	Ge	Ge	Ge

    b)

n-type semiconductor	Ge	Ge	Ga	Ge

    c)

No change in conductivity	Ge	Ge	Ge	Ge

    d)

It becomes superconductor	Ge	Ge	Ge	Ge

46. Assertion : Metals are good conductors of electricity.
    Reason: Metals conduct electricity in solid as well as in molten state.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false.
    d) If both assertion and reason are false

47. A solid compound XY has NaCl structure. If the radius of the cations is 100 pm, the radius of the anion (Y)will be:
    a) 275.1 pm b) 322.5 pm c) 241.5 pm d) 165.7 pm

48. In CaF_2 type (fluorite structure) Ca^{2+} ions form _(A)_ structure and P- ions are present in all _(B)_ voids. The coordination number of Ca^{2+} is _(C)_ and F^- is _(D)_ (A), (B), (C) and (D) respectively are

a)

A	B	C	D
ccp	octahedral	8	4

b)

A	B	C	D
bcc	tetrahedral	4	8

c)

A	B	C	D
ccp	tetrahedral	8	4

d)

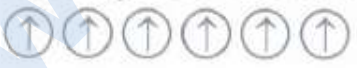
A	B	C	D
ccp	octahedral	4	8

49. Which of the following statements about the interstitial compounds is incorrect?
a) They are chemically reactive b) They are much harder then pure metal
c) They have higher melting points than the pure metal.
d) They retain metallic conductivity.

50. In NaCl is doped with 10 a mol % of $SrCl_2$, the concentration of cation vacancies will be (No = 6.02×10^{23} mol^{-1})
a) 6.02×10^{16} mol^{-1} b) 6.02×10^{17} mol^{-1} c) 6.02×10^{14} mol^{-1}
d) 6.02×10^{15} mol^{-1}

51. Which of the following statements is not correct about hexagonal close packing?
a) In hcp, atoms occupy 74% the available space
b) It is AB AB type packing in which third layer is aligned with the first layer.
c) Be, Mg, Mo etc. are found to have hcp structure
d) The coordination number is 6.

52. Which of the following does not represent radius of the atom correctly?
(i) Simple cubic cell: Radius = $\frac{a}{2}$
(ii) Pace centred cubic cell: Radius = $\frac{a}{3\sqrt{3}}$
(iii) Body centred cubic cell: Radius $\frac{\sqrt{3}}{4}a$
a) (i) b) (iii) c) (ii) d) (i) and (ii)

53. Which of the following arrangements shows schematic alignment of magnetic moments of antiferromagnetic substances?
a)  b) c)
d)

54. Which of the following statements is not correct?
a) The number of carbon atoms in a unit cell df diamond is 4.
b) The number of Bravais lattices in which a crystal can be categorized is 14

c)

The fraction of the total volume occupied by the atoms in a primitive cell is 0.48.

d) Molecular solids are generally volatile

155. In the table given below, dimensions and angles of various crystals are given. Complete the table by filling the blanks.

Type of crystal	Dimensions	Angles
1. Cubic	a=b=c	$\propto=\beta=\vee=$p
2. Tetragonal	q	$\propto=\beta=\vee=90^0$
3. Orthorhombic	a≠b≠c	r
4. Hexagonal	s	$\propto=\beta=\vee=90^0$, $\vee=$t

a)

p	q	r	s	t
90^0	a=b≠c	$\propto=\beta=\vee=90^0$	a=b≠c	120^0

b)

p	q	r	s	t
120^0	a=b=c	$\propto=90^0$,$\beta=\vee=120^0$	a≠b≠c	90^0

c)

p	q	r	s	t
90^0	a≠b=c	$\propto=\beta=\vee=120^0$	a≠b≠c	90^0

d)

p	q	r	s	t
120^0	a≠b≠c	$\propto\neq\beta\neq\vee\neq90^0$	a≠b=c	120^0

156. Which of the following statements is not true?

a) Paramagnetic substances are weakly attracted by magnetic field.

b) Ferromagnetic substances cannot be magnetised permanently.

c)

The domains in antiferromagnetic substances are oppositely oriented with respect to each other.

d)

Pairing of electrons cancels their magnetic moment in the diamagnetic substances.

157. Percentage of free space in a body centred cubic unit cell is

a) 30% b) 32% c) 34% d) 28%

158. In calcium fluoride, having the fluorite structure, the coordination number for calcium ion (Ca^{2+}) and fluoride ion (F^-) are :

a) 4 and 2 b) 6 and 6 c) 8 and 4 d) 4 and 8

159. On doping Ge metal with a little of In or Ga, one gets:

a) p-type semi conductor b) n-type semi conductor c) insulator d) rectifier

60. Relationship between the atomic radius and the edge length of a body-centered cubic unit cell is
a) r = a/2 b) $r = \sqrt{a/2}$ c) $r = \frac{\sqrt{3}}{4}a$ d) $r = \frac{3a}{2}$

61. Which of the following does not represent a type of crystal system?
a) Triclinic b) Monoclinic c) Rhombohedral d) Isotropical

62. Pure silicon and germanium behave as
a) conductors b) semiconductors c) insulators d) piezoelectric crystals.

63. Silicon doped with electron-rich impurity forms_____
a) p-type semiconductor b) n-type semiconductor c) intrinsic semiconductor d) insulator

64. What type of stoichiometric defect is shown by ZnS?
a) Schottky defect b) Frenkel defect c) Both Frenkel and Schottky defects d) Non-stoichiometric defect

65. If the radius of an octahedral void is r and radius of atoms in close packing is R, the relation between r and R is:
a) r = 0.414R b) R = 0.414r c) r = 2R d) r = $\sqrt{2R}$

66. Lithium metal crystallises in a body centered cubic crystal. If the length of the side of the unit cell of lithiurr is 351 pm, the atomic radius of the lithium will be
a) 15l.8 pm b) 75.5 pm c) 300.5 pm d) 240.8 pm

67. Assertion: In crystalline solids, the value of resistance is different in different directions.
Reason: Crystalline solids are isotropic in nature.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) If both assertion and reason are false

68. In ccp arrangement the pattern of successive layers can be designated as
a) AB AB AB b) ABC ABC ABC c) AB ABC AB d) ABA ABA ABA

69. The anionic sites occupied by unpaired electrons are called F-centres or colour centres. They impart (X) colour to the crystals of NaCl. Excess of lithium makes LiCl crystals (Y) and excess of potassium makes KCl crystals (Z). (X), (Y) and (Z) are
a) yellow, green and pink respectively
b) pink, yellow and violet (or lilac) respectively
c) yellow, pink and violet (or lilac) respectively
d) red, yellow and pink respectively.

70. The total number of tetrahedral voids in the face centred unit cell is_____
a) 6 b) 8 c) 10 d) 12

71. Ionic solids conduct electricity in molten state but not in solid state because
a)
in molten state free ions are furnished which are not free to move in solid state
b) in solid state ionic solids are hard, brittle and become soft in molten state
c) all solids conduct electricity in molten state
d) in solid state ions are converted to atoms which are insulators.

72. Crystalline CsCl has density 3.988 g cm^{-3}. The volume occupied by single CsCl ion pair in the crystal will be:
a) 7.014×10^{-3} cm^3 b) 7.014×10^{-23} cm^3 c) 1.014×10^{-3} cm^3
d) 1.542×10^{-5} cm^3

73. In which of the following structures coordination number for cations and anions in the packed structure will be same?
a)
Cl^- ions form fee lattice and Na^+ ions occupy all octahedral voids of the unit cell
b)
Ca^{2+} ions form fcc lattice and F^- ions occupy all the eight tetrahedral voids of the unit cell
c)
O2- ions formfee lattice and Na^+ ions occupy all the eight tetrahedral voids of the unit cell
d)
S^{2-} ions form fee lattice and Zn^{2+} ions go into alternate tetrahedral voids of the unit cell.

174. An element crystallises into a structure which may be described by a cubic type of unit cell having one atom on each corner of the cube and two atoms on one of its diagonals. If the volume of this unit cell is 24×10^{-24} cm and density of element is 7.2 g cm^{-3} the number of atoms present in 200 g of element is:
a) 3.5×10^{24} b) 5.7×10^{23} c) 6.3×10^{20} d) 1×10^{10}

175. AB crystallizes in a body-centred cubic lattice with edge length 'a' equal to 387 pm. The distance between two oppositely charged ions in the lattice is:
a) 335pm b) 250pm c) 200pm d) 300pm

176. Match the column I having type of lattice point and its contribution to one unit cell in column II and mark the appropriate choice

Column-I		Column-II	
A)	Corner	(i)	1
B)	Edge	(ii)	1/8
C)	Face center	(iii)	1/4
D)	Body center	(iv)	1/2

a) (A) → (ii), (B) → (i), (C) → (iii), (D) → (iv)
b) (A)→(ii), (B)→(iii), (C)→(iv), (D)→(i)
c) (A)→ (i), (B)→ (ii), (C)→ (iv), (D)→ (iii)
d) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

177. A ferromagnetic substance becomes a permanent magnet when it is placed in a magnetic field because
a) all the domains get oriented in the direction of magnetic field
b)
all the domains get oriented in the direction opposite to the direction of magnetic field
c) domains get oriented randomly
d) domains are not affected by magnetic field

178. Which of the following crystals does not exhibit Frenkel defect?
a) AgBr b) AgCl c) KBr d) ZnS

179. The lattice site in a pure crystal cannot be occupied by
a) molecule b) ion c) electron d) atom

80. For two isomorphous crystals A and B, the ratio of density of A to that of B is 1.6 while the ratio of the edge length of B to that of A is 2. If the molar mass of crystal B is 200 g mol, then that of crystal A is:
a) 240 g mor^{-1} b) 120 g mol^{-1} c) 80 g mol^{-1} d) 40 g mol^{-1}

81. The ability of a substances to assume two or more crystalline structures is called
a) Isomerism b) Polymorphism c) Isomorphism d) Amorphism

82. The correct order of the packing efficiency in different types of unit cells is _____.
a) fcc < bcc < simple cubic b) fcc > bcc > simple cubic
c) fcc < bcc > simple cubic d) bcc simple cubic

83. Which of the following statements is not true about the hexagonal close packing?
a) The coordination number is 12. b) It has 74% packing efficiency
c)
Tetrahedral voids of the second layer are covered by the spheres of the third layer
d)
In this arrangement spheres of the fourth layer are exactly aligned with those of the first layer.

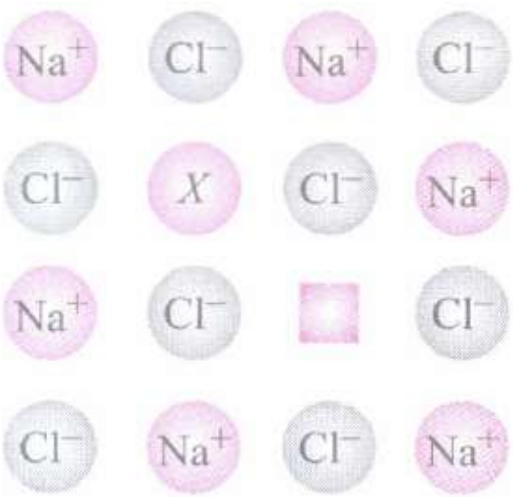
84. A cubic solid is made up of two elements P and Q. Atoms of P are present at the corners of the cube and atoms of Q are present at body centre. What is the formula of the compound and what are coordination numbers of P and Q?
a) PQ_2,6: 6 b) PQ,6: 6 c) P_2Q,6: 8 d) PQ, 8 : 8

85. Ionic solids, with Schottky defects, contain in their structure:

a) cation vacancies only b) cation vacancies and interstitial cations
c) equal number of cation and anion vacancies
d) anion vacancies and interstitial anions.

86. An element crystallising in body centred cubic lattice has an edge length of 500 pm. If its density is 4 g cm^{-3}, the atomic mass of the element (in g mol^{-1}) is (consider $N_A = 6 \times 10^{23}$)
a) 100 b) 250 c) 125 d) 150

87. In the given crystal structure what should be the cation X which replaces Na + to create a cation vacancy?



a) Sr^{2+} b) K^{+} c) Li^{+} d) Br^{-}

88. Schottky defect in crystals is observed when
a) an ion leaved its normal site and occupies an interstitial site
b) unequal number of cations and anions are missing from the lattice
c) density of the crystal is increased
d) equal number of cations and anions are missing from the lattice

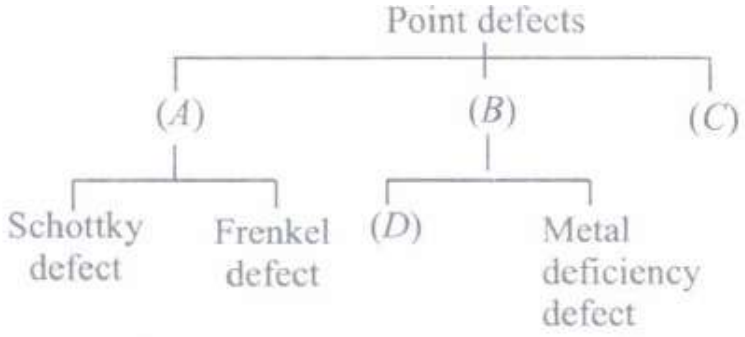
89. Which of the following statements is not true about amorphous solids?
a) On heating they may become crystalline at certain temperature
b) They may become crystalline on keeping for long time
c) Amorphous solids can be moulded by heating.
d) They are anisotropic in nature

90. In zinc blende structure
a) each S^{2-} ion is surrounded by six Zn^{2+} ions b) it has fcc structure
c) zinc ions occupy half of the tetrahedral sites
d) each Zn^{2+} ion is surrounded by six sulphide ions

91. The pure crystalline substance on being heated gradually first forms a turbid liquid at constant temperature and still at higher temperature turbidity completely disappears. The behaviour is a characteristic of substance forming
a) Allotropic crystals b) Liquid crystals c) Isomeric crystals
d) Isomorphous crystals

92. Which type of crystals contains more than one Bravais lattice?
a) Hexagonal b) Triclinic c) Rhombohedral d) Monoclinic

193. Identify A, B, C and D in the following flow chart:



a)

A	B	C	D
Impurity defects	Stoichiometric defects	Non-stoichiometric defects	Anion excess defects

b)

A	B	C	D
Stoichiometric defects	Non-stoichiometric defects	Impurity defects	Metal excess defects

c)

A	B	C	D
Non-stoichiometric defects	Stoichiometric defects	Impurity defects	Cation vacancy

d)

A	B	C	D
Impurity defects	Stoichiometric defects	Metal excess defects	Non-stoichiometric defects

194. The number of carbon atoms per unit cell of diamond unit cell is

a) 8 b) 6 c) 1 d) 4

195. The pyknometric density of sodium chloride crystal is 2.165×10^3 kg m^{-3} while its X-ray density is 2.17 g $\times 10^3$ kg m^{-3}. The fraction of unoccupied sites in sodium chloride crystal is:

a) 5.96×10^{-3} b) 5.96 c) 5.96×10^{-2} d) 5.96×10^{-1}

196. Assertion: Face centred cubic cell has 4 atoms per unit cell.
Reason : In fcc unit cell, there are 8 atoms at the corners and 6 atoms at face centres.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) If both assertion and reason are false

197. What is the effect of Frenkel defect on the density of ionic solids?
a) The density of the crystal increases.
b) The density of the crystal decreases.
c) The density of the crystal remains unchanged.
d) There is no relationship between density of a crystal and defect present in it.

198. Which of the following is true about the value of refractive index of quartz glass?
a) Same in all directions b) Different in different directions
c) Cannot be measured d) Always zero

199. A solid compound XY has NaCl structure. If the radius of the cation is 100 pm, the radius of the anion (Y) will be :
a) 275.1 pm b) 322.5 pm c) 241.5 pm d) 165.7 pm

200. Assertion: Quartz glass is crystalline solid and quartz is an amorphous solid.
Reason: Quartz glass has long range order
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) If both assertion and reason are false

201. The fcc crystal contains how many atoms in each unit cell?
a) 6 b) 8 c) 4 d) 5

202. Paramagnetic substances are magnetised in a magnetic field in the same direction. Paramagnetism is due to the presence of
a) one or more unpaired electrons b) all paired electrons
c) permanent spin and orbital motion
d) parallel and anti-parallel spins in equal number.

203. The fraction of total volume occupied by the atoms present in a simple cube is :
a) $\frac{\pi}{\sqrt[3]{2}}$ b) $\frac{\pi}{\sqrt[4]{2}}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{6}$

204. Assertion CsCl has body-centred cubic arrangement.
Reason: CsCl has one Cs^+ ion and 8 Cl^- ions in its unit cell.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) If both assertion and reason are false

205. Most crystals show good cleavage because their atoms, ions or molecules are :
a) weakly bonded together b) strongly bonded together
c) spherically symmetrical d) arranged in planes.

206. Silver halides generally show
a) Schottky defect b) Frenkel defect c) both Frenkel and Schottky defects
d) cation excess defect

207. To get a n-type semiconductor from silicon, it should be doped with a substance with valence_____
a) 2 b) 1 c) 3 d) 5

208. CsBr crystallises in a body-centred cubic lattice. The unit cell length is 436.6 pm. Given that the atomic mass of Cs = 133 and that of Br = 80 amu and Avogadro number being 6.02×10^{23} mol^{-1}, the density of CsBr is :
a) 4.25 g/cm^3 b) 42.5 g/cm^3 c) 0.425 g/cm^3 d) 8.25 g/cm^3

209. An element (atomic mass = 100 g/mol) having bcc structure has unit cell edge 400 pm. The density of element is:
a) 7.289 g/cm^3 b) 2.144 g/cm^3 c) 10.376 g/cm^3 d) 5.188 g/cm^3

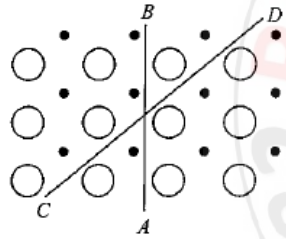
210. A crystalline structure has radius ratio (r_+ / r_-) in the range of 0.225 - 0.414. The coordination number and arrangement of anions around the cations are
a) 3, plane triangular b) 6, octahedral c) 4, tetrahedral d) 8, cubic

211. Cations are present in the interstitial sites in_____
a) Frenkel defect b) Schottky defect c) vacancy defect
d) metal deficiency defect

212. Which of the following is true about the charge acquired by p-type semiconductors?
a) positive b) neutral c) negative
d) depends on concentration of p impurity

213. In crystals of which one of the following ionic compounds would you expect maximum distance between centres of cations and anions?
a) CsI b) CsF c) LiF d) LiI

214. Study the figure of a solid given below depicting the arrangement of particles. Which is the most appropriate term used for the figure?



a) Isotropy b) Anisotropy c) Irregular shape d) Amorphous nature

215. Ferrimagnetism is observed when the magnetic moments of the domains in the substance are
a) oppositely oriented and cancel each other's magnetic moment.
b) aligned in parallel and anti-parallel directions in unequal numbers
c) randomly oriented and their magnetic moments get cancelled
d) in same direction and get aligned in a magnetic field

RAVI MATHS TUITION CENTRE , WHATSAPP - 8056206308

Time : 1 Mins **SOLUTIONS 1** **Marks : 944**

1. The volume strength of 1.5 N H_2O_2 solution is:
   a) 4.8 b) 5.2 c) 8.4 d) 8.8
2. If two liquids A and B form minimum boiling azeotrope at some specific composition then_____.
   a) A-B interactions are stronger than those between A-A or B-B
   b)
   vapour pressure of solution increases because more number of molecules of liquids A and B can escape from the solution
   c)
   vapour pressure of solution decreases because less number of molecules of only one of the liquids escape from the solution
   d) A - B interactions are weaker than those between A-A or B-B
3. At high altitudes the partial pressure of oxygen is less than that at the ground level. This leads to
   a) low concentrations of oxygen in the blood and tissues
   b) high concentrations of oxygen in the blood and tissues
   c) release of dissolved gases and formation of bubbles of nitrogen in the blood
   d) thickening of blood and tissues.
4. According to Henry's law 'the partial pressure of the gas in vapour phase (p) is proportional to the mole fraction of the gas (x) in the solution'. For different gases the correct statement about Henry's constant is
   a) higher the value of K_H at a given pressure, higher is the solubility of the gas
   b) higher the value of K_H at a given pressure, lower is the solubility of the gas
   c) K_H is not a function of nature of gas
   d) K_H value for all gases is same at a given pressure.

5. The law which indicates the relationship between solubility of a gas in liquid and pressure is _____ .
   a) Raoult's law b) Henry's law c) Lowering of vapour pressure
   d) van't Hoff law
6. What is the mole fraction of glucose in 10% w/W glucose solution?
   a) 0.01 b) 0.02 c) 0.03 d) 0.04
7. Which of the following solutions shows positive deviation from Raoult's law?
   a) Acetone + Aniline b) Acetone + Ethanol c) Water + Nitric acid
   d) Chloroform + Benzene
8. Camphor is often used in molecular mass determination because
   a) It is readily available b) It has a very high cryoscopic constant
   c) It is volatile d) It is solvent for organic substances
9. How many grams of NaOH are present in 250 mL of 0.5 M NaOH solution?
   a) 7.32 g b) 3.8 g c) 5 g d) 0.5 g
10. Which of the following aqueous solutions has minimum freezing point?
    a) 0.01 m NaCl b) 0.005 m MgI_2 c) 0.005 m C_2H_5OH d) 0.005 m $MgSO_4$
11. The value of Henry's law constant for some gases at 293 K is given below. Arrange the gases in the increasing order of their solubility.
    He: 144.97 kbar, H2: 69.16 kbar,
    N_2 : 76.48 kbar, 02 : 34.86 kbar
    a) He < N_2 < H_2 < O_2 b) O_2 < H_2 < N_2 < He c) H_2 < N_2 < O_2 < He
    d) He < O_2 < N_2 < H_2
12. The osmotic pressure of a solution can be increased by
    a) increasing the volume b) increasing the number of solute molecules
    c) decreasing the temperature d) removing semipermeable membrane.
13. An aqueous solution is 1.00 molal in KI. Which change will cause the vapour pressure of the solution to increase?
    a) Addition of NaCl b) Addition of Na_2SO_4 c) Addition of 1.00 molal KI
    d) Addition of water
14. The beans are cooked earlier in pressure cooker because
    a) Boiling point increases with increasing pressure
    b) Boiling point decreases with increasing pressure

c) Internal energy is not lost while cooking in pressure cooker

d) Extra pressure of pressure cooker, softens the beans

15. The vapour pressure, at a given temperature, of an ideal solution containing 0.2 mole of a non-volatile solute and 0.8 mole of solvent is 60 mm of Hg. The vapour pressure of the pure solvent at the same temperature is:

a) 150 mm of Hg b) 120 mm of Hg c) 75 mm of Hg d) 60 mm of Hg

16. We have three aqueous solutions of NaCl labelled as 'A', 'B' and 'C' with concentrations 0.1 M, 0.01 M and 0.001 M, respectively. The value of van't Hoff factor for these solutions will be in the order.

a) $i_A BC$ b) $i_A > i_B > i_C$ c) $i_A = i_B = i_C$ d) $i_A < i_B > i_C$

17. When a gas is bubbled through water at 298 K, a very dilute solution of gas is obtained. Henry's law constant for the gas is 100 k bar. If gas exerts a pressure of 1 bar, the number of moles of gas dissolved in 1 litre of water is:

a) 0.555 b) 55.55×10^{-5} c) 55.55×10^{-3} d) 5.55×10^{-5}

18. A solution containing 10 g per dm^3 of urea (molecular mass: 60 g mol^{-1}) is isotonic with a 5% solution of a non-volatile solute. The molecular mass of this non volatilec solute is:

a) 300 g mol^{-1} b) 350 g mol^{-1} c) 200 g mol^{-1} d) 250 g mol^{-1}

19. A 5% solution (w/W) of cane sugar (molar mass = 342 g mol^{-1}) has freezing point 271 K. What will be the freezing point of 5% glucose (molar mass = 18 g mol^{-1}) in water if freezing point of pure water is 273.15 K?

a) 273.07 K b) 269.07 K c) 273.15 K d) 260.09 K

20. Formation of a solution from two components can be considered as

(i) Puresolvent -> Separated solute molecules, ΔH_1

(ii) Puresolvent -> Separated solute molecules, ΔH_2

(iii) Separated solvent and solute molecules -l solution ΔH_3 , solution so formed will be ideal if

a) $\Delta H_{sol} = \Delta H_3 - \Delta H_1 - \Delta H_2$

b) $\Delta H_{sol} = \Delta H_1 + \Delta H_2 - \Delta H_3$

c) $\Delta H_{sol} = \Delta H_3 + \Delta H_2 - \Delta H_1$

d) $\Delta H_{sol} = \Delta H_1 - \Delta H_2 - \Delta H_3$

21. Which of the following statements about the composition of the vapour over an ideal 1: 1 molar mixture of benzene and toluene is correct? Assume that the temperature is constant at 25°C. (Given, vapour pressure data at 25°C, benzene = 12.8 kPa, toluene = 3.85 kPa)
    a) The vapour will contain equal amounts of benzene and toluene
    b) Not enough information is given to make a prediction
    c) The vapour will contain a higher percentage of benzene.
    d) The vapour will contain a higher percentage of toluene
22. Mole fraction of the solute in a 1.00 molar aqueous solution is
    a) 1.7700 b) 0.1770 c) 0.0177 d) 0.0344
23. The van't Hoff factor of 0.005 M aqueous solution of KCl is 1.95. The degree of ionisation of KCl is
    a) 0.95 b) 0.97 c) 0.94 d) 0.96
24. Arrange the following aqueous solutions in the order of their increasing boiling points
    (i) 10^{-4} M NaCl
    (ii) 10^{-4} M Urea
    (iii) 10^{-3} M $MgCl_2$
    (iv) 10^{-2} M NaCl
    a) (i) < (ii) < (iv) < (iii) b) (ii) < (i) = (iii) < (iv) c) (ii) < (i) < (iii) < (iv)
    d) (iv) < (iii) < (i) = (ii)
25. A solute X when dissolved in a solvent associates to form a pentamer. The value of van't Hoff factor (i) for the solute will be
    a) 0.5 b) 5 c) 0.2 d) 0.1
26. Pure water can be obtained from sea water by:
    a) centrifugation b) plasmolysis c) reverse osmosis d) sedimentation
27. Which one is a colligative property?
    a) Boiling point b) Vapour pressure c) Osmotic pressure d) Freezing point
28. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Ethyl alcohol + Water	(i)	$p = p^o x$
(B)	Benzene + Toluene	(ii)	Effect of pressure on gas solutions
(C)	Henry's law	(iii)	Ideal solution

(D)	Raoult's law	(iv)	Azeotropic mixture

a) (A) → (i), (B)→(ii), (C)→(iii), (D)→(iv)
b) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)
c) (A)→ (iv), (B)→ (iii), (C)→ (ii), (D)→ (i)
d) (A)→ (iii), (B)→ (ii), (C)→ (i), (D)→ (iv)

29. What is the mole fraction of the solute in a 1.00 m aqu solution?
a) 0.177 b) 1.770 c) 0.0354 d) 0.0177

30. The vapour pressure of two liquids P and Q are 80 and 60 torr, respectively. The total vapour pressure of solution obtained by mixing 3 moles of P and 2 moles of Q would be :
a) 140 torr b) 20 torr c) 68 torr d) 72 torr

31. 4 L of 0.02 M aqueous solution of NaCl was diluted by adding one litre of water. The molality of the resultant solution is_____.
a) 0.004 b) 0.008 c) 0.012 d) 0.016

32. Which of the following aqueous solutions has minimum freezing point?
a) $0.01\ \mathrm{m\ NaCl}$ b) $0.005\ \mathrm{m\ MgI_2}$
c) $0.005\ \mathrm{m\ C_2H_5OH}$ d) $0.005\ \mathrm{m\ MgSO_4}$

33. The mole fraction of the solute in one molal aqueous solution is:
a) 0.009 b) 0.018 c) 0.027 d) 0.036

34. Which one is not equal to zero for an ideal solution:
a) ΔS_{mix} b) $\Delta \mathrm{V_{mix}}$ c) $\Delta \mathrm{P} = \mathrm{P_{observed}} - \mathrm{P_{Raoult}}$
d) $\Delta \mathrm{H_{mix}}$

35. Vapour pressure of benzene at 30°C is 121.8 mm. When 15 g of a non-volatile solute is dissolved in 250 g of benzene its vapour pressure decreased to 120.2mm. The molecular weight of the solute is (Molecular weight of solvent = 78)
a) 356.2 b) 456.8 c) 530.1 d) 656.1

36. H_2S is a toxic gas used in qualitative analysis. If solubility of H_2S in water at STP is 0.195 m, what is the value of K_H?
a) 0.0263 bar b) 69.16 bar c) 192 bar d) 282 bar

37. Which of the following statements is false?

a) Units of atmospheric pressure and osmotic pressure are the same.

b)

In reverse osmosis, solvent molecules move through a semipermeable membrane from a region of lower concentration of solute to a region of higher concentration.

c) The value of molal depression constant depends on nature of solvent

d) Relative lowering of vapour pressure, is a dimensionless quantity.

38. Which of the following colligative property can provide molar mass of proteins (or polymers or colloids) with greatest precision?

a) Osmotic pressure b) Elevation in boiling point

c) Depression in freezing point d) Relative lowering of vapour pressure

39. For which of the following solutes the van't Hoff factor is not greater than one?

a) $NaNO_3$ b) $BaCl_2$ c) $K_4[Fe(CN)_6]$ d) NH_2CONH_2

40. At equilibrium the rate of dissolution of a solid solute in a volatile liquid solvent is_____.

a) less than the rate of crystallisation

b) greater than the rate of crystallisation c) equal to the rate of crystallisation

d) Zero

41. 2 g of sugar is added to one litre of water to give sugar solution. What is the effect of addition of sugar on the boiling point and freezing point of water?

a) Both boiling point and freezing point increase.

b) Both boiling point and freezing point decrease.

c) Boiling point increases and freezing point decreases.

d) Boiling point decreases and freezing point increases

42. The relative lowering of vapour pressure is equal to the ratio between the number of

a) solute molecules to the solvent molecules

b) solute molecules to the total molecules in solution

c) solvent molecules to the total molecules in the solution

d) solvent molecules to the total number of ions of the solute

43. **Assertion:** At equilibrium, vapour phase will be always rich in component which is more volatile.

Reason: The composition of vapour phase in equilibrium with the solution is determined by the partial pressures of the components.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false

44. Which of the following 0.10 M aqueous solution will have the lowest freezing point?
a) $Al_2(SO_4)_3$ b) $C_5H_{10}O_5$ c) KI d) $C_{12}H_{22}O_{11}$

45. **Assertion:** Molecular mass of KCl calculated on the basis of colligative properties will be lower than the normal molecular mass.
Reason: Experimentally determined molar mass is always lower than the true value.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false

46. The mixture that forms maximum boiling azeotrope is:
a) Ethanol + Water b) Acetone + Carbon disulphicle c) Heptane + Octane
d) Water + Nitric acid

47. On dissolving sugar in water at room temperature solution feels cool to touch. Under which of the following cases dissolution of sugar will be most rapid?
a) Sugar crystals in cold water b) Sugar crystals in hot water
c) Powdered sugar in cold water d) Powdered sugar in hot water

48. If 0.15 g of solute, dissolved in 15 g of solvent, is boiled at a temperature higher by 0.216°C, than that of the pure solvent, the molecular weight of the substance is (molal elevation constant for the solvent $\text{is } 2.16^\circ C$)
a) 1.01 b) 10 c) 10.1 d) 100

49. Which of the following 0.10 M aqueous solution will have the lowest freezing point?
    a) $Al_2(SO_4)_3$ b) $C_5H_{10}O_5$ c) KI d) $C_{12}H_{22}O_{11}$
50. The vapour pressure of benzene at a certain temperature is 640 mm Hg. A non-volatile and non-electrolyte solid, weighing 2.175 g is added to 39.08 g of benzene. If the vapour pressure of the solution is 600mm Hg, what is the molecular weight of solid substance?
    a) 49.50 b) 59.60 c) 69.40 d) 79.82
51. A beaker contains a solution of substance 'A: Precipitation of substance 'A' takes place when small amount of 'A' is added to the solution. The solution is _____.
    a) saturated b) supersaturated c) unsaturated d) concentrated
52. How many grams of concentrated nitric acid solution should be used to prepare 250 ml of 2.0 M HNO_2? The concentrated acidic is 70% HNO_3
    a) 90.0 gconc. HNO_3 b) 70.0 gconc. HNO_3 c) 54.0 gconc. HNO_3
    d) 45.0 gconc HNO_3
53. How much oxygen is dissolved in 100 mL water at 298 K if partial pressure of oxygen is 0.5 atm and $K_H = 1.4 \times 10^{-3}$ mol/L/atm?
    a) 22.4 mg b) 22.4 g c) 2.24 g d) 2.24 mg
54. Express the terms representing the following formulae.
    (i) $\frac{No.\ of\ moles\ of\ solute}{Volume\ of\ solution\ in\ litres}$ =(W)
    (ii) $\frac{No.\ of\ moles\ of\ solute}{Mass\ of\ solvent\ in\ kg}$ =(X)
    (iii) $\frac{No.\ moles\ of\ component}{Moles\ in\ the\ solution}$ =(Y)
    (iv) $\frac{Mass\ of\ component}{Mass\ of\ solution}$ =(Z)
    a)

W	X	Y	Z
Molality	Molarity	Mass fraction	Mole fraction

    b)

W	X	Y	Z
Molality	Molarity	Mass fraction	Mole fraction

c)

W	X	Y	Z
Molarity	Molality	Mole fraction	Mass fraction

d)

W	X	Y	Z
Molarity	Molality	Mole fraction	Mass fraction

55. Concentration terms like mass percentage, ppm, mole fraction and molality do not depend on temperature. However, molarity is a function of temperature because

a) volume depends on temperature and molarity involves volume

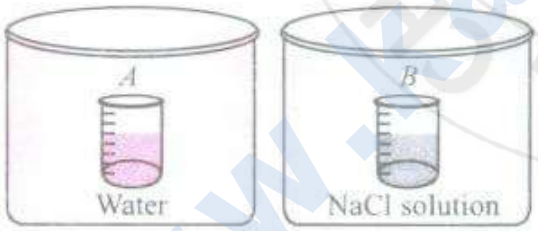
b)

molarity involves non -volatile solute while all other terms involve volatile solute

c) number of moles of solute change with change in temperature

d) molarity is used for polar solvents only.

56. Two beakers of capacity 500 mL were taken. One of these beakers, labelled as "A", was filled with 400 mL water whereas the beaker labelled "B" was filled with 400 mL of 2 M solution of NaCl. At the same temperature both the beakers were placed in closed containers of same material and same capacity as shown in figure.



At a given temperature, which of the following statements is correct about the vapour pressure of pure water and that ofNaCl solution.

a) Vapour pressure in container (A) is more than that in container (B).

b) Vapour pressure in container (A) is less than that in container (B).

c) Vapour pressure is equal in both the containers.

d)

Vapour pressure in container (B) is twice the vapour pressure in container (A).

57. When acetone and chloroform are mixed together, hydrogen bonds are formed between them. Which of the following statements is correct about the solution made by mixing acetone and chloroform?
    a) On mixing acetone and chloroform will form an ideal solution.
    b)
    On mixing acetone and chloroform positive deviation is shown since the vapour pressure increases.
    c)
    On mixing acetone and chloroform negative deviation is shown since there is decrease in vapour pressure.
    d) At a specific composition acetone and chloroform
58. Which of the aqueous equimolal solution will have its vapour pressure near to solvent?
    a) Urea b) $Ba(NO_3)_2$ c) $NaNO_3$ d) $Al(NO_3)_3$
59. Which of the following statements is not correct?
    a) 5% aqueous solutions of NaCl and KCl are said to be isomolar.
    b) 1M sucrose solution and 1M glucose solution are isotonic.
    c)
    Molecular mass of acetic acid and benzoic acid is higher than normal mass in cryoscopic methods.
    d) For the same solution, $\frac{\triangle T_b}{\triangle T_f} = \frac{K_b}{K_f}$
60. Which one of the following is incorrect for ideal solution?
    a) $\Delta H_{mix} = 0$ b) $\Delta Umix = 0$ c) $\Delta P = P_{obs} - P_{calculate\ by\ Raoult's\ law} = 0$ d) $\Delta G_{mix} = 0$
61. Fill in the blanks with appropriate words.
    Azeotropic mixtures boil without change in their _____. Azeotropic mixtures exist in solutions showing _____ or _____ deviations. _____ solutions do not form azeotropes. van't Hoff factor for an electrolyte is _____ than 1.
    a) colour, positive, negative, non-ideal, greater
    b) properties, positive, negative, ideal, smaller
    c) boiling point, positive, negative, non-ideal, lesser
    d) composition, positive, negative, ideal, greater
62. Equimolal solutions in the same solvent have

a) same elevation in boiling point and same depression in freezing point
b) different elevation in boiling point and different depression in freezing point
c) same elevation in boiling point but different depression in freezing point
d) same depression in freezing point but different elevation in boiling point.

63. According to Raoult's law, Relative lowering of vapour pressure of a solution is equal to
a) moles of solute b) moles of solvent c) mole fraction of solute
d) mole fraction of solvent

64. Osmotic pressure of a solution containing 2 g dissolved protein per 300 cm^3 of solution is 20 mm of Hg at 27°C. The molecular mass of protein is
a) 6239.6 g mol^{-1} b) 12315.5 g mol^{-1} c) 3692.1 g mol^{-1} d) 7368.4 g mol^{-1}

65. Vapour pressure of pure water at 298 K is 23.8 mm Hg. 50 g of urea is dissolved in 850 g of water. The vapour pressure of water for this solution and its relative lowering are respectively.
a) 23.8 mm Hg and 0.16 b) 25.4 mm Hg and 0.02 c) 30.2 mm Hg and 0.020
d) 23.4 mm Hg and 0.017

66. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	K_b	(i)	$\frac{K_b \times W_2 \times 1000}{\triangle T_b \times W_1}$
(B)	M_2	(ii)	$\frac{W_2 \times 1000}{M_2 \times W_1}$
(C)	π	(iii)	$\frac{RT_b^2}{1000 \times L_V}$
(D)	m	(iv)	$\frac{\triangle T_b \times dRT}{1000 \times k_b}$

a) (A) →(i), (B) → (iii), (C) → (ii), (D) → (iv)
b) (A) → (iv), (B) → (ii), (C) → (i), (D) → (iii)
c) (A)→ (ii), (B)→ (iv), (C)→ (iii), (D)→ (i)
d) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)

67. The system that forms maximum boiling azeotrope is
a) acetone - chloroform b) ethanol - acetone c) n-hexane - n-heptane
d) carbon disulphide - acetone.

68. Which one of the following electrolytes has the same value of van't Hoff factor (i) as that of $Al_2(SO_4)_3$ if all are 100% ionized?
a) K_2SO_4 b) $K_3[Fe(CN)_6]$ c) $Al(NO_3)$ d) $K_4[Fe(CN)_6]$

69. Vapour pressure of chloroform ($CHCl_3$) and dichloromethane (CH_2Cl_2) at 25°C are 100 mm Hg and 41.5 mm Hg respectively. Vapour pressure of the solution obtained by mixing 25 .5 g of $CHCl_3$, and 40 g of CH_2Cl_2 at the same temperature wil1 be: (Molecular mass of $CHCl_3$ = 119.5 u and molecular mass of CH_2Cl_2 = 85 u)
    a) 173.9 mm Hg b) 615.0 mm Hg c) 347.9 mm Hg d) 285.5 mm Hg
70. **Assertion:** The solutions which show large positive deviations from Raoult's law form maximum boiling azeotropes.
    Reason: 95% aqueous solution of ethanol is maximum boiling azeotrope.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false.
    d) If both assertion and reason are false
71. Which of the following statements is correct?
    a) A saturated solution will remain saturated at all temperatures.
    b) A plant cell swells when placed in hypertonic solution.
    c)
    The depression in freezing point is directly proportional to molality of the solution.
    d) Lowering in vapour pressure is a colligative property.
72. Which one of the following modes of expressing concentration is independent of temperature?
    a) Molarity b) Molality c) Formality d) Normality
73. Which of the following azeotropes is not correctly matched?
    a)
    HNO_3 (68%) + H_2O (32%) : Maximum boiling azeotrope, boiling point = 393.5 K
    b) H_2O (43%) + HI (57%) : Minimum boiling azeotrope, boiling point = 290 K

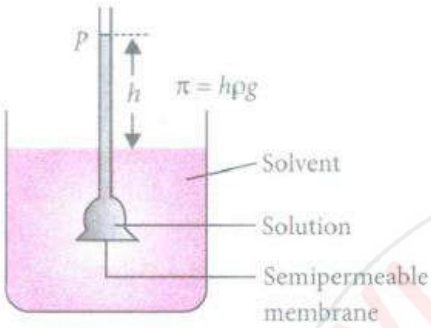
c)

C_2H_5OH (95.5%) + Hp (4.5%) : Minimum boiling azeotrope, boiling point = 351.15 K

d)

Chloroform (93.2%) + C_2H_5OH (6.8%) : Minimum boiling azeotrope, boiling point = 332.3 K

74. If semipermeable membrane is placed between the solvent and solution as shown in the given figure then



a)

the flow of the solvent from its side to solution side across a semipermeable membrane can be stopped if some extra pressure (called osmotic pressure) is applied on the solution.

b) both (b) and (c).

c)

the solvent molecules will flow through the membrane from solution to pure solvent

d) the solvent molecules will flow continuously till the equilibrium is attained

75. Which of the following aqueous solutions should have the highest boiling point?

a) 1.0 M NaOH b) 1.0 M Na_2SO_4 c) 1.0 M NH_4NO_3 d) 1.0 M KNO_3

76. Molarity of liquid HCl, if density of solution is 1.17g/cc is :

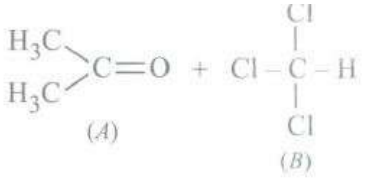
a) 36.5 b) 18.25 c) 32.05 d) 42.10

77. Given below are few mixtures formed by mixing two components. Which of the following binary mixtures will have same composition in liquid and vapour phase?

(i) Ethanol + Chloroform

(ii) Nitric acid + Water
(iii) Benzene + Toluene
(iv) Ethyl chloride + Ethyl bromide
a) (i) and (iii) b) (i) and (ii) c) (i), (ii) and (iii) d) (iii) and (iv)

78. When acetone and chloroform are mixed together, which of the following observations is correct?



a) A - A and B - B interactions are stronger than A - B interactions.
b) A - A and B - B interactions are weaker than A - B interactions.
c) A - A, B - B and A - B interactions are equal.
d) The liquids form separate layers and are immiscible.

79. Among the following substances the lowest vapour pressure is exerted by
a) water b) alcohol c) ether d) mercury.

80. Partial pressure of a solution component is directly proportional to its mole fraction. This is known as
a) Henry's law b) Raoult's law c) Distribution law d) Ostwald's dilution law

81. A solution is made by dissolving 20 g of a substance in 500 mL of water. Its osmotic pressure was found to be 600 mm of Hg at 15°C. Find the molecular weight of the substance
a) 1198 b) 500 c) 1200 d) 1000

82. Which of the following will have the highest f.pt. at one atmosphere?
a) 0.1 M NaCl solution b) 0.1 M sugar solution c) 0.1 M $BaCl_2$ solution
d) 0.1 M $FeCl_3$ solution

83. 1 M, 2.5 litre NaOH solution is mixed with another 0.5 M, 3 litre NaOH solution. Then find out the molarity of resultant solution
a) 0.80 M b) 1.0 M c) 0.73 M d) 0.50 M

84. What will be the osmotic pressure in pascals exerted by a solution prepared by dissolving 1.0g of polymer of molar mass 150,000 in 500 mL of water at 37°C?
a) 30.96 Pa b) 34.36 Pa c) 68.72 Pa d) 48.25 Pa

85. An organic compound containing C, H and N gave the following results on analysis C = 40%, H = 13.33%, N = 46.67%. Its empirical formula would be

a) $C_2H_7N_2$ b) CH_5N c) CH_4N d) C_2H_7N

86. What are the conditions for an ideal solution which obeys Raoult's law over the entire range of concentration?
a) $\triangle_{mix}H = 0, \triangle_{mix}V = 0, P_{Total} = P_A^o x_A + P_B^o x_B$
b) $\triangle_{mix}H$ = +ve, $\triangle_{mix}V = 0, P_{Total} = P_A^o x_A + P_B^o x_B$
c) $\triangle_{mix}H = 0, \triangle_{mix}V$ = +ve, $P_{Total} = P_A^o x_A + P_B^o x_B$
d) $\triangle_{mix}H = 0, \triangle_{mix}V = 0, P_{Total} = P_B^o x_B$

87. A solution of sucrose (molar mass = 342 g mol^{-1}) has been prepared by dissolving 68.5 g of sucrose in 1000 g of water. The freezing point of the solution obtained will be : (k_f for water = 1.86K kg mol^{-1})
a) - 0.372°C b) - 0.520°C c) + 0.372°C d) - 0.570°C

88. Which one of the following electrolytes has the same value of Van't Hoffs factor (i) as that of the $Al_2(SO_4)_3$ (if all are l00% ionised)?
a) $K_3[Fe(CN)_6]$ b) $Al(NO_3)_3$ c) $K_4[Fe(CN)_6]$
d) K_2SO_4

89. The van't Hoff factor, i for a compound which undergoes dissociation in one solvent and association in other solvent is respectively.
a) less than one and less than one b) greater than one and less than one
c) greater than one and greater than one
d) less than one and greater than one

90. The molality of 648 g of pure water is
a) 36 m b) 55.5 m c) 3.6 m d) 5.55 m

91. Considering the formation, breaking and strength of hydrogen bond, predict which of the following mixtures will show a positive deviation from Raoult's law?
a) Methanol and acetone b) Chloroform and acetone
c) Nitric acid and water d) Phenol and aniline

92. A 5% solution of cane sugar (molecular weight = 342) is isotonic with 1% solution of a substance X. The molecular weight of X is :
a) 34.2 b) 171.2 c) 68.4 d) 136.8

93. If 1g of solute (molar mass = 50 g mol^{-1}) is dissolved in 50 g of solvent and the elevation in boiling point is 1K. The molar boiling constant of the solvent is
a) 2 b) 3 c) 2.5 d) 5

94. Two liquids A and B form ideal solutions. At 300 K, the vapour pressure of a solution containing 1 mole of A and 3 moles of B is 550 mm Hg. At the same temperature, if one more mole of B is added to this solution, the vapour pressure of the solution increases by 10 mm Hg. The vapour pressures of A and B in their pure states are respectively
    a) P_A^o = 600 mm Hg and P_B^o = 400 mm Hg
    b) P_A^o = 550 mm Hg and P_B^o= 560 mm Hg
    c) P_A^o= 450 mm Hg and P_B^o = 650 mm Hg
    d) P_A^o= 400 mm Hg and P_B^o = 600 mm Hg
95. What is the mass percentage of carbon tetrachloride if 22 g of benzene is dissolved in 122 g of carbon tetrachloride?
    a) 84.72% b) 15.28% c) 50% d) 44%
96. The Henry's law constant for the solubility of N, gas in water at 298 K is 1.0 x 10^5 atm. The mole fraction of N_2 in air is 0.8. The number of moles of N_2 from air dissolved in 10 moles of water at 298 K and 5 atm pressure is:
    a) 4.0 x 10^{-4} b) 4.0 x 10^{-5} c) 5.0 x 10^{-4} d) 4.0 x 10^{-6}
97. Which of the following relations is not correctly matched with the formula?
    a) In case of association, $\propto = \frac{i-1}{\frac{1}{n}-1}$ b) In case of association, $\propto = \frac{i-1}{n+1}$
    c) Relative lowering of vapour pressure= $\frac{P_A^o - P_A}{P_A^o} = i\frac{n_B}{n_A+n_B}$
    d) Elevation in boiling point, $\triangle T_b = k_b \times \frac{W_B \times 1000}{M_B \times W_A}$
98. Homogeneous mixture of two or more than two components is called
    a) solute b) solvent c) both (a) and (b) d) solution
99. **Assertion:** Decrease in the vapour pressure of water by adding 1 mol of sucrose to one kg of water is higher to that produced by adding 1 mol of urea to the same quantity of water at the same temperature.
    Reason: Molecular mass of sugar is less than that of urea.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false.

d) If both assertion and reason are false

100. What will be the freezing point of a 0.5 m KCl solution? The molal freezing point constant of water is 1.86 °C m^{-1}.

a) -1.86°C b) - 0.372 °C c) - 3.2 °C d) O°C

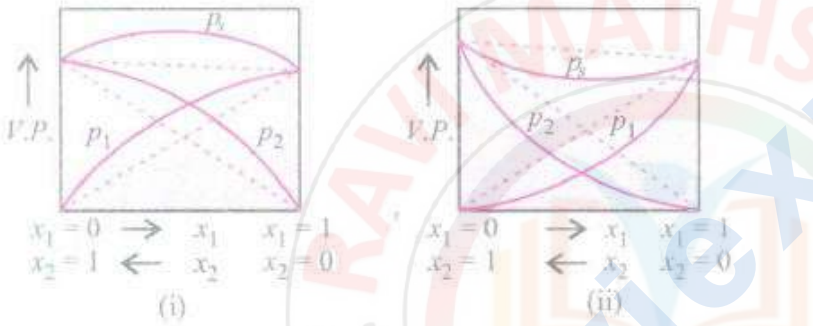
101. Which of the following is dependent on temperature?

a) Molarity b) Mole fraction c) 'Weight percentage d) Molality

102. 0.5 molal aqueous solution of a weak acid (HX) is 20% ionized. If k_f for water is 1.86 K-kg-mol $^{-1}$, the lowering in freezing point of the solution is :

a) -1.12 K b) 0.56 K c) 1.12 K d) - 0.56 K

103. Study the figures given below and mark the correct statement.



(i) Nitric acid + Water, (i) Water + Ethyl alcohol,

a) (ii) Acetone + Ethyl alcohol b) (ii) Acetone + Benzene

(i) Acetone + Ethyl alcohol, (i) Benzene + Chloroform,

c) (ii) Acetone + Chloroform d) (ii) Acetone + Chloroform

104. The density of a solution prepared by dissolving 120 g of urea (mol. mass = 60 u) in 1000 g of water is 1.15 g/mL. The molarity of this solution is:

a) 1.78 M b) 1.02 M c) 2.05 M d) 0.50 M

105. Ihe relative lowering in vapour pressure is proportional to the ratio of number of

a) solute molecules to solvent molecules

b) solvent molecules to solute molecules

c) solute molecules to the total number of molecules in solution

d) solvent molecules to the total number of molecules in solution.

106. Arrange the following solutions in increasing order of their osmotic pressures.

(i) 34.2 g/litre sucrose

(ii) 60 g/litre of urea

(iii) 90 g/litre of glucose

(iv) 58.5 g/litre of sodium chloride

a) (i) < (iii) < (ii) < (iv) b) (iii) < (i) < (iv) < (ii) c) (i) < (iii) < (iv) < (ii)

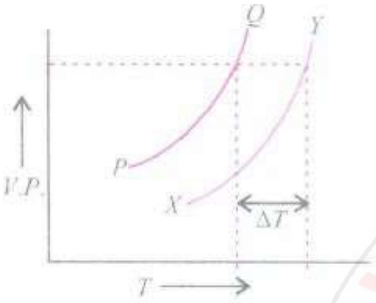
d) (ii) < (iv) < (i) < (iii)

107. An unripe mango placed in a concentrated salt solution to prepare pickle, shrivels because_____

a) it gains water due to osmosis b) it loses water due to reverse osmosis

c) it gains water due to reverse osmosis d) it loses water due to osmosis

108. In the graph plotted between vapour pressure (V.P.) and temperature(T),



a)

PQ is the curve for solvent, XY is the curve of solution and Δ T is depression in freezing point

b)

PQ is the curve for solution, XY is the curve for solvent and Δ T is elevation in boiling point

c)

PQ is the curve for solvent, XY is the curve for solution and Δ T is molal elevation in boiling point

d)

PQ is the curve for solvent, XY is the curve for solution and Δ T is elevation in boiling point.

109. When 1.04 g of $BaCl_2$ is present in 10^5 g of solution the concentration of solution is

a) 0.104 ppm b) 10.4 ppm c) 0.0104 ppm d) 104 ppm

10. Grapes placed in three beakers X, Y and Z containing different type of solutions are shown in figures.

If beaker X contains water, Yand Z contain

a) Y - hypotonic solution, Z - hypertonic solution

b) Y - hypertonic solution, Z - hypotonic solution c) Y and Z- isotonic solutions

d) Y and Z- hypotonic solutions

11. The van't Hoff factor (i) for a dilute aqueous solution of the strong electrolyte barium hydroxide is:

a) 0 b) 1 c) 2 d) 3

12. 75.2 g of phenol is dissolved in a solvent of K_f= 14. If the depression in freezing point is 7 K then find the % of phenol that dimerises.

a) 75% b) 80% c) 70% d) 100%

13. Of the following 0.10 m aqueous solutions, which one will exhibit the largest freezing point depression.

a) KCl b) $C_6H_{12}O_6$ c) $Al_2(SO_4)_3$ d) K_2SO_4

14. The preservation of meat by salting and of fruits by adding sugar protects them from bacterial action because

a) bacteria die of eating sugar or salt

b) due to osmosis bacteria lose water on salted meat or candid fruit and die

c) due to osmosis bacteria gain water on salted meat or candid fruit and die

d) bacteria get stuck to the salt and sugar layers and die.

15. At 100°C the vapour pressure of a solution of 6.59 of solute in 100 g water is 732 mm. If K_b = 0.52, the boiling print of this solution will be:

a) 101°C b) 100°C c) 102°C d) 103°C

16. Value of Henry's constant K_H_____.

a) increases with increase in temperature

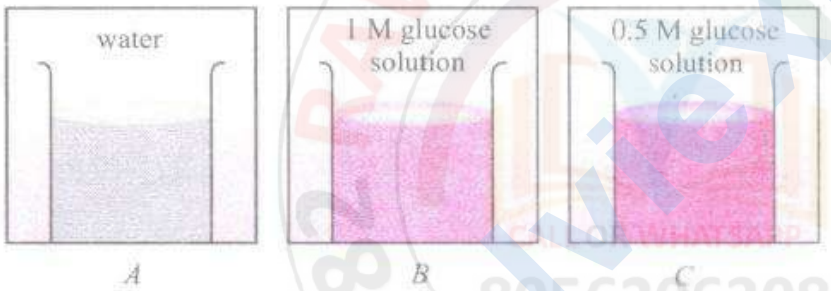
b) decreases with increase in temperature c) remains constant

d) first increases then decreases

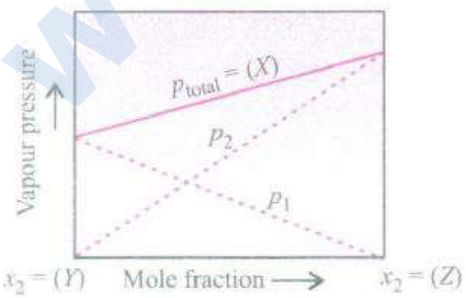
17. Solubility of a substance is its maximum amount that can be dissolved in a specified amount of solvent. It depends upon
(i) nature of solute
(ii) nature of solvent
(iii) temperature
(iv) pressure
a) Only (i), (ii) and (iii) b) Only (i), (iii) and (iv) c) Only (i) and (iv)
d) (i), (ii), (iii) and (iv)

18. Blood cells retain their normal shape in solutions which are
a) hypotonic to blood b) isotonic to blood c) hypertonic to blood
d) equinormal to blood

19. In three beakers labelled as (A), (B) and (C), 100 mL of water, 100 mL of 1 M solution of glucose in water and 100 mL of 0.5 M solution of glucose in water are taken respectively and kept at same temperature.



Which of the following statements is correct?
a) Vapour pressure in all the three beakers is same.
b) Vapour pressure of beaker B is highest.
c) Vapour pressure of beaker C is highest.
d)
Vapour pressure of beaker B is lower than that of C and vapour pressure of beaker C is lower than that of A.

20. 

X, Y and Z in the above graph are

a) $X = P_1 + P_2, Y = 1, Z = 0$ b) $X = P_1 + P_2, Y = 0, Z = 1$
c) $X = P_1 * P_2, Y = 0, Z = 1$ d) $X = P_1 - P_2, Y = 1, Z = 0$

21. The van't Hoff factor I for a compond which undergoes dissociation in one solvent and associaion in other solvent is respectively
a) less than one and greater than one. b) less than one and less than one.
c) greater than one and less than one.
d) greater than one and greater than one

22. A solution containing 10.2 g glycerine per litre is isotonic with a 2% solution of glucose. What is the molecular mass of glycerine?
a) 91.8 g b) 91.8 g c) 83.9 g d) 890.3 g

23. 250 mL of sodium carbonate solution contains 2.65 g of Na_2CO_3. If 10 mL of this solution is diluted to 500 ml., the concentration of the diluted acid will be:
a) 0.01 M b) 0.001 M c) 0.05 M d) 0.002 M

24. **Assertion:** Amalgam of mercury with sodium is an example of solid solutions.
Reason: Mercury is solvent and sodium is solute in the solution.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false

25. K_H values for $Ar_{(g)}$, $CO2_{(g)}$, $HCHO_{(g)}$ and $CH4_{(g)}$ are 40.39, 1.67, 1.83 x 10^{-5} and 0.413 respectively. Arrange these gases in the order of their increasing solubility.
a) $HCHO < CH_4 < CO_2 < Ar$ b) $HCHO < CO_2 < CH_4 < Ar$
c) $Ar < CO_2 < CH_4 < HCHO$ d) $Ar < CH_4 < CO_2 < HCHO$

26. A solution containing components A and B follow Raoult's law when
a) A - B attraction force is greater than A - Aand B - B
b) A-B attraction force is less than A - A and B - B
c) A- B attraction force remains same as A.-A and B- B
d) Volume of solution is different from sum of volume of solute and solvent

27. The boiling point of 0.2 mol kg^{-1} solution of X in water is greater than equimolal solution of Y in water. Which one of the following statements is true in this case?
    a) X is undergoing dissociation in water
    b) Molecular mass of X is greater than the molecular mass of Y
    c) Molecular mass of X is less than the molecular mass of Y
    d) Y is undergoing dissociation in water while X undergoes no change.

28. The freezing point depression constant for water is $-1.86^{o}Cm^{-l}$. If 5.00 g Na_2SO_4 is dissolved in 45.0 g H_2O, the freezing point is charged by $-3.82^{o}C$. Calculate the van't Hoff factor for Na^2SO^4
    a) 2.05 b) 2.63 c) 3.11 d) 0.381

29. If a is the degree of dissociation of Na_2SO_4, the vant Hoff's factor (i) used for calculating the molecular mass is
    a) $1+\alpha$ b) $1-\alpha$ c) $1+2\alpha$ d) $1-2\alpha$

30. In a pair of immiscible liquids, a common solute dissolve in both and the equilibrium is reached. Then, the concentration of the solute in upper layer is:
    a) in fixed ratio with that in the lower layer b) same as the lower layer
    c) lower than the lower layer d) higher than the lower layer

31. **Assertion:** 1M solution of KCl has greater osmotic pressure than 1 M solution of glucose at the same temperature.
    Reason: In solution KCl dissociates to produce more number of particles.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false.
    d) If both assertion and reason are false

32. On the basis of information given below mark the correct option.
    Information: On adding acetone to methanol some of the hydrogen bonds between methanol molecules break.

a)
At specific composition methanol-acetone mixture will form minimum boiling azeotrope and will show positive deviation from Raoult's law.
b)
At specific composition methanol-acetone mixture forms maximum boiling azeotrope and will show positive deviation from Raoult's law.
c)
At specific composition methanol-acetone mixture will form minimum boiling azeotrope and will show negative deviation from Raoults law.
d)
At specific composition methanol-acetone mixture will form maximum boiling azeotrope and will show negative deviation from Raoult's law.

133. Sea water is 3.5% by mass of common salt and has a density 1.04 g cm^{-3} at 293 K. Assuming the salt to be sodium chloride, then osmotic pressure of sea water will be (assume complete ionisation of the salt)
a) 25.45 atm b) 11.56 atm c) 29.98 atm d) 30.20 atm

134. During osmosis, flow of water through a semipermeable membrane is
a) from both sides of semipermeable membrane with equal flow rates
b) from both sides of semipermeable membrane with unequal flow rates
c) form solution having lower concentration only
d) from solution having higher concentration only

135. **Assertion**: In an ideal solution, $\triangle_{mix}H$ is zero.
Reason: In an ideal solution, A - B interactions are lower than A - A and B - B interactions.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false

36. The vapour pressure of a solvent decreased by 10 mm in two columns of mercury when a non-volatile solute was added to the solvent. The mole fraction of the solute in the solution is 0.2.What should be the mole fraction of the solvent if decrease in the vapour pressure is 20 mm of mercury:
a) 0.8 b) 0.6 c) 0.4 d) 0.2

37. All form ideal solution except
a) C_6H_6 and $C_6H_5CH_3$ b) C_2H_5Cl *and* C_2H_5I
c) C_6H_5Cl *and* C_6H_5Br d) C_2H_5I *and* C_2H_5OH

38. **Assertion:** Lowering of vapour pressure is not dependent on the number of species present in the solution.
Reason: Lowering of vapour pressure and relative lowering of vapour pressure are colligative properties.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false

39. A solution contains non-volatile solute of molecular mass M_2. Which of the following can be used to calculate the molecular mass of solute in terms of osmotic pressure?
a) $M_2 = \left(\frac{m_2}{\pi}\right) VRT$ b) $M_2 = \left(\frac{m_2}{V}\right) \frac{RT}{\pi}$
c) $M_2 = \left(\frac{m_2}{V}\right) \pi RT$ d) $M_2 = \left(\frac{m_2}{V}\right) \frac{\pi}{RT}$

40. What weight of glycerol should be added to 600 g of water in order to lower its freezing point by 10 °C? (K_f= 1.860 C m^{-1})
a) 496 g b) 297 g c) 310 g d) 426 g

41. Which of the following statements is false?

a)

Two different solutions of sucrose of same molality prepared in different solvents will have the same depression in freezing point.

b)

The osmotic pressure of a solution is given by the equation 1t = CRT (where C is the molarity of the solution).

c)

Decreasing order of osmotic pressure for 0.01 M aqueous solutions of barium chloride, potassium chloride, acetic acid and sucrose is $BaCl_2$> KCl > CH_3COOH > sucrose.

d)

According to Raoult's law, the vapour pressure exerted by a volatile component of a solution is directly proportional to its mole fraction in the solution.

42. If molality of the dilute solution is doubled, the value of molal depression constant (K_f) will be :

a) tripled b) unchanged c) doubled d) halved

43. **Assertion:** A solution of phenol and aniline will show negative deviations from Raoult's law.

Reason: In case of negative deviations from Raoult's law, A - B forces are stronger than A - A and B - B forces.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false.

d) If both assertion and reason are false

44. 1.4275 g sample of [Cr(NH_3)6]SO_4Cl (mol. wt. = 285.5) is dissolved to prepare 250 mL solution showing an osmotic pressure of 1.478 atm at 27°C. Which of the following statements are correct about this solution?

(I) Each molecule furnishes three ions in solution.

(II) The van't Hoff factor is 3.

(III) Equilibrium molarity of $[Cr(NH_3)_6]\ SO_4Cl=0$

(IV) Equilibrium molarity of $[Cr(NH_3)6]^{3+}$ = 0.02 M

a) I and III only b) II and IV only c) I, II and IV only d) All of these

145. Vapour pressure of a pure liquid X is 2 atm at 300 K. It is lowered to 1 atm on dissolving 1 g of Y in 20 g of liquid X. If molar mass of X is 200, what is the molar mass of Y?

a) 20 b) 50 c) 100 d) 200

146. What will be the mole fraction of ethanol in a sample of spirit containing 85% ethanol by mass?

a) 0.69 b) 0.82 c) 0.85 d) 0.60

147. Sea water is desalinated to get fresh water by which of the following methods?

a)

When pressure more than osmotic pressure is applied pure water is squeezed out of sea water by reverse osmosis.

b)

When excess pressure is applied on sea water pure water moves in by osmosis.

c) Water moves out from sea water due to osmosis.

d) Salt is precipitated from sea water when kept undisturbed for sometime

148. Which one is not equal to zero for an ideal solution?

a) ΔH_{mix} b) ΔS_{mix} c) ΔV_{mix} d) $\Delta P=P_{observed} - P_{Raoult's}$

149. On the basis of information given below mark the correct option. Information:

(i) In bromo ethane and chloroethane mixture intermolecular interactions of A-A and B-B type are nearly same as A-B type interactions.

(ii) In ethanol and acetone mixture A-A or B-B type intermolecular interactions are stronger than A-B type interactions.

(iii) In chloroform and acetone mixture A-A or B- B type intermolecular interactions are weaker than A-B type interactions.

a) Solution (II) and (III) will follow Raoult's law.

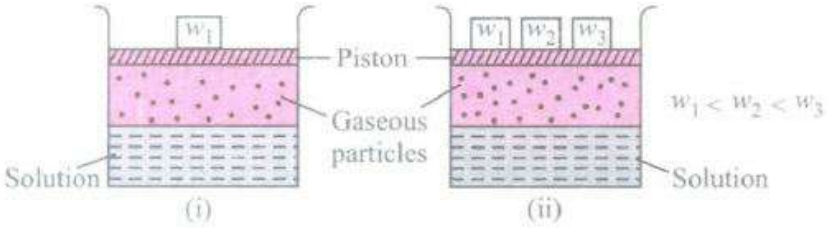
b) Solution (I) will follow Raoults law.

c) Solution (II) will show negative deviation from Raoults law.

d) Solution (III) will show positive deviation from Raoult's law.

50. Which one of the following modes of expressing concentration is independent of temperature?
a) Molarity b) Molality c) Formality d) Normality

51. Consider the two figures given below.



Which of the following statements regarding the experiment is true?
a) Ihe solubility of a gas in liquid in beaker (i) is greater than that in beaker (ii).
b) The solubility of a gas in beaker (i) is less than that in beaker (ii).
c) The solubility of a gas is equal in both beakers.
d) The solubility of a gas remains unaffected by change in weights.

52. Which of the following solutions is an example of negative deviation from Raoult's law?
a) Acetone + Ethanol b) Carbon tetrachloride + Chloroform
c) Acetone + Chloroform d) Water + Ethanol

53. 3 moles of P and 2 moles of Q are mixed, what will be their total vapour pressure in the solution if their partial vapour pressures are 80 and 60 torr respectively?
a) 80 torr b) 140 torr c) 72 torr d) 70 torr

54. In amalgam of mercury with sodium, solvent is
a) mercury b) sodium c) amalgam d) none of these.

55. For an ideal solution with PA > PB, which of the following is true?
a) $(x_A)_{liquid} = (x_A)_{vapour}$ b) $(x_A)_{liquid} > (x_A)_{vapour}$ c) $(x_A)_{liquid} > (x_A)_{vapour}$
d) $(x_A)_{liquid}$ and $(x_A)_{vapour}$ do not bear any relationship with each other

56. 1 .00 g of a non-electrolyte solute (molar mass 250 g mol^{-1}) was dissolved in 51 .2 g of benzene. If the freezing point depression constant, K_f of benzene is 5.12 K $kg\ mol^{-1}$, the freezing point of benzene will be lowered by
a) 0.3 K b) 0.5 K c) 0.4 K d) 0.2

57. What is the mass of urea required for making 2.5 kg of 0.25 molal aqueous solution?
a) 37 g b) 25 g c) 125 g d) 27.5 g

58. Maximum amount of a solid solute that can be dissolved in a specified amount of a given liquid solvent does not depend upon_____.
a) temperature b) nature of solute c) pressure d) nature of solvent

59. Low concentration of oxygen in the blood and tissues of people living at high altitude is due to_____.
a) low temperature b) low atmospheric pressure
c) high atmospheric pressure
d) both low temperature and high atmospheric pressure

60. **Assertion:** Pressure does not have any effect on solubility of solids in liquids.
Reason: Solids and liquids are highly incompressible
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false

61. A solution of urea (mol. mass 56 g mol^{-1}) boils at 100. 18°C at the atmospheric pressure. If K_f and K_b for water are 1.86 and 0.512 K kg mol^{-1} respectively. the above solution will freeze at:
a) 0.654°C b) -0.654°C c) 6.54°C d) -6.54°C

62. An organic compound contains C = 40%, O = 53 .34% O and H = 6.60%. The empirical formula of the compound is:
a) CH_2O b) CHO c) CH_4O_2 d) C_2H_2O

63. Which of the following has the highest freezing point?
a) 1 m NaCl solution b) 1 m KCl solution c) 1 m $AlCl_3$ solution
d) 1 m $C_6H_{12}O_6$ solution

64. Vapour pressure of benzene at $30^\circ C$ is 121.8 mm. When 15g of a non-volatile solute is dissolved in 250 g of benzene weight of the solute is (mol. weight of solvent: 78)
a) 356.2 b) 456.8 c) 530.1 d) 656.7

65. During dissolution when solute is added to the solvent, some solute particles separate out from the solution as a result of crystallisation. At the stage of equilibrium, the concentration of solute in the solution at given temperature and pressure

a) increases b) decreases c) remains constant d) keeps changing.

66. **Assertion:** The vapour pressure of an aqueous solution of sucrose is less than 1.013 bar at 373.15 K.

Reason: Vapour pressure of water is 1.013 bar at 373.15 K.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false.

d) If both assertion and reason are false

67. 25.3 g of sodium carbonate, Na_2CO_3 is dissolved in enough water to make 250 mL of solution . If sodium carbonate dissociates completely, molar concentration of sodium ions, Na^+ and carbonate ions, CO_3^{2-} are respectively. (Molar mass of Na_2CO_3 = 106 g mol^{-1})

a) 0.955 M and L.910 M b) 0.910 M and 0.955 M c) 1.90 M and 1.910 M

d) 0.477 M and 0.477 M

68. In comparison to a 0.01 M solution of glucose, the depression in freezing point of a 0.01 M $MgCl_2$ solution is

a) the same b) about twice c) about three times d) about six times

69. A 0.0020 m aqueous solution of an ionic compound $Co(NH_3)_5(NO_2)Cl$ freezes at - 0.00732°C. Number of moles of ions which 1 mole of ionic compound produces on being dissolved in water will be : (k_f = - 1.86°C/m)

a) 2 b) 3 c) 4 d) 1

70. Henry's law constant for molality of methane in benzene at 298 K is 4.27 X 10^5 mm Hg. The mole fraction of methane in benzene at 298 K under 760 mm Hg is

a) 1.78 x 10^{-3} b) 17.43 c) 0.114 d) 2.814

171. Which of the following statements is correct about diffusion and osmosis?
(i) In osmosis, a semipermeable membrane is used while diffusion is without membrane.
(ii) In osmosis, movement of molecules occurs in one direction while in diffusion, movement occurs in all directions.
(iii) In osmosis, only the solvent moves while in diffusion both solute and solvent move.
a) Only (i) and (ii) b) (i) only c) Only (ii) and (iii) d) (i), (ii) and (iii)

172. Benzene and naphthalene form an ideal solution at room temperature. For this process, the true statement (s) is (are)
(i) $\triangle G$ is positive
(ii) $\triangle S_{system}$ is positive
(iii) $\triangle S_{surroundings} = 0$ (iv) $\triangle H = 0$
a) (ii) and (iv) only b) (i) and (iii) only c) (ii), (iii) and (iv) only d) all of these

173. For carrying reverse osmosis for desalination of water the material used for making semipermeable membrane is
a) potassium nitrate b) parchment membrane c) cellulose acetate
d) cell membrane.

174. 10% solution of urea is isotonic with 6% solution of a non-volatile solute X. What is the molecular mass of solute X?
a) 6 g mol^{-1} b) 60 g mol^{-1} c) 36 g mol^{-1} d) 32 g mol^{-1}

175. What is the molarity of a solution containing 10 g of NaOH in 500 mL of solution?
a) 0.25 mol L^{-1} b) 0.5 mol L^{-1} c) 0.75 mol L^{-1} d) 1.25 mol L^{-1}

176. Which one of the following salts will have the same value of van't Hoff factor (i) as that of $K_4[Fe(CN)_6]$?
a) $Al_2(SO_4)_3$ b) $NaCl$ c) $Al(NO_3)_3$ d) Na_2SO_4

177. At a given temperature, osmotic pressure of a concentrated solution of a substance_____.
a) is same as that of a dilute solution
b) cannot be compared with osmotic pressure of dilute solution
c) is higher than that at a dilute solution
d) is lower than that of a dilute solution

178. What will be the molality of a solution of glucose in water which is 10% w/W?

a) 0.01 m b) 0.617 m c) 0.668 m d) 1.623 m

179. An aqueous solution of 2% non-volatile solute exerts a pressure of 1.004 bar at the normal boiling point of the solvent. What is the molecular mass of the solute?
a) 23.4 g mol^{-1} b) 41.35 g mol^{-1} c) 10 g mol^{-1} d) 20.8 g mol^{-1}

180. Why is the molecular mass determined by measuring colligative property in case of some solutes is abnormal?
a) Due to association or dissociation of solute molecules.
b) Due to insolubility of solute molecules.
c) Due to decomposition of solute molecules.
d) Due to large size of solute molecules.

181. Which of the following statement about the compositions of the vapour over an ideal 1 : 1 molar mixture of benzene and toiuene is correct? Assume that the temperature is constant at 25°C.
(Given: Vapour Pressure Data at 25°C benzene= 12.8 kPa, toluene = 3.85 kPa)
a) The vapour will contain a hight percentage of benzene
b) The vapour will contain a higher percentage of toluene
c) The vapour will contain equal amounts of benezene and toluene
d) Not enough information is given to make a prediction

182. The mixture which shows positive deviation from Raoult's law is
a) Chioroethane + Brornoethane b) Ethanol + Acetone c) Benzene + Toluene
d) Acetone + Chloroform

183. Sprinkling of salt helps in clearing the snow covered roads in hills. The phenomenon involved in the process is
a) lowering in vapour pressure of snow
b) depression in freezing point of snow c) increase in freezing point of snow
d) melting of ice due to increase in temperature by putting salt.

184. Concentrated aqueous sulphuric acid is 98% H_2SO_4 by mass and has a density of 1.80 gmL^{-1} Volume of acid required to make one liter of 0.1M H_2SO_4 solution is :
a) 11.10 mL b) 16.65 mL c) 22.20 mL d) 5.55 mL

185. Relative lowering of vapour pressure, osmotic pressure of a solution and elevation in boiling points are___(p)_____properties. Osmosis is the passage of____(q)____through a semipermeable membrane from a solution

of_____(r)_____towards a solution of ____(s)_____. Osmotic pressure is equivalent to mechanical pressure which must be applied on____(t)_____to prevent osmosis. In the above paragraph p, q, r, s and t respectively are

a) colligative, solution, higher concentration, lower concentration, solution

b) colligative, solvent, higher concentration, lower concentration, solution

c) colligative, solution, lower concentration, higher concentration, solvent

d) colligative, solvent, lower concentration, higher concentration, solution.

186. P_A and P_B are the vapour pressure of pure liquid components A and B, respectively of an ideal binary solution. If X_A represents the mole fraction of component A, the total pressure of the solution will be:

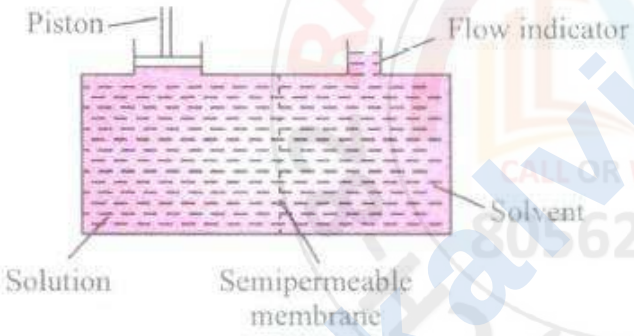
a) $P_A + X_A (P_B - P_A)$ b) $P_A + X_A (P_A - P_B)$ c) $P_B + X_A (P_B - P_A)$

d) $P_B + X_A (P_A - P_B)$

187. At 25°C, the highest osmotic pressure is exhibited by 0.1 M solution of

a) urea b) $CaCl_2$ c) KCl d) glucose

188. Study the following figure showing osmosis and mark the correct statement.



a)

The external pressure applied on the solution to stop osmosis is called osmotic pressure.

b)

The external pressure applied on the solvent to stop osmosis is called osmotic pressure.

c)

The hydrostatic pressure built up on solvent which just stops osmosis is osmotic pressure.

d)

Pressure developed by solvent while solution flows through semipermeable membrane.

89. The vapour pressures of ethanol and methanol are 44.5 mm Hg and 88.7 mm Hg respectively. An ideal solution is formed at the same temperature by mixing 60 g of ethanol with 40 g of methanol. The total vapour pressure of the solution and the mole fraction of methanol in the vapour are respectively.
a) 43.46 mm and 0.51 b) 66.15 mm and 0.657 c) 66.15 mm and 0.791
d) 70.59 mm and 0.657

90. The values of van't Hoff factors for KCl, NaCl and K_2SO_4, respectively, are:
a) 2, 2 and 2 b) 2, and 3 c) 1, 1 and 2 d) 1, 1 and 1

91. Which condition is not satisfied by an ideal solution?
a) $\Delta_{mix}H = 0$ b) $\Delta_{mix}V = 0$ c) $\Delta_{mix}S = 0$
d) Obeyance to Raoult's Law

92. What will be the degree of dissociation of 0.1 M $Mg(NO_3)_2$ solution if van't Hoff factor is 2.7 4?
a) 75% b) 87% c) 100% d) 92%

93. Which mixture of the solutions will lead to the formation of negatively charged colloidal $[AgI]I^-$ so?
a) $50\ mL\ of\ 1M AgNO_3 + 50\ mL\ of\ 2MKI$
b) $50\ mL\ of\ 2M AgNO_3 + 50\ mL\ of\ 1.5MKI$
c) $50\ mL\ of\ 0.1M AgNO_3 + 50\ mL\ of\ 0.1MKI$
d) $50\ mL\ of\ 1M AgNO_3 + 50\ mL\ of\ 1.5MKI$

94. What will be the molarity of 30 mL of 0.5 M H_2SO_4 solution diluted to 500 mL?
a) 0.3 M b) 0.3 M c) 3 M d) 0.103 M

95. Intermolecular forces between n-hexane and n-heptane are nearly same as between hexane and heptane individually. When these two are mixed, which of the following is not true about the solution formed?
a) It obeys Raoult's law, i.e. $P_A = X_A P^o$ and $P_B = x_B P^o$ b) $\triangle H_{mixing}$ is zero.
c) $\triangle V_{mixing}$ is zero. d) It forms minimum boiling azeotrope.

96. Two liquids HNO_3 (A) and water (B) form a maximum boiling azeotrope when mixed in the ratio of 68% and 32% respectively. It means
a) A - B interactions are stronger than A - A and B - B interactions
b) A - B interactions are weaker than A - A and B - B interactions
c) vapour pressure of solution is more than the pure components
d) vapour pressure of solution is less since only one component vaporises .

197. The elevation in boiling point of a solution of 9.43 g of $MgCl_2$ in 1 kg of water is (Kb = 0.52 K kg mol^{-1}, Molar mass of $MgCl_2$ = 94.3 g mol^{-1})
a) 0.156 b) 0.52 c) 0.17 d) 0.

198. How many gram of a dibasic acid (mol. wt. 200) should be present in 100 mL of the aqueous solution to give 0.1 N?
a) 1 g b) 2 g c) 10 g d) 20 g

199. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	$\triangle H_{mix}=0$, $\triangle V_{mix}=0$	(i)	Non-ideal solution
(B)	$\triangle H_{mix}\neq 0$, $\triangle V_{mix}\neq 0$	(ii)	Positive deviation
(B)	$\triangle H_{mix}<0$, $\triangle V_{mix}<0$	(iii)	Ideal solution
(D)	$\triangle H_{mix}>0$, $\triangle V_{mix}>0$	(iv)	Negative deviation

a) (A) → (i), (B)→ (iii), (C)→ (ii), (D)→ (iv)
b) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)
c) (A)→(ii), (B)→(iii), (C)→(iv), (D)→(i)
d) (A)→ (iii), (B)→ (ii), (C)→ (i), (D)→ (iv)

200. Out of the following 0.10 m aqueous solutions, which one will exhibit the largest freezing point depression:
a) KCl b) $C_6H_{12}O_6$ c) $Al_2(SO_4)_3$ d) K_2SO_4

201. **Assertion:** Aquatic species are more comfortable in warm waters than cold waters.
Reason: K_H values for both N_2 and O_2 decrease with increase of temperature.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false

202. An ideal solution is formed when its components
a) have no volume change on mixing b) have no enthalpy change on mixing
c) have both the above characteristics d) have high solubility

203. 200 mL of an aqueous solution of a protein contains its 1.26 g.The osmotic pressure of this solution at 300 K is found to be 2.57 x 1 0^{-3} bar. The molar mass of protein will be (R = 0.083 L bar mol^{-1} K^{-1})
a) 51022 g mol^{-1} b) 122044 g mol^{-1} c) 31011 g mol^{-1} d) 61038 g mol^{-1}

204. A plant cell shrinks when it is kept in a
a) hypotonic solution b) hypertonic solution c) isotonic solution
d) pure water

205. **Assertion:** Osmosis does not take place in two isotonic solutions separated by semipermeable membrane.
Reason: Isotonic solutions have same osmotic pressure.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false

206. **Assertion:** One molar aqueous solution is more concentrated than that of 1 molal aqueous solution.
Reason: Molarity is a function of temperature as volume depends on temperature
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false

207. The freezing point depression constant (K_f) of benzene is 5.12 K kg mol^{-l}. The freezing point depression for the solution of molality 0.078 m containing a non-electrolyte solute in benzene is (rounded off up to two decimal places)
a) 0.60K b) 0.20K c) 0.80K d) 0.40K

208. A 0.1 molal aqueous solution of a weak acid is 30% ionized. If K_f for water is 1.86°C/m, the freezing point of the solution will be
a) -1.18°C b) -54°C c) -0.36°C d) -24°C

209. What amount of $CaCl_2$ (i = 2.47) is dissolved in 2 litres of water so that its osmotic pressure is 0.5 atm at 27°C?
a) 3.42 g b) 9.24 g c) 2.834 g d) 1.820 g

210. Which one of the following salts will have the same value of van't Hoff factor (i) as that of $K_4[Fe(CN)_6]$?
a) $Al_2[Fe(CN)6]$ b) NaCl c) $Al(NO_3)_2$ d) Na_2SO_4

211. A solution has 1: 4 mole ratio of pentane to hexane. The vapour pressure of the pure hydrocarbons at 20°C are 440 mm of Hg for pentane and 120 mm of Hg for hexane. The mole fraction of pentane in the vapour phase would be :
a) 0.549 b) 0.200 c) 0.786 d) 0.478

212. **Assertion:** The concentration of pollutants in water or atmosphere is often expressed in terms of ppm.
Reason: Concentration in parts per million can be expressed as mass to mass, volume to volume and mass to volume.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false.
d) If both assertion and reason are false

213. 0.001 molal solution of $[Pt(NH_3)_4Cl_4]$ in water had a freezing point depression of 0.0054 ^{0}c. If Kf for water is 1.80, the correct formula of the compound is
a) $[Pt(NH_3)_4Cl_3]Cl$ b) $[Pt(NH_3)_4Cl_4]$ c) $[Pt(NH_3)_4Cl_2]Cl_2$ d) $[Pt(NH_3)_4Cl]Cl_3$

214. Which of the following is not an industrial or biological importance of osmosis?
a) Movement of water from soil into plant roots and upper portion of plant.
b) Salting of meat to prevent bacterial action.
c) Reverse osmosis for desalination of sea water.
d) Filling of ink in a fountain pen.

215. Colligative properties depend on _____ .
a) the nature of the solute particles dissolved in solution
b) the number of solute particles in solution
c) the physical properties of the solute particles dissolved in solution
d) the nature of solvent particles

216. How many Na^+ ions are present in 100mL of 0.25M of NaCl solution?
a) 0.025×10^{23} b) 1.505×10^{22} c) 15×10^{22} d) 2.5×10^{23}

217. The value of Henry's constant K_H is_____.
a) greater for gases with higher solubility
b) greater for gases with lower solubility c) constant for all gases
d) not related to the solubility of gases

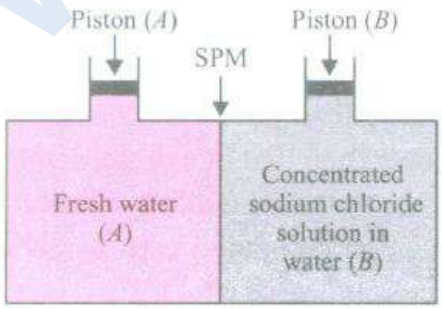
218. A solution is obtained by mixing 200 g of 30% and 300 g of 20% solution by weight. What is the percentage of solute in the final solution?
a) 50% b) 28% c) 64% d) 24%

219. People taking lot of salt experience puffiness or swelling of the body due to
a) water retention in tissue cells and intercellular spaces because of osmosis
b) water loss from the cells through skin tissues
c) capillary action of water through skin pores
d) excessive thirst and drinking more water.

220. Which of the following will have same value of van't Hoff factor as that of $K_4[Fe(CN)_6]$?
a) $Al_2(SO_4)_3$ b) $AlCl_3$ c) $Al(NO_3)_3$ d) $Al(OH)_3$

221. A solution containing 12.5 g of non-electrolyte substance in 185 g of water shows boiling point elevation of 0.80 K. Calculate the molar mass of the substance. (Kb = 0.52 K kg mol^{-1})
a) 53.06 g mol^{-1} b) 25.3 g mol^{-1} c) 16.08 g mol^{-1} d) 43.92 g mol^{-1}

222. Consider the figure and mark the correct option.



a)
Water will move from side (A) to side (B) if a pressure lower than osmotic pressure is applied on piston (B).
b)
Water will move from side (B) to side (A) if a pressure greater than osmotic pressure is applied on piston (B).
c)
Water will move from side (B) to side (A) if a pressure equal to osmotic pressure is applied on piston (B).
d)
Water will move from side (A) to side (B) if pressure equal to osmotic pressure is applied on piston (A).

223. A 5% solution of cane sugar (mol. wt. = 342) is isotonic with 1 % solution of a substance X. The moiecular weight of x is:
a) 34.2 b) 171.2 c) 68.4 d) 136.8

224. M and 2.5L NaOH solution is mixed with another 0.5M and 3L NaOH solution. Then, find out the molarity of resultant solution?
a) 0.80M b) 1.0M c) 0.73M d) 0.50M

225. Which one is a colligative property ?
a) Boiling point b) Vapour pressure c) Osmotic pressure d) Freezing point

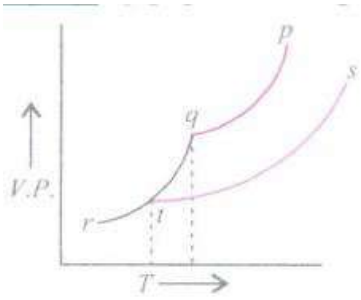
226. The unit of ebulioscopic constant is_____.
a) K kg mol^{-1} or K $(molality)^{-1}$ b) mol kg K^{-1}or K^{-1}(molality)
c) kg mol^{-1} K^{-1}or K^{-1}($molality)^{-1}$ d) K mol kg-1or K (molality)

227. What is the mole fraction of the solute in a 1.00 m aqueous solution?
a) 0.177 b) 1.770 c) 0.0354 d) 0.0177

228. A solution of acetone in ethanol
a) shows a positive deviation from Raoult's law
b) behaves like a non-ideal solution c) Obeys Raoult's law
d) Show a negative deviation from Raoult's law

229. Which of the following representations of i (van't Hoff factor) is not correct?
a) $i=\frac{Observed\ colligative\ property}{Expected\ colligative\ property}$ b) $i=\frac{Norma\ molecular\ mass}{Observed\ molecular\ mass}$
c) $i=\frac{Number\ of\ molecules\ actually\ present}{Number\ of\ molecules\ expected\ to\ be\ present}$
d) $i=\frac{Total\ number\ of\ particles\ taken\ before\ association/dissciation}{Number\ of\ particles\ after\ association/dissociation}$

230. In the given graph, pq, qr and st represent



a)

pq ⟶ liquid state of solution, qr ⟶ solid state of solution, st ⟶ liquid state of solvent

b)

pq ⟶ liquid state of solvent, qr ⟶ solid state of solvent, st ⟶ liquid state of solution

c)

pq ⟶ liquid state of solvent, qr ⟶ solid state of solution, st ⟶ liquid state of solution

d)

pq ⟶ solid state of solvent, qr ⟶ liquid state of solvent, st ⟶ solid state of solution.

231. Which of the following statements is not correct?

a) 5% aqueous solutions of NaCl and KCl are said to be isomolar.

b) 1 M sucrose solution and 1 M glucose solution are isotonic

c)

Molecular mass of acetic acid and benzoic acid is higher than normal mass in cryoscopic methods.

d) For the same solution, $\frac{\Delta T_b}{\Delta T_f} = \frac{K_b}{K_f}$

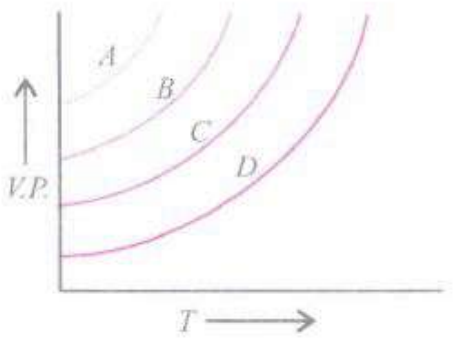
232. The vapour pressure at a given temperature of an ideal solution containing 0.2 mole of a non-volatile solute and 0.8 mole of solvent is 60 mm of Hg. The vapour pressure of the pure solvent at the same temperature is :

a) 150 mm of Hg b) 60 mm of Hg c) 75 mm of Hg d) 120 mm of Hg

233. Which of the following units is useful in relating concentration of solution with its vapour pressure?

a) Mole fraction b) Parts per million c) Mass percentage d) Molality

234. The given graph shows the vapour pressure-temperature curves for some liquids.



Liquids A, B, C and D respectively are

a) diethyl ether, acetone, ethyl alcohol, water

b) acetone, ethyl alcohol, diethyl ether, water

c) water, ethyl alcohol, acetone, diethyl ether

d) ethyl alcohol, acetone, diethyl ether, water.

235. Which of the following is an example of gaseous solution?

a) Camphor in nitrogen gas b) Solution of hydrogen in palladium

c) Chloroform mixed with nitrogen gas d) Both (a) and (c)

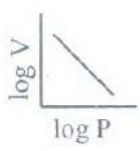
236. 25.3 g of sodium carbonate, Na_2CO_3 is dissolved in enough water to make 250 mL of solution. If sodium carbonate dissociates completely, molar concentration of sodium ion, Na^+ and carbonate ion, CO_3^{2-} are respectively (Molar mass of Na_2CO_3 = 106 g mol^{-1})

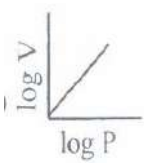
a) 0955M and 1.910M b) 1.910M and 0.955M c) 1.90M and 1.910M

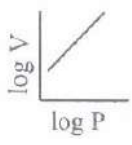
d) 0.477M and 0.477M

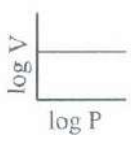
Ravi Maths Tuition Centre

Time : 1 Mins **STATE'S OF MATTER LIQUID AND GASES 1** **Marks : 954**

1. A mixture of dihydrogen and dioxygen at one bar pressure contains 20% by weight of dihydrogen. Calculate the partial pressure of dihydrogen.
   a) 0.8 b) 1.8 c) 2.8 d) 3.0
2. If 10gm of a gas at atmospheric pressure is cooled from 273°C to 0°C keeping the volume constant, its pressure would become
   a) 2 atm b) 273 atm c) 1/273 atm d) 1/2 atm
3. Surface tension does not vary with
   a) temperature b) concentration c) size of the surface d) vapour pressure.
4. If V is the observed molar volume of real gas and Vd is the molar volume of an ideal gas then Z is
   a) VV_{id} b) $\frac{V}{V_{id}}$ c) $\frac{\overline{V}}{\overline{V}_{id}}$ d) $\frac{V^2}{V_{id}}$
5. Which assumption of kinetic theory is not followed when a real gas shows non-ideal behaviour?
   a) Gas molecules move at random with no attractive forces between them
   b) The velocity of gas molecules is dependent on temperature
   c)
   Amount of space occupied by a gas is much greater than that by actual gas molecules
   d)
   During collisions with the walls of the container or with another molecules, energy is conserved
6. The total pressure of a mixture of 8g of oxygen and 14g of nitrogen contained in a 11.2L vessel at O°C is
   a) 0.5 atm b) 1 atm c) 1.5 atm d) 2 atm
7. Increase in kinetic energy can overcome intermolecular forces of attraction. How will the viscosity of liquid be affected by the increase in temperature?
   a) Increase b) No effect c) Decrease d) No regular pattern will be followed.
8. The Boyle's law can be expressed graphically as
   a) 

   b) 

   c) 

   d) 

9. Following represents equation of state for n moles of real gas

$$\left[P + \frac{n^2 a}{V^2}\right][V - nb] = nRT$$

Select incorrect statement for a real gas.

a) Constant 'a' is a measure of force of attraction among gas molecules

b) a is expressed in atm L^2 mol^{-2}, b is expressed in L mol^{-1}

c) A t high pressure, compression factor is $\left(1 + \frac{Pb}{RT}\right)$

d) $\frac{n^2 a}{V^2}$ is also called internal volume

10. Which of the following indicates RMS velocity of a gas?

(a) $\sqrt{\frac{2RT}{M}}$

(b) $\sqrt{\frac{3P}{d}}$

(c) $\sqrt{\frac{8RT}{\pi M}}$

(d) $\sqrt{\frac{3RT}{M}}$

a) c, d b) b, d c) a, c d) a, b

11. A gas occupies a volume of 300 cm^3 at 27°C and 620 mmHg pressure. The volume of gas at 47°C and 640 mmHg pressure is:

a) 400 c.c. b) 510 c.c. c) 310 c.c. d) 350 c.c.

12. At which one of the following temperature-pressure conditions, the deviation of a gas from ideal behaviour is expected to be minimum?

a) 350K and 3 atm b) 550K and 1 atm c) 250K and 4 atm d) 450K and 2 atm

13. What will be the volume of 2.8 g of carbon monoxide at 27°C and 0.821 atmospheric pressure?

a) 2.5L b) 4L c) 3.5L d) 3L

14. Given below are the critical temperatures of a few gases. When the gases are started cooling, which gas will liquefy first and which will liquefy in the end?

Gas	T_c/K
N_2	126.0
CO_2	304.10
NH_3	405.5
O_2	154.3

a) N_2 will liquefy first and NH_3 at last. b) NH_3 will liquefy first and CO_2 at last

c) NH_3 will liquefy first and N_2 at last. d) CO_2 will liquefy first and NH_3 at last.

15. SO_2 molecule is twice as heavy as 02 molecule. Hence at 25°C the ratio of the average kinetic energies of Sulphur dioxide and oxygen is
    a) 1 :1 b) 2 : 1 c) 1 : 2 d) 4 : 1
16. Boyle's temperature or Boyle point is the temperature at which a real gas starts behaving like an ideal gas over a particular range of pressure. A graph is plotted between compressibility factor Z and pressure P.
    What is the deviation of real gas from ideal behaviour in terms of compressibility factor, Z?

    a)
    As the temperature increases, Z approaches a value close to one and gas starts behaving ideally
    b) Z continuously decrease with increase in pressure
    c) Z continuously increase with increase in pressure
    d) At high pressure, every gas has value Z = 1
17. The intermolecular terce of J attraction: present between NH_3 and C_6H_6 are
    a) Dipole - Dipole b) Ion - dipole c) Dipole - induced dipole d) Dispersion
18. Taking into account the pressure and volume corrections, the gas equation can be written as
    a) $\left(p+\frac{a^2}{V^2}\right)(v-b)=nRT$ b) $\left(p+\frac{an^2}{V^2}\right)(v-nb)=nRT$ c) $\left(p+\frac{aV}{nRT}\right)\left(\frac{V-b}{nRT}\right)=RT$
    d) $\left(p+\frac{Z}{V^2}\right)(V-Zb)=nRT$
19. Dipole-induced dipole interactions are present in which of the following pairs:
    a) Cl_2 and CCl_4 b) HCl and He atoms c) SiF_4 and He atoms d) H_2O and alcohol
20. To which of the followings the Dalton's law of partial pressures is not applicable?
    a) H_2 and He b) NH_3 and HCl c) N_2 and H_2 d) N_2 and O_2
21. In a closed flask of 5 L, 1.0 g of H_2 is heated from 300 to 600 K. Which statement is not correct?
    a) Pressure of the gas increases b) The rate of collision increases
    c) The number of moles of gas increases
    d) The energy of gaseous molecules increases
22. The pressure exerted by 6.0g of methane gas in a 0.03 m^3 vessel at 129°C is (Atomic masses : C = 12.01, H = 1.01 and R = 8.314 JK^{-1} mol^{-1})
    a) 31684 pa b) 21521 pa c) 13409 pa d) 41648 pa
23. Gases show ideal gas behaviour at
    a) high pressure and high temperature b) low pressure and high temperature
    c) low pressure and low temperature d) high pressure and low temperature

24. Under what conditions will a pure sample of an ideal gas not only exhibit a pressure of 1 atm but also a concentration of 1 mol L^{-1}? [R = 0.082 L atm mol^{-l} deg $^{-1}$]
    a) at STP b) When V = 22.4 L c) When T = 12K
    d) Impossible under any conditions.
25. The rms speed of N_2 molecules in a gas is u. If the temperature is doubled and the nitrogen molecules dissociate into nitrogen atoms, the rms speed becomes:
    a) u/2 b) 2u c) 4u d) 14u
26. What is the density of CO_2 at 27°C and 2.5 atm pressure?
    a) 5.2gL^{-1} b) 6.2gL^{-1} c) 7.3gL^{-1} d) 4.46gL^{-1}
27. At what temperature will the molar kinetic energy of 0.3 mol of He be the same as that of 0.4 mol of argon at 400 K?
    a) 700 K b) 533 K c) 800 K d) 400 K
28. A closed container contains equal number of moles of two gases X and Y at a total pressure of 710 mm of Hg. If gas X is removed from the mixture, the pressure will :
    a) become double b) become half c) remain same d) become one-fourth
29. 350 cm^3 of CH_4 and 175 cm^3 of an unknown gas 'A' diffused in the same time under similar conditions. The molecular mass of gas A is:
    a) 32 b) 64 c) 30 d) 71
30. In ion-dipole forces, the magnitude of the interaction energy (E)
    a) $E = \frac{Z^2\mu}{r^2}$ b) $E = \frac{Z\mu}{r}$ c) $E = \frac{Z\mu^2}{r^2}$ d) $E = \frac{Z\mu}{r^2}$
31. Equal masses of H_2, O_2 and methane have been taken in a container of volume V at temperature 27°C in identical conditions. The ratio of the volumes of gases H_2 : O_2: CH_4 would be
    a) 8 : 16 : 1 b) 16 : 8 : 1 c) 16 : 1 : 2 d) 8 : 1 : 2
32. It is observed that H_2 and He gases always show positive deviation from ideal behaviour i.e., Z > 1. This is because
    a) the value of a is very large due to high attractive forces
    b)
    the weak intermolecular forces of attraction due to which a is very small and a/V^2 is negligible
    c) the value of b is very large due to large size of the molecules
    d) both a and b are very small and negligible
33. The thickness of window panes of old buildings is more at the bottom than at the top, which is due to
    a) Surface tension of glass b) Viscosity of glass
    c) Expansion of solid at a given temperature
    d) Expansion of liquid at a given temperature
34. van der Waals constant b in corrected equation for real gases represents

a) measure of effective size of gas molecules
b) magnitude of attractive forces among gas molecules
c) free volume of the molecules
d) difference in pressure and volume of gas molecules.

35. On doping Ge metal with a little of In or Ga, one gets:
a) p-type semiconductor b) insulator c) n-type semiconductor d) rectifier

36. The number of atoms contained in a fcc unit cell of a mono atomic substance is:
a) 1 b) 2 c) 4 d) 6

37. Which of the following statements does not describe Charles' law?
a)
The volume of a given amount of a gas at constant pressure varies directly as its absolute temperature.
b)
For each degree change in temperature, the volume of a sample of a gas changes by the fraction of its volume at 0°C.
c)
All gases expand or contract by the same fraction of their volume at 0°C per degree change in temperature.
d) $V_t = V_0 \left(\frac{273-t}{273}\right)$

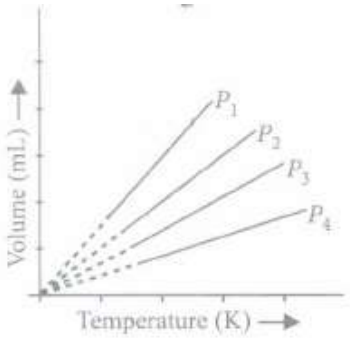
38. Assertion: All the gases should be cooled below their critical temperature for liquification.
Reason: Cooling slows down the movement of molecules therefore, intermolecular forces may hold the slowly moving molecules together and the gas liquifies.
All the gases should be cooled below their critical temperature for liquification.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

39. A 2 L vessel is filled with air at 50°C and a pressure of 3 atm. The temperature is now raised to 200°C. A valve is now opened so that the pressure inside drops to one atm. What will be the fraction of the total number of moles, inside escaped on opening the valve? (Assume no change in the volume of the container) .
a) 7.7 b) 9.9 c) 8.9 d) 0.77

40. 'n' moles of an ideal gas at temperature 'T' occupy 'V' litres of volume, exerting a pressure of 'P' atmospheres. What is its concentration in mole lir' (R = gas constant)
a) $\frac{RT}{R}$ b) $\frac{P}{RT}$ c) $\frac{RT}{P}$ d) $\frac{R}{RT}$

41. By what factor does the average velocity of a gaseous molecule increase when the temperature (in Kelvin) is doubled?
a) 2.8 b) 4.0 c) 1.4 d) 2.0

42. A plot of volume (V) versus temperature (T) for a gas at constant pressure is a straight line passing through the origin. The plots at different values of pressure are shown in figure.



Which of the following order of pressure is correct for this gas?

a) $P_1 > P_2 > P_3 > P_4$ b) $P_1 = P_2 = P_3 = P_4$ c) $P_1 < P_2 < P_3 < P_4$

d) $P_1 < P_2 = P_3 < P_4$

43. If the ratio of molar masses of two gases A and B is 1 : 4. What is the ratio or the average speeds?

a) 2 b) 4 c) 1 d) 4

44. Boyle's temperature of various gases are given below.

Gas	A_1	A_2	A_3	A_4
T_B(K)	117	23	498	406

a) A b) A_2 c) A_3 d) A_4

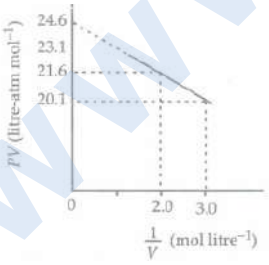
45. A mixture in which the mole ratio of H_2 and O_2 is 2: 1 is used to prepare water by the reaction

$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$

The total pressure in the container is 0.8 atm at 20°C before the reaction. The final pressure at 120°C after reaction is (assuming 80% yield of water)

a) 1.787 atm b) 0.878 atm c) 0.787 atm d) 1.878 atm

46. For one mole of a van der Waals gas when b = 0 and T = 300 K, the PV vs 1/ V plot is shown below. The value of the van der Waals constant a(atm litre^2 mol^{-2}) is



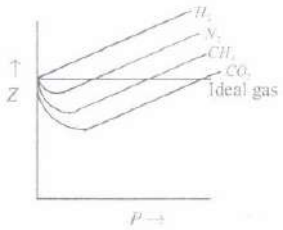
a) 1.5 b) 4.5 c) 1.5 d) 3.0

47. At NTP the volume of a gas is 40 mL. If pressure is increased to 800 mm of Hg at the same temperature, what will be the volume of the gas?

a) 38 mL b) 22400 mL c) 240 mL d) 431 mL

48. Equal volumes of two jars contain HCl,NH_3, gases respectively at constant temperature and pressure P. When one of the jars is inverted over another jar so that they mix up, the pressure in either of the jars is
    a) 1 atm b) Equal to P c) Becomes Zero d) P+P=2P

49. Compressibility factor $\left(Z = \frac{PV}{nRT}\right)$ is plotted against pressure. What is the order of liquefiability of the gas.



    a) H_2 2 4 2 b) CO_2 4 2 2 c) H_2 4 2 2 d) CH_4 2 2 2

50. At 27°C, one mole of an ideal gas exerted a pressure of 0.821 atmospheres. What is its volume in litres? (R = 0.082 lit-atm/mol^{-1}' K^{-1})
    a) 300 b) 30 c) 0.3 d) 3

51. A gas such as carbon monoxide would be most likely to obey the ideal gas law at:
    a) high temperature and low pressures. b) low temperature and high pressures.
    c) high temperature and high pressures. d) low temperature and low pressures.

52. At 1 atmospheric pressure and 0°C, certain mass of a gas measures 0.4 L. Keeping the pressure constant, if the temperature is increased to 273°C, what will be its volume?
    a) 0.8 L b) 22.4 L c) 54.6 L d) 0.4 L

53. Maximum deviation from ideal gas is expected from:
    a) $H_2(g)$ b) $N_2(g)$ c) $CH_4(g)$ d) $NH_3(g)$

54. Absolute zero is defined as the temperature
    a) at which all molecular motion ceases b) at which liquid helium boils
    c) at which ether boils d) All of the above

55. What will be the pressure of the gaseous mixture when 0.5 L of H_2 at 0.8 bar and 2.0 L of O_2 at 0.7 bar are introduced in a 1L vessel at 27°C?
    a) 1.8 bar b) 2.8 bar c) 3.0 bar d) 5 bar

56. The ratio among most probable velocity, mean velocity and root mean square velocity is given by
    a) 1 : 2 : 3 b) $1 : \sqrt{2} : \sqrt{3}$ c) $\sqrt{2} : \sqrt{3} : \sqrt{\frac{8}{\pi}}$ d) $\sqrt{2} : \sqrt{\frac{8}{\pi}} : \sqrt{3}$

57. Combination that obeys Dalton's law
    A = CO, B = Cl_2, C = F_2, D = Xe
    a) A, B b) B, C c) B, D d) A, C

58. In a mixture of N_2 and CO_2 gases, the partial pressure of CO_2 is 1.25 atm.The total pressure of the mixture is 5 atm. The mole fraction of N_2 in the mixture is.
    a) 0.82 b) 0.75 c) 0.80 d) 0.65

59. Which of the following relation is correct for an ideal gas regarding its pressure (P) and translational kinetic energy per unit volume (E)?
a) $P = \frac{2}{3}E$ b) $P = \frac{3}{2}E$ c) $P = \frac{1}{2}E$ d) P =2E

60. Two identical vessels are filled with 44g of Hydrogen and 44g of carbon dioxide at the same temperature. If the pressure of CO_2 is 2 atm. the pressure of Hydrogen is
a) 1 atm b) 44 atm c) 2 atm d) 22 atm

61. According to kinetic theory of gases, the collisions between molecules of a gas
a) occur in a zig-zag path b) occur in a straight line c) change velocity and energy
d) result in settling down of molecules

62. In a flask of volume V litres, 0.2 mol of oxygen, 0.4 mol of nitrogen, 0.1 mol of ammonia and 0.3 mol of helium are enclosed at 27°C. If the total pressure exerted by these non-reacting gases is one atmosphere, the partial pressure exerted by nitrogen is
a) 0.1 atmosphere b) 0.2 atmosphere c) 0.3 atmosphere d) 0.4 atmosphere

63. At low pressure Vander Waal's equation for 3 moles of a real gas will have its simplified from
a) $\frac{PV}{RT-(3a/V)} = 3$ b) $\frac{PV}{RT+RB} = 3$ c) $\frac{PV}{RT-3Pb} = 1$ d) $\frac{PV}{RT-(9/V)} = 3$

64. A real gas obeying van der Waals equation will resemble ideal gas, if the
a) constants a and b both are small b) a is large and b is small
c) a is small and b is large d) constants a and b both are large

65. Liquids show viscosity which is due to
X) Creation of friction between the layers of the fluid.
Y) Inter molecular attraction force of the liquid
Z) Inter molecular repulsion forces the liquid.
a) Y, Z b) X, Y c) X, Z d) X, Y, Z

66. Pressure of 1 g of an ideal gas A at 27°C is found to be 2 bar. When 2 g of another ideal gas B is introduced in the same flask at same temperature the pressure becomes 3 bar. What would be the ratio of their molecular masses?
a) 4: 1 b) 1: 4 c) 1: 8 d) 2: 8

67. The intermetallic compound LiAg crystallizes in cubic lattice in, which both lithium and silver have coordination number of eight. The crystal class is
a) simple cube b) body centred cube c) face centred cube d) None of the above

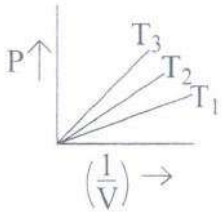
68. How much should the pressure be increased in order to decrease the volume of a gas by 5% aconstant temperature?
a) 25% b) 10% c) 4.26% d) 5.26%

69. At STP, 0.50 mole H_2 gas and 1.0 mole He gas:
a) Have equal average kinetic energies b) Have equal molecular speeds
c) Occupy equal volumes d) Have equal effusion rates

70. A container of 1 L capacity contains a mixture of 4 g of O_2 and 2 g of H_2 at O°C. What will be the total pressure of the mixture?
a) 50.42 atm b) 25.21 atm c) 15.2 atm d) 12.5 atm

71. Viscosity of ethanol is 12.0 millpoise. Viscosity of ethanol in S.I system is
a) 1.2 b) 1.2×10^{-3} c) 1.2×10^{-2} d) 1.2×10^{-1}

72. From th e graph the correct order of temperatures is

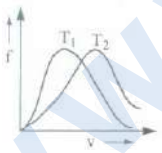
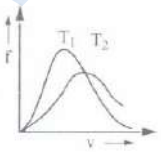
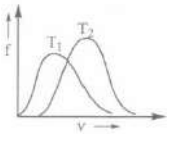
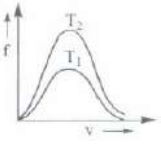


a) $T_3 > T_2 > T_1$ b) T_321 c) $T_3 = T_2 = T_1$ d) $T_3 > T_2 < T_I$

73. For real gases, the relation between P, V and T is given by van der Waals equation, $\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$. for the following gases CH_4, CO_2, O_2, H_2
Which gas will have
(i) highest value of a
(ii) lowest value ob b?
a) (i) CO_2, (ii) H_2 b) (i) CH_4, (ii) CO_2 c) (i) H_2, (ii) CO_2 d) (i) O_2 (ii) H_2

74. The main reason for deviation of gases from ideal behaviour is few assumptions of kinetic theory. These are
(i) There is no force of attraction between the molecules of a gas
(ii) Volume of the molecules of a gas is negligibly small in comparison to the volume of the gas
(iii) Particles of a gas are always in constant random motion
a) (i) and (ii) b) (ii) and (iii) c) (i), (ii) and (iii) d) (iii) only

75. Which of the following diagaram correctly represents the Boltzmann distribution of molecular speeds at two temperatures T_I and T_2 where $T_2 > T_1$? (Proportion of molecules = f, molecular speed = v)

a)  b)  c)  d) 

76. When 2g of a gas A is introduced into an evacuated flask kept at 25°C. the pressure is found to be 1 atmosphere. If 3g of another gas is then added to the same flask, the total pressure becomes 1.5 atm. Assuming ideal behaviour, the ratio of their molecular weights $M_A : M_B$ is
a) 3 : 1 b) 1 : 3 c) 2 : 3 d) 3 : 2

77. A gas can be liquefied if :
a) forces of attraction are low under ordinary condition
b) forces of attraction are high under ordinary conditions

c) forces of attraction are zero under ordinary conditions
d) forces of attraction either high or low under ordinary conditions

78. If volume occupied by CO_2 molecules is negligible then what will be the pressure $\left(\frac{P}{5.277}\right)$ exerted by one mole of CO_2 gas at 300 K? (a = 3.592 atm L^2 mol^{-2})
a) 7 b) 8 c) 9 d) 3

79. A glass bulb is connected to an open limb manornctre. The level of mercury in both limbs of the manometer was same. The bulb was heated to 57°C. If the room temperature and the atmospheric pressure were 27°C and 750 mm, the difference of levels in the two limbs will be.
a) 2.5 cm b) 5.0 cm c) 7.5 cm d) 10.0 cm

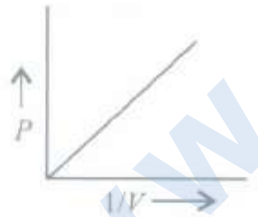
80. A balloon of diameter 21 meter weight 100 kg. Calculate its pay-load. its pay filled with He at 1.0 arm and 27°C. Density of air is 1.2 kgm^{-3}.(Given: R=0.0821 L atm K^{-1} mol^{-1})
a) 4952.42 kg b) 4932.42 kg c) 493.242 kg d) none of these

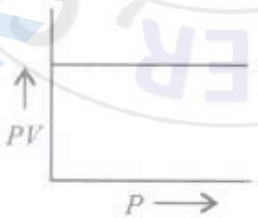
81. A steel cylinder of 8 litres capacity contain hydrogen gas at 12 atm pressure. At the same temperature how many cycle tubes of 4 litres capacity at 2 atm can be filled up with this gas.
a) 12 b) 48 c) 5 d) 10

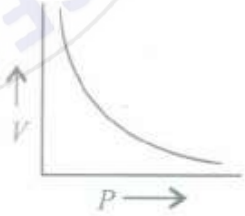
82. Two gases A and B having the same volume diffuse through a porous partition in 20 and 10 s respectively. The molecular mass of A is 49 U. Molecular mass of B will be :
a) 12.25u b) 6.50u c) 25.00u d) 50.00u

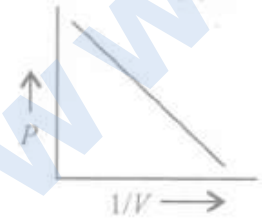
83. Equal masses of helium and oxygen are mixed in a container at 25°C. The fraction of the total pressure exerted by oxygen in the mixture of gases is:
a) 1/3 b) 2/3 c) 1/9 d) 4/9

84. Which of the following graphs represents the correct Boyle's law?

(i) 

(ii) 

(iii) 

(iv) 

a) (i), (ii) and (iii) b) (i) and (iv) c) (ii) and (iii) d) (i), (ii) and (iv)

85. Assertion: The gases show ideal behaviour when the volume occupied is large so that the volume of the molecules can be neglected in comparison to it
Reason : The behaviour of the gas becomes more ideal when pressure is very low.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

86. Compressibility factor of a gas is given by the equation $Z = \frac{PV}{nRT}$. on this basis, mark the correct statement.
a) When Z > 1, real gases get compressed easily
b) When Z = 1 real gases get compressed easily
c) When Z > 1, real gases are difficult to compress
d) When Z = 1, real gases are difficult to compress.

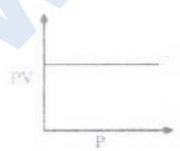
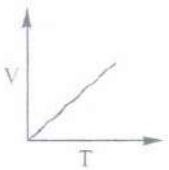
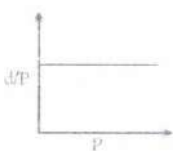
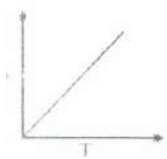
87. The most probable velocity of the molecules of a gas is 1 krn/sec. The R.M.S velocity of the molecules is
a) 1.128 km/sec b) 1.224 km/sec c) 1.5 km/sec d) 1.086 km/sec

88. Compressibility factor for H_2 behaving as real gas is
a) 1 b) $\left(1 - \frac{a}{RTV}\right)$ c) $\left(1 + \frac{Pb}{RT}\right)$ d) $\frac{RTV}{(1-a)}$

89. A 10 It vessel contains He gas at 10 atm and TK. How many balloons of one litre capacity at 1 atm and 2TK can be filled by using the gas present in the cylinder:
a) 200 b) 190 c) 180 d) 170

90. In Vander Waal's equation of state of the gas law, the constant 'b' is a measure of
a) Intermoleculer repulsions b) Intermolecular collisions per unit volume
c) volume occupied by the molecules d) Intermolecular attraction

91. A bubble of air is underwater at temperature 15°C and pressure 1.5 bar. If the bubble rises to the surface where the temperature is 25°C and the pressure is 1.0 bar, what will happen to the volume of the bubble?
a) Volume will become greater by a factor of 1.6.
b) Volume will become greater by a factor of 1.1
c) Volume will become smaller by a factor of 0.70
d) Volume will become greater by a factor of 2.5.

92. Which of the following indicates the isotherms?
a)  b)  c)  d) 

93. At what temperature will the rate of diffusion of N_2 be 1.6 times the rate of diffusion of $S0_2$ at 27°C?
a) 336°C b) 27°C c) 50°C d) 63°C

94. The deviation from the ideal gas behaviour of a gas can be expressed as

a) $Z = \frac{P}{VRT}$ b) $Z = \frac{PV}{nRT}$ c) $Z = \frac{nRT}{PV}$ d) $Z = \frac{VR}{PT}$

95. How many number of moles of nitrogen will be present in 2.24 L of nitrogen gas at STP?
a) 9.9 b) 0.099 c) 0.001 d) 1.00

96.

Gas	O_2	N_2	NH_3	CH_4
a	1.360	1.390	4.170	2.253

The table indicates the value of vander Waal's constant a in L^2atm mol^{-2}. The gas which can most easily be liquefied is?
a) O_2 b) N_2 c) NH_3 d) CH_4

97. The volume occupied by 88 g of CO_2 at 30°C and 1 bar pressure will be
a) 5.05 L b) 49.8 L c) 2 L d) 55 L

98. The Ne atom has 10 times the mass of H_2. Which of the following statements is true?
I) At 25°C the both have the same kinetic energy
II) Ten moles of H_2 would have the same volume as I mole of Ne at same temperature and pressure
III) One mole of Ne exerts the same pressure as one mole of H_2 at STP.
IV) A H_2 molecule travels 10 times faster than Ne atom at same temperature
V) At STP, one litre of Ne has 10 times the density of 1 litre of H_2.
a) II, IV, V b) I, III, V c) I, II, III d) I, II

99. Joule-Thomson coefficient is zero at:
a) Inversion temperature b) Critical temperture c) Absolute temperature
d) Below O°C

100. Positive deviation from ideal behaviour takes place because of:
a) Molecular interaction b/w atoms and $\frac{PV}{nRT}$ >1
b) Molecular interaction b/w atoms and $\frac{PV}{nRT} < 1$ c) Finite size of atoms and $\frac{PV}{nRT} > 1$
d) Finite size of atoms and $\frac{PV}{nRT} < 1$

101. A five litre flask contains 3.5 gm of N_2, 3g of H_2 and 8g of H_2 at 27°C. The total pressure exerted by the mixture of these gases is:
a) 92.4 atm b) 0.924 atm c) 9.24 atm d) 924 atm

102. 2gm of hydrogen is present in a closed vessel at S.T.P. If the same quantity of another gas 'X' where introduced into the vessel the pressure becomes-, 1.5 atm. The gas"X' would be
a) CH_4 b) SO_2 c) He d) O_2

103. Van der Waal's real gas, act as an ideal gas, at what conditions?
a) High temperature, low pressure b) Low temperature, high pressure
c) High temperature, high pressure d) Low temperature, low pressure

104. A closed flask contains water in all its three states, solid, liquid and vapour at 0°C. In this situation, the average kinetic energy of water molecules will be
a) the greatest in all the three states b) the greatest in vapour state
c) the greatest in the liquid state d) same in all the three states

105. At high altitudes, water boils at a lower temperature because
a) the atmospheric pressure is high at high altitudes
b) the viscosity of water is reduced at high altitudes
c) the atmospheric pressure is low at high altitudes
d) the surface tension of water is reduced at high altitudes

106. If volume occupied by CO_2 molecules is negligible, then the pressure exerted by one mole of CO_2 gas in terms of temperature (T), assuming V to be single valued, is
a) $P = \frac{RT}{4a}$ b) $P = \frac{RT}{4(a-b)}$ c) $P = \frac{R^2T^2}{4a}$ d) $\frac{R^2T^2}{4ab}$

107. Assertion: Viscosity of liquids decreases as the temperature rises.
Reason: At high temperature, molecules have high kinetic energy and can overcome the intermolecular forces to flow faster
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

108. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	u_{rms}/u_{av}	(i)	1.22
(B)	u_{av}/u_{mp}	(ii)	1.13
(C)	u_{rms}/u_{mp}	(iii)	1.08

a) $(A) \rightarrow (iii), (B) \rightarrow (ii), (C) \rightarrow (i)$ b) $(A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iii)$
c) $(A) \rightarrow (iii), (B) \rightarrow (i), (C) \rightarrow (ii)$ d) $(A) \rightarrow (ii), (B) \rightarrow (iii), (C) \rightarrow (i)$

109. Which set of conditions represents easiest way to liquefy a gas?
a) Low temperature and high pressure b) High temperature and low temperature
c) Low temperature and low pressure d) High temperature and high pressure

110. Density of gas is found to be 5.46 g/dm^3 at 27°C and 2 bar pressure. What will be its density at STP?
a) 3.0 g dm^{-3} b) 5.0 g dm^{-3} c) 6.0 g dm^{-3} d) 10.82 g dm^{-3}

111. Which is not true in case of an ideal gas?
a) It cannot be converted into a liquid
b) There is no interaction between the molecules
c) All molecules of the gas move with same speed
d) At a given temperature, pV is proportional to the amount of the gas

112. 180ml of hydrocarbon having a molecular weight 16 diffuses in 1.5 min. Under similar conditions time taken by 120ml of SO_2 to diffuse is
a) 2 min b) 1.5 min c) 1 min d) 1.75 min

113. Inversion temperature $\left(T_i = \frac{2a}{Rb}\right)$ is defined as the temperature above which if gas is expanded adiabatically it gets warm up but if temperature of gas is lower than T_i, then it will cool down. What will happen to a gas if it is adiabatically expanded at 50°C if its Boyle's temperature is 20°C?
a) Heating b) Cooling c) Constant d) None

114. A gaseous mixture was prepared by taking equal mole of CO and N_2. If the total pressure of the mixture was found 1 atmosphere, the partial pressure of the nitrogen (N_2) in the mixture is:
a) 0.5 atm b) 0.8 atm c) 0.9 atm d) 1 atm

115. In the fluorite structure, the coordination number of Ca^{2+} ions is
a) 4 b) 6 c) 8 d) 3

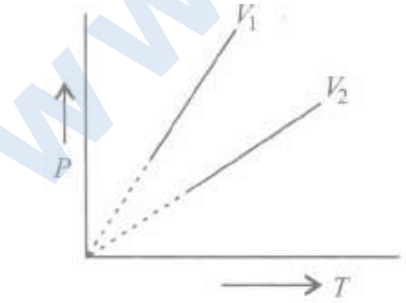
116. Assuming N_2 molecule of spherical shape with radius 2 x 10^{-9}cm, the percentage of empty space in one mole of N_2 gas taken at STP is:
a) 0.1% b) 99.9% c) 90% d) 10%

117. The surface tension of water at 20°C is 72.75 dyne cm^{-1}. Its value in SI system is
a) 7.275 N m^{-1} b) 0.7275 N m^{-1} c) 0.07275 N m^{-1} d) None of the above

118. Liquids are similar to gases because
a) both possess the property of flowing and take the volume of the containers
b) both diffuse and take the shape of the containers
c) both are readily compressible and diffuse d) both are capable of infinite expansion

119. A sample of water gas contains 42% by volume of carbon monoxide. If the total pressure is 760 mm of Hg, the partial pressure of carbon monoxide is :
a) 380 mm of Hg b) 319.2 mm of Hg c) 38 mm of Hg d) 360 mm of Hg

120. A plot of P vs T for a given mass of gas at constant volume is a straight line. P vs T at constant volumes V_1 and V_2 for an ideal gas are shown below:



Which of the following is correct?
a) $V_1 > V_2$ b) $V_1 < V_2$ c) $V_1 = V_2$ d) $V_1 = 2V_2$

121. What is the effect on the pressure of a gas if its temperature is increased at constant volume?

a) The pressure of the gas increases. b) The pressure of the gas decreases
c) The pressure of the gas remains same d) The pressure of the gas becomes double

122. What volume in litres will be occupied by 4.4 g of CO_2 at STP?
a) 22.4 L b) 44.8 L c) 12.2 L d) 2.24 L

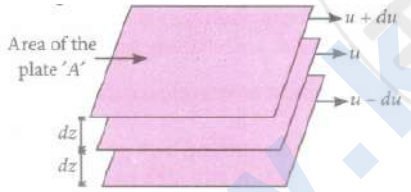
123. Read the following statements and identify the incorrect statement
a) Volume of one mole of a gas at critical temperature is called molar volume
b) Pressure of a gas at critical temperature is called critical pressure
c) The critical temperature, pressure and volume are called critical constants
d)
Critical temperature is the highest temperature at which a gas can exist as liquid, above this temperature it is a gas.

124. Find incorrect match
a) Unit of surface energy = J-m^{-2} b) Unit of surface tension = N-m^{-1}
c) Molecules on the surface of liquid = less energy.
d) Minimum surface area of a liquid = Lowest energy state

125. Two closed bulbs of equal volume (V) containing an ideal gas initially at pressure P_i and temperature T_1 are connected through a narrow tube of negligible volume as shown in the figure below. The temperature of one of the bulbs is then raised to T2 The final pressure p_f is

a) $P_i\left(\frac{T_1T_2}{T_1+T_2}\right)$ b) $2P_i\left(\frac{T_1}{T_1+T_2}\right)$ c) $2P_i\left(\frac{T_2}{T_1+T_2}\right)$ d) $2P_i\left(\frac{T_1T_2}{T_1+T_2}\right)$

126. The figure



helps to establish the relationship between force and
a) area of contact b) velocity gradient c) coefficient of viscosity d) both (a) and (b).

127. The relationship between P_C V_C and T_C is:
a) P_cV_c =RT b) P_CV_C=3RT_C c) $P_CV_C = \frac{3}{5}RT_C$ d) $P_CV_C = \frac{3}{8}RT_C$

128. If one mole of a gas A (mol.wt-40) occupies a volume of 20litres., under the same conditions of temperature and pressure the volume occupied by 2 moles of gas B (mol.wt=80) is
a) 80 L b) 60 L c) 50 L d) 40 L

129. If p, V, M, T and R are pressure, volume, molar mass, temperature and gas constant respectively then for an ideal gas, the density is given by
a) $\frac{RT}{pM}$ b) $\frac{p}{RT}$ c) $\frac{M}{V}$ d) $\frac{pM}{RT}$

130. 50 mL of each gas A and of gas B takes 150 s and 200 s respectively for effusing through a pin hole under the similar conditions. If molecular mass of gas B is 36, the molecular mass of gas A will be :
a) 96 b) 128 c) 20.25 d) 64

131. At a given temperature the ratio of RMS and average velocities is
a) 1.086: 1 b) 1: 1.086 c) 2: 1.086 d) 1.086:2

132. N_2 gas is present in one litre flask at a pressure of 7.6×10^{-10} mm of Hg. The number of N_2 gas molecules in the flask at 0^oC are
a) 2.68×10^9 b) 2.68×10^{10} c) 1.34×10^{28} d) 2.68×10^{22}

133. If the ratio of masses of SO_3 and O_2 gases confined in a vessel is 1 : 1, then the ratio of their partial pressures would be
a) 5:2 b) 2:5 c) 2:1 d) 1:2

134. Among the following compounds viscosity is highest for
a) Methanol b) Propane-1.2.3 triol c) Ethyleneglycol d) Ethanol

135. Which of the following does not decrease with rise in temperature?
a) Density b) Surface tension c) Vapour pressure d) Viscosity

136. A gas at 350 K and 15 bar has molar volume 20 percent smaller than that for an ideal gas under the same conditions. The correct option about the gas and its compressibility factor (Z) is:
a) Z > 1 and repulsive forces are dominant b) Z < 1 and attractive forces are dominant
c) Z < 1 and repulsive forces are dominant d) Z > 1 and attractive forces are dominant

137. The ratio of kinetic energies of 2gm of H_2 and 4gm of CH_4 at a given temperature is
a) 4:1 b) 2:32 c) 1:4 d) 16:2

138. Calculate the volume occupied by 16 grm O_2 at 300 K and 8.31 MPa If $\frac{P_cV}{RT_c} = 3/8$ and $\frac{P_rV_r}{T_r} = 2.21$
(Given: R = 8.314 Mpa/K-mol)
a) 125.31 mL b) 124.31 mL c) 248.62 mL d) none of these

139. How does the surface tension of a liquid vary with increase in temperature?
a) Remains same b) Decreases c) Increases d) No regular pattern is followed

140. Which of the following does not express the properties of gases?
a) Gases are highly compressible. b) Gases exert pressure equally in all directions
c) Gases have much higher density than liquids and solids.
d) Gases mix evenly and completely in all proportions.

141. Two flasks A and B have equal volumes. A is maintained at 300 K and B at 600 K. while A contains H_2 gas, B has an equal mass of CO_2 gas. Find the ratio of total K. E. of gases in flask A to that of B
a) 1 : 2 b) 11 : 1 c) 33 : 2 d) 55 : 7

142. If the assumption that there is no force of attraction between the molecules of a gas is correct, what will be the consequences?
a) All gases will be ideal gases
b) The gases will never liquefy when cooled and compressed.
c) Gases will have definite volume. d) Gases will occupy a definite space.

143. Consider three one-litre flasks labeled A, B and C filled with the gases NO. NO_2 and N_2O. respectively, each at 1 atm and 273 K. In which flask do the molecules have the highest average kinetic energy?
a) Flask C b) All are the same c) Flask A d) None

144. A sea diver at depth of 45 m exhales a bubble of air that is 1.0 cm in radius Assuming the ideal behaviour, find of this bubble as it breaks ath the surface of water?
a) 1.75 cm b) 1.50 cm c) 1.25 cm d) 0.75 cm

145. Match the column I with column II and mark the appropriate choice.

Column-I		Column-II	
A	$P = p_1+p_2+p_3+....$	(i)	Boyle's law
B	$P_1V_1 = P_2V_2 = P_3V_3 =...$	(ii)	Ideal gas equation
C	$(V-b)\left(p+\frac{a}{V^2}\right)=RT$	(iii)	Dalton's law of partial pressure
D	PV = nRT	(iv)	Equation for real gases

a) (A) → (i), (B) → (ii), (C) → (iv), (D) → (iii) b) (A) →(iii), (B) →(i), (C) →(iv), (D) →(ii)
c) (A)→ (ii), (B)→ (iii), (C)→ (i), (D)→ (iv) d) (A)→ (iv), (B)→ (ii), (C)→ (iii), (D)→ (i)

146. An ideal gas cannot be liquefied because
a) its critical temperature is always above 0^oC
b) its molecules are relatively smaller in size c) it solidifies before becoming a liquid
d) forces operating between its molecules are negligible

147. For ammonia vander waals parameter 'a' value is 4.17 lit^2, atm mol". For NH_3, 'b' value is
a) 5.2 mol/lit b) 5.2 litt/mol c) 037 lit / mol d) 0.037 mol/ lit

148. Boiling point of hydrogen fluoride is highest amongst HF, HCI, HBr and HI. Which type of intermolecular forces are present in hydrogen fluoride?
a) H-F has highest van der Waals forces and dipole moment
b) H-F has highest London forces
c)
H-F has highest dipole moment hence has dipole-dipole, London forces and hydrogen bonding.
d) H-F has strong intermolecular interactions like dipole-induced dipole.

149. Balloons of 4L capacity are to be filled with Hydrogen at a pressure of 1 atm and 27 $^\circ$ C from an 8L cylinder containing Hydrogen at 10 atm at the same temperature. The number of balloons that can be filled is
a) 20 b) 18 c) 40 d) 38

150. Regarding dipole - dipole attractions the incorrect statement is

a) Dipole - dipole attractions are more if the molecules have high dipole moment values.
b) In liquid HBr, dipole - dipole attractions are present.
c) Dipole - Dipole interaction energy between stationary polar molecules $\propto r^{-3}$.
d) Dipole-dipole interaction energy between rotating molecules $\propto r^6$

151. A cubical vessel has a side with 1 cm length contained a gas at a pressure of 'P'. When the side of the vessel is made 1/2 cm, the pressure of the gas becomes :
a) P b) P/8 c) 2P d) 8P

152. In which one of the following cases mean free path increases
a) Helium molecules in a container are replaced by oxygen molecules
b) Oxygen molecules in a container replaced by CO_2 molecules
c) N_2 molecules in a container are replaced by Helium molecules
d) Helium molecules in a container are replaced by nitrogen molecules

153. Assertion: In Maxwell-Boltzmann distribution of speeds, the curve broadens at higher temperature
Reason: At a particular temperature, the individual speed of molecules as well as the distribution of speeds remains the same.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

154. Which of the pairs of gases diffuse at a slower, rate than CO_2?
a) H_2 and He b) SO_2 and SO_3 c) N_2 and CO d) N_2O and C_3H_8

155. The internal resistance to flow In liquid is called
a) Fluidity b) Specific resistance c) Viscosity d) Surface tension

156. Correct gas equation is
a) $\frac{V_1T_2}{p_1} = \frac{V_2T_1}{p_2}$ b) $\frac{p_1T_1}{V_1} = \frac{p_2V_2}{T_2}$ c) $\frac{p_1V_1}{p_2V_2} = \frac{T_1}{T_2}$ d) $\frac{V_1V_2}{T_1T_2} = p_1p_2$

157. According to Graham's law at a given temp, the ratio of diffusion γ_A/γ_B of gases A and B is given by
a) $\left(\frac{P_A}{P_B}\right)\left(\frac{M_A}{M_B}\right)^{\frac{1}{2}}$ b) $\left(\frac{M_A}{M_B}\right)\left(\frac{P_A}{P_B}\right)^{\frac{1}{2}}$ c) $\left(\frac{P_A}{P_B}\right)\left(\frac{M_B}{M_A}\right)^{\frac{1}{2}}$ d) $\left(\frac{M_A}{M_B}\right)\left(\frac{P_B}{P_A}\right)^{\frac{1}{2}}$

158. Mark the correct statement for viscosity
a) Greater the viscosity, more slowly the liquid flows.
b) Viscosity increases with increase in temperature
c) Hydrogen bonding and van der Waals forces decrease the viscosity.
d) Viscosity is the measure of ease with which a liquid flows

159. In between which of the following molecules London force exists
a) CO_2, CO_2
b) HCl, HCl

c) HCl, C_6H_6

a) Only a b) Only a and c c) Only a and b d) a, b, and c

160. One mole of a real gas within the Boyle's temperature range shows a pressure of 3 atm in a container of V litre. If the gas is heated to some higher temperature in the same vessel, the gas would show:

a) Z>1 b) Z< I c) Z=I d) Z⩾1

161. The density of a gas is I gm. lit at STP. At 6atm pressure and 546°C, the density of the same gas is

a) 2 g/lt b) 1 g/lt c) 0.5 g/lt d) 0.25 g/lt

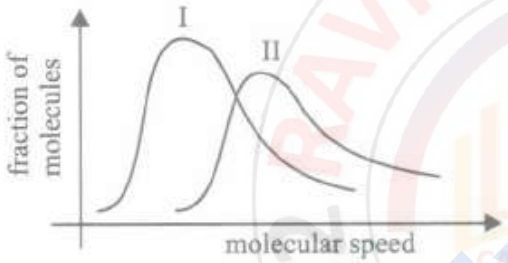
162. The surface tension of which of the following liquid is maximum :

a) C_2H_5OH b) CH_3OH c) H_2O d) C_6H_6

163. A 10 L flask contains a gaseous mixture of CO and CO_2 at a total pressure of 2 atm and 298 K. If 0.20 mole of CO is present, find its partial pressure.

a) 0.49 atm b) 1.51 atm c) 1 atm d) 2 atm

164. The graphs representing distribution of molecular speeds at 300 K for gases Cl_2 and N_2 are as shown in fig. (atomic mass N = 14, Cl = 35.5).



Select the correct option.

a) I graph is for N_2 and II is for Cl_2 b) II graph is for N_2 and I is for Cl_2

c) Either graph can be taken for N_2 or Cl_2 d) Information is not sufficient.

165. Pressure remaining the same, the volume of a given mass of an ideal gas increases for every degree centigrade rise in temperature by definite fraction of its volume at :

a) O°C b) Absolute zero c) Its critical temperature d) Its Boyle's temperature

166. The Certain volume of a gas exerts on its walls some pressure at a particular temperature. It has been found that by reducing the volume of the gas to half of its original value the pressure becomes twice that of the initial value at constant temperature. This happens because:

a) mass of the gas increases with pressure b) speed of the gas molecules decreases

c) more number of gas molecules strike the surface per second

d) gas molecules attract each other.

167. The vander Waal's parameters of two gases are given as

	a (dm^6 bar mol^{-2})	b ($dm^3 mor^{-1}$)
Gas A	6.5	0.056

Gas B	18.0	0.011

Considering the value of parameters, which of the following statement(s) is/are correct

a) Critical volume of A < critical volume of B

b) Critical pressure of A > critical pressure of B

c) Critical temperature of A < critical temperature of B

d) Ease of liquification of A > ease of liquification of B

168. Choose the wrong statement from among the following.

a)

The corrected pressure $P + \frac{an^2}{V^2}$ in Vander Waals equation (symbols have their usual meanings) is the pressure which the gas would exert if it were ideal.

b)

Above their respective Boyle's temperatures, H_2 shows positive deviation throughout (z > 1) while O_2 shows negative deviation (z < 1) followed by positive deviation (z > 1)

c)

A gas shows negative deviation when long range attractive intermolecular forces are dominating

d) The intercept of PV vs P isotherm of any gas at 27°C is equal to 24.4 L atm mol^{-1}

169. Schottky defect in a crystal is observed when

a) an ion leaves its normal site and occupies an interstitial site

b) unequal number of cations and anions are missing from the lattice

c) density of the clystal is increased

d) equal number of cations and anions are missing from the lattice

170. As the temperature increases, average kinetic energy of molecules increases. What would be the effect of increase of temperature on pressure provided the volume is constant?

a) Increases b) Decreases c) Remains same d) Becomes half

171. 0.3 g of a gas has a volume of 112 ml at 0°C and 2atm pressure. Its Molecular weight is

a) 60 b) 30 c) 44 d) 28

172. Value of gas constant R in the ideal gas equation PV = nRT depends upon:

a) temperature of the gas b) pressure of the gas

c) units in the P, V and T are measured d) nature of the gas.

173. CO_2 and CH_4 have critical temperatures of 304 K and 190 K, respectively. P_c for CO_2 = 72 atm and P_c for CH_4 = 45 atm. The ratio bco_2: bCH_4 is

a) 2 : 3 b) 1 : 1 c) 2 : 1 d) 3 : 2

174. The temperature of the gas is raised from 27°C to 927°C. The root mean square speed of the gas is :

a) $\sqrt{\frac{927}{27}}$ times of the earlier value b) Same as before c) Halved d) Doubled

175. For real gases van der Waals equation is written as:

$\left(p+\frac{an^2}{V^2}\right)(V-nb)=nRT$ where 'a' and 'b' are van der Waals constants.

Two sets of gases are:

(I) O_2, CO_2, H_2 and He

(II) CH_2, O_2, and H_2

The gases given in set-I in increasing order of,b, and gases given in set-II decreasing order of 'a', are arranged below. Select the correct order from the following:

a) $(I)\mathrm{He}<\mathrm{H_2}<\mathrm{CO_2}<\mathrm{O_2}(II)\mathrm{CH_4}>\mathrm{H_2}>\mathrm{O_2}$

b) $(I)\mathrm{O_2}<\mathrm{He}<\mathrm{H_2}<\mathrm{CO_2}(II)\mathrm{H_2}>\mathrm{O_2}>\mathrm{CH_4}$

c) $(I)\mathrm{H_2}<\mathrm{He}<\mathrm{O_2}<\mathrm{CO_2}(II)\mathrm{CH_4}>\mathrm{O_2}>\mathrm{H_2}$

d) $(I)\mathrm{H_2}<\mathrm{O_2}<\mathrm{He}<\mathrm{CO_2}(II)\mathrm{O_2}>\mathrm{CH_4}>\mathrm{H_2}$

176. The vander Waal's equation of law of corresponding states for 1 mole of gas is

$\left(here\ \pi=\frac{P}{P_c},\phi=\frac{V}{V_c}\ and\ \theta=\frac{T}{T_c}\right)$

a) $\left(\pi+\frac{3}{\phi^2}\right)(3\phi-1)=8\theta$ b) $\left(\pi+\frac{3}{\phi}\right)(3\phi-1)=8R\theta$

c) $\left(\pi+\frac{3}{\phi}\right)(3\phi+1)=8R\theta$ d) $\left(\pi-\frac{3}{\phi}\right)(3\phi-1)=8R\theta$

177. At 273 K temperature and 9 atm pressure, the compresibility for a gas is 0.9. The volume of I millimoles of gas at this temperature and pressure is

a) 2.24 litre b) 0.020 mL c) 2.24 mL d) 22.4 mL

178. For a real gas, the compressibility factor Zhas different values at different temperatures and pressures. Which of the following is not correct under the given conditions?

a) Z < 1 at very low pressure b) Z > 1 at high pressure c) Z = 1 under all conditions

d) Z = 1 at intermediate pressure

179. Carbondioxide present at F can be liquified

a) At critical volume by compression b) At critical pressure by compression

c) By compression at any temperature

d) By compression and lowering the temperature

180. The average kinetic energy in joules of molecules in 8.0 g of methane at 27 C is :

a) 6.21×10^{-20} J/molecule b) 6.21×10^{-21} J/molecule c) 6.21×10^{-22} J/molecule

d) 3.1×10^{-22} J/molecule

181. The pressure of a 1 : 4 mixture of dihydrogen and dioxygen enclosed in a vessel is one atmosphere. What would be the partial pressure of dioxygen?

a) 0.8×10^{5} atm b) 0.008 N m^{-2} c) 8×10^{4}N m^{-2} d) 0.25 atm

182. Which of the following postulates of kinetic theory of gases is not correct?

a) Gases consist of particles which are in continuous, random motion.

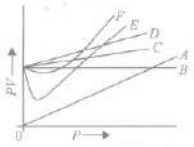
b) The particles are infinitely small and very close to each other.

c) The collisions of the particles with each other are elastic.

d)

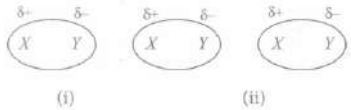
The pressure of a gas is caused by the collisions of gas particles with the wall of the container.

183. Which curve in figure represents the curve of ideal gas?



a) B only b) C and D only c) E and F only d) A and B only

184. Study the figures given below and identify the type of interaction between XY - XY molecules.



a) Dipole-Induced dipole b) Dipole- Dipole c) Dispersion forces

d) Induced dipole-Induced dipole.

185. The RMS velocity of a gas at O°C is 2m/s. The RMS velocity of the same gas at 819°C

a) 1 m/s b) 4 m/s c) 8 m/s d) 16 m/s

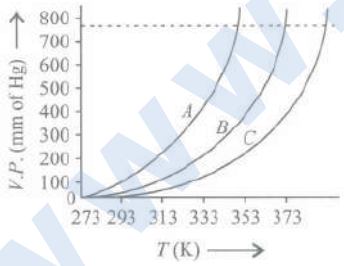
186. In Duma's method of estimation of nitrogen 0.35gm of an organic compound gave 55 ml of nitrogen collected at 300 K temperature and 715mm pressure. The percentage composition of nitrogen in the compound would be (Aqueous tension at 300K = 15mm)

a) 16.45 b) 17.45 c) 14.45 d) 15.45

187. Choose the temperature above which CO_2 cannot be liquified whatsoever applied pressure is:

a) 290 K b) 294.5 K c) 302 K d) 304 K

188. A graph between vapour pressure and temperature of few liquids is given below. Study the graph and answer the following question:



Which of the following statements is true?

a)

Boiling point of a liquid is the temperature at which its vapour pressure becomes equal to atmospheric pressure.

b)

Boiling point of water can be increased by increasing the pressure above the atmospheric pressure.

c) Liquid C has higher boiling point than B due to higher intermolecular forces.

d) All of these.

189. A gas is said to behave like an ideal gas when the relation $\frac{PV}{T}$ =constant. When do you expect a real gas to behave like an ideal gas?
a) When the temperature is low b) When both the temperature and pressure are low
c) When both the temperature and pressure are high
d) When the temperature is high and pressure is low

190. 600 cc of a gas at a pressure of 750 mm is compressed to 500 cc. Taking the temperature to remain constant, the increase in pressure is
a) 150 mm b) 250 mm c) 350 mm d) 450 mm

191. For orthorhombic system axial ratios are a = b = c and the axial angles are
a) $\alpha = \beta = \gamma \neq 90^\circ$ b) $\alpha = \beta = \gamma = 90^\circ$ c) $\alpha = \gamma = 90^\circ, \beta \neq 90^\circ$
d) $\alpha \neq \beta \neq \gamma \neq 90^\circ$

192. The pressure of a mixtures of equal weights of two gases X and Y with molecular weight 4 and 40 respectively is 1.1 atm. The partial pressure of the gas X in the mixture is
a) 1 atm b) 0.1 atm c) 0.15 atm d) 0.5 atm

193. When an ideal gas undergoes unrestrained expansion, no cooling occurs because the molecules
a) Are above the inversion temperature b) Exert no attractive forces on each other
c) Do work equal to loss in kinetic energy d) Collide without losing energy

194. A gaseous mixture was prepared by taking equal moles of CO and N_2. If the total pressure of the mixture was found 1 atm, the partial pressure of the nitrogen (N_2) in the mixture is :
a) 0.8 atm b) 0.9 atm c) 1 atm d) 0.5 atm

195. Ideal gas equation is also called equation of states because:
a) it depends on states of matter
b) it is a relation between four variables and describes the state of any gas
c) it is combination of various gas laws and any variable can be calculated
d) it is applicable to only ideal gases under STP conditions.

196. In van der Waals equation for a non-ideal gas, the term that accounts for intermolecular force is :
a) (V - b) b) $(P + \frac{a}{V^2})$ c) RT d) PV

197. 2 moles of Xenon is present in a one litre vessel. For Xenon gas a = 4.19lt^2. atm. mol^{-2}, b = 0.05 lt/mol. The volume of free space available for random motion of molecules is
a) 900 c.c b) 100 c.c c) 950 c.c d) 50 c.c

198. For an ideal solution, the correct option is:
a) $\Delta_{mix} V \neq 0$ *at constant* T *and* P
b) $\Delta_{mix} \mathrm{H} = 0$ *at constant* T *and* P
c) $\Delta_{mix} \mathrm{G} = 0$ *at constant* T*and* P d) $\Delta_{mix} \mathrm{S} = 0$ *at constant* T *and* P

199. Laminar flow of a liquid means

a)
Regular gradation of velocity for layers in passing from one layer to the next layer of a liquid
b) Showing constancy in the velocity of layers of a liquid
c) Increase in the velocity of layers from surface to bottom of a liquid d) All

200. Assertion (A) : Compressibility factor for hydrogen varies with pressure with positive slope at all pressures.
Reason (R) : Even at low pressures, repulsive forces dominate in hydrogen gas
a)
Both assertion and reason are true and reason is the correct explanation of assertion.
b)
Both assertion and reason are true but reason is not the correct explanation of assertion
c) Assertion is true but reason is false d) Both assertion and reason are false

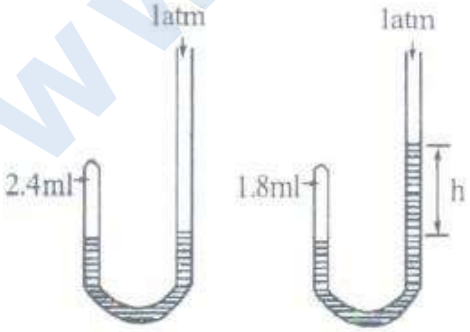
201. An open flask contains air at 27°C. At what temperature should it be heated so that 1/3rd of air present in it goes out?
a) 177°C b) 100°C c) 300°C d) 150°C

202. At 27°C, a closed vessel contains a mixture of equal weights of helium (mol. wt = 4), me than (mol.wt = 16) and sulphur dioxide (mol. wt = 64). The pressure exerted by the mixture is 210 m If the partial pressure of helium methane and sulphurdioxide are P_1, P_2 and P_3 respectively, whic one of the following is correct?
a) $P_3>P_2>P_1$ b) $P_1>P_2>P_3$ c) $P_1>P_3>P2$ d) $P_2>P_3>P_1$

203. The RMS velocity of an ideal gas at 300 K is 12240 cm/see, then its most probable velocity in cm/see at the same temperature is:
a) 10000 b) 11280 c) 1000 d) 12240

204. In which case change in entropy is negative?
a) Expansion of a gas at constant temperature b) Sublimation of solid to gas
c) $2H(g) \rightarrow H_2(g)$ d) Evaporation of water

205. By taking two J- tubes at constant temperature what is the difference in the levels of mercury in two columns?



a) 1013.3 mm b) 1140 mm c) 253.3 mm d) 760 mm

206. The root mean square speed of N_2 molecules in a gas is u. If the temperature is doubled and the nitrogen molecules dissociate into nitrogen atoms, the root mean square speed becomes

a) u/2 b) 2u c) 4u d) 14u

207. Four particles have speed 2,3,4 and 5 cm/s respectively. Their rms speed is
a) 3.5 cm/s b) (27/2) cm/s c) $\sqrt{54} cm/s$ d) $\left(\sqrt{54}/2\right) cm/s$

208. Assertion: Dipole-dipole forces acting between the molecules possessing permanent dipole, are weaker than ion-ion interactions
Reason : The attractive forces decrease with the increase of distance between the dipoles
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

209. What is r.m.s speed of O_2 molecule if its kinetic energy is 2 k cal mol^{-1}?
a) 7.24 x 10^2 m/sec b) 3.5 x 10^2 m/sec c) 1.8 x 10^1 m1sec d) 3.5 x 10^4 m/sec

210. Which of the following expressions represents the value and unit of van der Waals constant a?
a) $a = \frac{V}{n}, Lmol^{-1}$ b) $a = \frac{PV}{n}, atmL^2mol^{-1}$ c) $a = \frac{PV^2}{n^2}, atmL^2mol^{-1}$
d) $a = \frac{P}{n}, atm \quad mol^{-1}$

211. Which of the following relationships for various gas laws is not correct?
a) $V_t = V_0 + \frac{V_0}{273} \times t$ b) $\frac{V_1}{T_1} = \frac{V_2}{T_2}(constant P)$ c) $\frac{P_1}{T_1} = \frac{P_2}{T_2}(constant V)$ d) $\frac{P_1T_1}{V_1} = \frac{P_2T_2}{V_2}$

212. Which of the following expressions correctly represent the relationship between the average molar kinetic energy, $\overline{KE}$ of CO and N_2 molecules at the same temperature?
a) $\overline{KE}_{CO} = \overline{KE}_{N_2}$ b) $\overline{KE}_{CO} > \overline{KE}_{N_2}$ c) $\overline{KE}_{CO} < \overline{KE}_{N_2}$
d) Cannot be predicted unless the volumes of the gases are given

213. The ability of a substance to assume in two or more crystalline structure is called
a) isomerism b) polymorphism c) isomorphism d) amorphism

214. A solid with high electrical and thermal conductivity is:
a) Si b) Li c) NaCl d) ice

215. What will be the pressure exerted by a mixture of 3.2 g methane and 4.4 g of methane and 4.4g of carbon dioxide contained in a 9 dm^3 flask at 27°C?
a) 0.82 atm b) 8.31 x 10^4 Pa c) 1 atm d) 1.8 atm

216. The reaction between gaseous NH_3 and HBr produces a white solid NH_4Br. Suppose a small quantity of gaseous NH_3 and gaseous HBr are introduced simultaneously into opposite ends of an open tube which is one metre long. Calculate the distance of white solid formed from the end which was used to introduce NH_3.
a) At a distance of 34.45 cm from NH_3 end b) At a distance of 68.5 cm from NH_3 end
c) At a distance of 44.45 cm from HBr end d) At a distance of 45.45 cm from HBr end

217. Which of the following are correct statements?
X) Vander Waal's constant 'a' is a measure of attractive force
Y) Vander Waal's constant 'b' is also called co-volume or excluded volume
Z) 'b' is expressed in L mol^{-1}
a) X, Y b) Y, Z c) X, Z d) X, Y, Z

218. At a certain volume of Methane diffuses in 10 Seconds through a porous partition. The time taken by an equal volume O_2 to diffuse under similar condition is?
a) 14.14 Sec. b) 7.07 Sec. c) 20 sec. d) 5 Sec

219. Sharp glass edges are heated for making them smooth (polishing of glass) which is due to its
a) Viscocity b) Surface tension c) Fluidity d) Expansion nature of glass

220. When the absolute temperature of a gas is doubled then the correct statements are
a) The V of a gas increases by 4 times at constant P
b) The P of a gas increases by 2 times at constant V
c) The V of a gas increases by 2 times at constant P
d) The P of a gas increases by 4 times at constant V
a) b, d b) a ,c c) b, c d) a, d

221. The correct value of the gas constant 'R' is close to:
a) 0.082 L atm K b) 0.082 L-atm K^{-l} mol^{-l} c) 0.082 L atm^{-l} K mol^{-l}
d) 0.082 L^{-1} atm^{-l} K mol

222. The inter molecular forces present in inert gases are
a) Ion - ion b) Ion - dipole c) Dipole - dipole d) Dispersion

223. The edge length of a centred unit cubic cell is 508 pm. If the radius of the cation is 100 pm, the radius of the anion is
a) 288 pm b) 398 pm c) 154 pm d) 618 pm

224. The root mean square speeds at STP for the gases H_2, N_2, O_2 and HBr are in the order:
a) $H_2 < N_2 < O_2 < HBr$ b) $HBr < O_2 < N_2 < H_2$ c) $H_2 < N_2 = O_2 < HBr$
d) $HBr < O_2 < H_2 < N_2$

225. There is a standard value of temperature and pressure at which the molar volume of a gas is 22.4 L. The correct values are
a) 273 K, 1 atm b) 300 K, 760 mm c) 25°C, 760 mm d) 373 K, 1 atm

226. Root mean square velocity of a gas molecule is proportional to :
a) $m^{\frac{1}{2}}$ b) m° c) $m^{-\frac{1}{2}}$ d) m

227. Assertion: Gases become denser at high pressure
Reason : At high pressures, gases deviate from Boyle'slaw
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

228. At what temperature 28 g of N_2 will occupy a volume of 20 litres at 2 atm?
a) 300.0 K b) 487.2 K c) 289.6 K d) 283.8 K

229. What is the compressibility factor (Z) for 0.02 mole of a van der Waal's gas at pressure of 0.1 atm. Assume the size of gas molecules is neligible. Given : RT = 20 L atm mol^{-1} and a = 1000 atm L^2 mol^{-2}.
a) 2 b) 1 c) 0.02 d) 0.5

230. 2 moles of gas contained in a four litre flask exerts a pressure of II atm at 27°C. If vander Waals parameter b is 0.05 l/mol, the value of 'a' (in atm lt^2 $mol^{-2)}$ is
a) 6.46 b) 3.23 c) 2.0 d) 1.23

231. Assertion: At high altitudes, liquids boil at lower temperatures in comparison to that at sea level.
Reason: At high altitudes, atmospheric pressure is low.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

232. A vessel has N_2 gas saturated with water vapour at a total pressure of 1 atm. The partial pressure of water vapour is 0.3 atm. The contents of this vessel are completely transferred to another vessel having one third of the capacity of the original volume, at the same temperature. The total pressure of this system in the new vessel is
a) 3.0 atm b) 1 atm c) 3.33 atm d) 2.4 atm

233. Which one of the following statement is wrong for gases?
a) Gases do not have a definite shape and volume
b) Volume of the gas is equal to volume of container confining the gas
c) Confined gas exerts uniform pressure on the walls of its container in all directions
d) Mass of a gas cannot be determined by weighing a container in which it is enclosed.

234. What are the other elements besides noble gases which exist as gases under normal conditions? Fill up the blanks by choosing the correct option.

Group	1	15	16	17	18
	I				He
		II	III	IV	–
				V	–
					–

a)

I	II	III	IV	V
H	N	O	F	Cl

b)

I	II	III	IV	V
H	O	N	Cl	F

c)

I	II	III	IV	V
H	N	O	Cl	I

d)

I	II	III	IV	V
He	O	N	Cl	Br

235. 'X' moles of N_2 gas at S.T.P. conditions occupy a volume of 10 litres, then the volume of '2x' moles of CH_4 at 273°C and 1.5 atm is
a) 20 lit b) 26.6 lit c) 5 lit d) 16.6 lit

236. The types of attractive forces between a polar molecule and a non-polar molecule are:
a) hydrogen bonds b) dipole-induced dipole forces c) dispersion forces
d) dipole-dipole forces

237. An ideal gas, obeying kinetic theory of gases cannot be liquefied, because
a) it solidifies before becoming a liquid
b) forces acting between its molecules are negligible
c) its critical temperature is above 0°C d) its molecules are relatively small in size

238. A jar contains He and H_2 in the molar ratio 1: 5. The ratio of mean translational kinetic energy at the same temperature is:
a) 1: 5 b) 5: 1 c) 2: 1 d) 1: 1

239. The gas which can be liquified under high pressure at 4°C is
a) nitrogen b) hydrogen c) oxygen d) ammonia

240. Given van der Waals constant for NH_3t H2 and CO_2 are respectively 4.17, 0.244, 1.36 and 3.59, which one of the following gases is most easily liquefied?
a) NH_3 b) H_2 c) O_2 d) CO_2

241. 500 mL of nitrogen at 27°C is cooled to -5°C at the same pressure. The new volume becomes:
a) 326.32 mL b) 446.66 mL c) 546.32 mL d) 771.56 mL

242. 50 ml of oxygen diffuses under certain conditions through a porous membrane. The volume of Hydrogen that diffuses in the same time under the same conditions is:
a) 12.5 ml b) 25 ml c) 100 ml d) 200 ml

243. Internal energy and pressure of a gas of unit volume are related as:
a) $p = \frac{2}{3}U$ b) $p = \frac{3}{2}U$ c) $p = \frac{1}{2}U$ d) P = 2U

244. A certain gas takes three times as long to diffuse out as helium. Its molecular mass will be
a) 27 u b) 36 u c) 64 u d) 9 u

245. Which of the following assumptions is incorrect according to kinetic theory of gases?
a) Particles of a gas move in all possible directions in straight lines.
b) All the particles, at any particular time, have same speed and same kinetic energy
c)
There is no force of attraction between the particles of a gas at ordinary temperature and pressure.
d)
The actual volume of the gas is negligible in comparison to the empty space between them.

246. The behaviour of temporary gases like carbon dioxide approaches that of permanent gases such as nitrogen, oxygen, etc., as we go?

a) Below critical temperature b) Above critical temperature c) Above absolute zero
d) Below absolute zero

247. 34.05 mL of phosphorus vapour weighs 0.0625 g at 546°C and 1 bar pressure. What is the molar mass of phosphorus?
a) 124.77 g mol^{-1} b) 124.75 g mol^{-1} c) 12.47 g mol^{-1} d) 30 g mol^{-1}

248. The second-order Bragg diffraction of X-rays with 1.0 Å from a set of parallel planes in a metal occurs at an angle 60°. The distance between the scattering planes in the crystals is:
a) 0.575 Å b) 1.00 Å c) 2.00 Å d) 1.17 Å

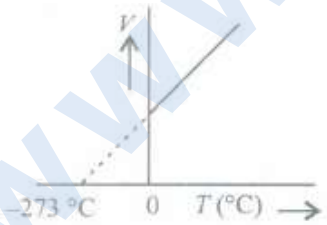
249. 0.5 mole each of H_2, SO_2 and CH_4 are kept in a container. A hole was made in the container. After 3 hours the order of partial pressures in the container will be
a) $P_{SO_2} > P_{CH_4} > P_{H_2}$ b) $P_{CH_4} > P_{SO_2} > P_{H_2}$ c) $P_{H_2} > P_{SO_2} > P_{CH_4}$
d) $P_{H_2} > P_{CH_4} > P_{SO_2}$

250. Equal masses of H_2, O_2 and methane have been taken in a container of volume V at temperature 27°C in identical conditions. The rational of the volume of gases H_2 : O_2 : CH_4 would be :
a) 8: 16: 1 b) 16: 8: 1 c) 16: 1: 2 d) 8: 1: 2

251. The drain cleaner, Drainex contains small bits of aluminium which react with caustic soda to produce dihydrogen. What volume of dihydrogen at 20°C and one bar will be released when 0.15 g of aluminium reacts?
a) 204 mL b) 200 mL c) 203 mL d) 400 mL

252. In a ten litre vessel, the total pressure of a gaseous mixture containing H_2, N_2 and CO_2 is 9.8 atm. The partial pressure of H_2 and N_2 are 3.7 and 4.2 atm respectively. Then the partial pressure of CO_2 is:
a) 1.9 atm b) 0.19 atm c) 2.4 atm d) 0.019 atm

253. If we plot volume of a certain mass of a gas against temperature at constant pressure, we get a straight line intersecting on the negative side at -273°C which explains about absolute zero. This graph is known as



a) isochor b) isotherm c) isotone d) isobar

254. The graph of viscosity coefficient (η) and absolute temperature (T) is_____
a) Straight line passing through origin b) Straight line parallel to temperature axis
c) Straight line with (+)ve slope d) Exponential graph

255. When the temperature of a gas is raised from 27°C to 927°C, its RMS velocity
a) gets halved b) get doubled c) remains same d) becomes $\sqrt{\frac{927}{27}}$ times

256. When is the deviation more in the behaviour of a gas from the ideal gas equation pV = nRT?

a) At high temperature and low pressure b) At low temperature and high pressure

c) At high temperature and high pressure d) At low temperature and low pressure

257. The relations between various variables of gaseous substances are given along with their formulae. Mark the incorrect relationship.

a) Density and molar mass $M = \frac{dRT}{P}$ b) Universal gas constant,P,V,T:R= $\frac{PV}{nT}$

c) Volume and pressure:V_2= $\frac{P_2V_1}{P_1}$ d) Volume and temperature:V2= $\frac{V_1T_2}{T_1}$

258. A person living in Shimla observed that cooking food without using pressure cooker takes more time.The reason for this observation is that at high altitude

a) pressure increases b) temperature decreases c) pressure decreases

d) temperature increases.

259. At Boyle temperature:

a)

the effects of the repulsive and atractive intermolecular forces just cancelled each other

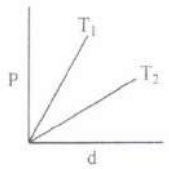
b)

the repulsive intermolecular forces are greater than the attractive intermolecular forces

c) the repulsive intermolecular forces are less than the attractive intermolecular forces

d) $b - \frac{a}{RT} > 0$

260. Diagram shows a graph between pressure and den ity for an ideal gas at two temperatures T_I and T_2 which is correct



a) $T_1 > T_2$ b) $T = T_2$ c) $T_I < T_2$ d) None

261. Select incorrect statement(s) :

a)

Volume correction is due to finite size of molecules and pressurecorrection is due to force of attraction between molecules

b)

At high temperatures, molecules have greater kinetic energy, and attractive forces are smaller and the behaviour of gases is close to the ideal gas behaviour

c)

Volume correction is also called covolume 01' excluded volume and is four times the volume of spherical molecules present in one mole of the gas

d)

At very low pressure, force of attraction is effective and pressure correction needs further resolution

262. If V is molar volume of gas and gas obey van der Waal's equation, the intercept of the plot PV (y-axis) vs. P (x-axis) is :

a) RT b) -RT c) $a + \frac{RT}{V}$ d) nRT

263. Most crystals show good cleavage because their atoms, ions or molecules are
a) weakly bonded together b) strongly bonded together c) spherically symmetrical
d) arranged in planes

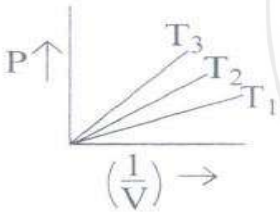
264. A gaseous mixture containing 0.35g of N_2 and 5600 ml of O_2 at STP is kept in a 5 litres flask at 300K. The total pressure of the gaseous mixture is:
a) 1.293 atm b) 1.2315 atm c) 12.315 atm d) 0.616 atm

265. 2 grams of Helium diffuses from a porous plate in 4min. How many grams of CH_4 would diffuse through the same plate in same time under similar conditions?
a) 4g b) 16g c) 8g d) 2g

266. At constant volume, for a fixed number of moles of a gas, the pressure of the gas increases with a rice in temperature, due to
a) increases in average molecular speed
b) decreased number of collisions amongst molecules
c) increase in molecular attractions d) decrease in mean free path

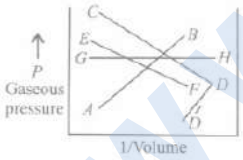
267. The total pressure of a mixture of 6.4 grams of oxygen and 5.6 grams of nitrogen present in a 2 lit vessel is 1200mm. What is the partial pressure of nitrogen in mm?
a) 1200 b) 600 c) 900 d) 200

268. The volume-temperature graphs of a given mass of an ideal gas at constant pressures are shown below. What is the correct order of pressures?



a) $P_1 > P_3 > P_2$ b) $P_1 > P_2 > P_3$ c) $P_2 > P_3 > P_1$ d) $P_2 > P_1 > P_3$

269. Which one of the given pressure versus volume plots represents Boyle's law?



a) Line AB b) Line CD c) Line EF d) Line GH

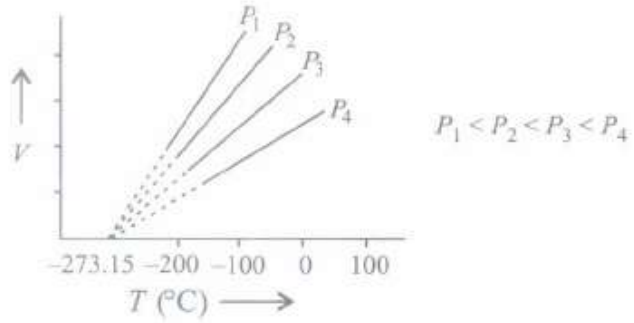
270. At any particular time, different particles in the gas
a) have same speed and kinetic energy
b) have same speed but different kinetic energies
c) have different speeds but same kinetic energy
d) have different speeds and hence different kinetic energies.

271. Under what conditions gases generally deviate from ideal behaviour?
a) At high temperature and low pressure b) At low temperature and high pressure
c) At high temperature and high pressure d) At low temperature and low pressure

272. The compressibility factor for N_2 at 223 K and 81.06 MPa is 1.95, and at 373 K and 20.265 MPa, it is 1.10. A certain mass of N_2 occupies a volume of 1.0 dm^3 at 223 K and 81.06 MPa. What is the volume occupied by the same quantity of N_2 at 373 K and 20.265 MPa?

a) 3.774 dm^3 b) 2.77 dm^3 c) 5.07 dm^3 d) 9.30 dm^3

273. Study the following graph and mark the incorrect statement following it.



a)

At zero volume all lines meet at -273.15 °C. This temperature is known as absolute zero.

b)

Each line of the volume vs temperature at constant pressure of graph is called isotherm.

c) All gases obey Charles' law at very low pressure and high temperature.

d)

Pressure remaining constant, volume of a gas is directly proportional to its absolute temperature.

274. The ratio of the kinetic energies of equal number of moles of H_2 and He at the same temperature is

a) 1 : 2 b) 2 : 1 c) 1 : 1 d) 4 : 1

275. In two vessels of 1 litre each at the same temperature 1 g of H_2 and 1 g of CH_4 are taken, for these

a) V_{rms} values will be same b) Kinetic energy per mol will be same

c) Total kinetic energy will same d) Pressure will be same

276. Which of the following relationships between partial pressure, volume and temperature is correct?

(i) $P = \frac{nRT}{V}$

(ii) $P_{total} = P_1 + P_2 + P_3$

(iii) $P_{total} = (n_1 + n_2 + n_3)\frac{RT}{V}$

a) (i) and (ii) b) (i) and (iii) c) (ii) and (iii) d) (i), (ii) and (iii)

277. R.M.S velecity of helium at S.T.P is x em/sec. R.M.S velocity of helium at 273 K and 4 atm is

a) 4x cm/ sec b) 3x cm/sec c) 2x cm/sec d) x cm/sec

278. Which of the following is not a correct expression regarding the units of coefficient of viscosity?

a) dyne cm^{-2} s b) dyne cm^2 S^{-1} c) N m^{-2} s d) Pa s

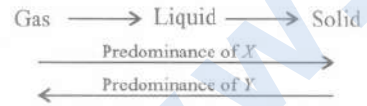
279. Poise stands for:
a) 1 dynes cm sec^{-2} b) 1 dyne sec cm^{-2} c) 10^{18} e.s.u-cm d) 10^{-7} erg sec

280. The unit of a in van der Waals equation,
$\left(p + \frac{an^2}{V^2}\right)(V - nb) = nRT$ is
a) atm L^2 mol^{-2} b) atm L mol^{-2} c) atm L mol^{-1} d) atm L^2 mol^{-1}

281. Assertion: At constant temperature PV vs P plot for real gases is not a straight line
Reason: In the curves of dihydrogen and helium, as the pressure increases the value of PV also increases
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

282. Assertion: Liquids and solids are hard to compress.
Reason: Magnitude of the repulsive forces between the molecules rises very rapidly as the distance separating the molecules decreases.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

283. What is the relationship between thermal energy and intermolecular interaction energy of a substance in three states in terms of X and Y?



a) X-Thermal energy, Y-Intermolecular interactions
b) X- Thermal energy, Y- Thermal energy
c) X-Intermolecular interactions, Y-Thermal energy
d) X-Intermolecular interactions, Y- Intermolecular interactions

284. Which of the following has highest surface tension?
a) Water b) Soap solution in water c) Detergent solution in water
d) Glycerol in water

285. Two glass bulbs A and B are connected by very small tube having a stop cock. Bulb A has a volume of 100 ml and contained a gas while bulb B is empty and has a volume of 150 ml. On opening the stop cock, the pressure of the gas in bulb A will fall down to
a) 80% b) 60% c) 40% d) 20%

286. Under critical states of a gas for one mole of a gas, compressibility factor is:

a) $\frac{3}{8}$ b) $\frac{8}{3}$ c) 1 d) $\frac{1}{4}$

287. The pressure required to liquefy a gas at the critical temperature is called:
a) reduced pressure b) critical pressure c) vapour pressure
d) atmospheric pressure

288. The correct formula for reduced pressure and reduced volume are
a) $P.P_C, N.V_C$ b) $\frac{P}{P_C}, \frac{V}{V_C}$ c) $\frac{P_C}{P}, \frac{V_C}{V}$ d) P_C, V_C

289. A pure crystalline substance on being heated gradually first forms a turbid liquid at constant temperature and still at higher temperature turbidity completely disappears. The behaviour is a characteristic of substance forming:
a) allotropic crystals b) liquid crystals c) isomeric crystals d) isomorphous crystals

290. If 4 moles of an ideal gas at 300 K occupy volume of 89.6 L, then pressure of the gas will be
a) 2 atm b) 1 atm c) 1.099 atm d) 2.910 atm

291. Which of the following phenomena does not involve surface tension?
a) Mercury drops acquire spherical shape. b) Liquids tend to rise in the capillary.
c) A liquid flows over a fixed surface d) Moist soil grains are pulled together

292. When sodium metal is dropped in liquid NH_3 it forms Na^+ and gets ammoniated. Which of the following forces are responsible for the formation of ammoniated sodium ion.
a) Ion - induced dipole b) Dipole - dipole c) Ion - dipole d) Dipole - induced dipole

293. Which of the following relations regarding molecular velocities are true?
a) Most probable velocity = 0.8166 x RMS velocity
b) RMS velocity = 0.9213 x Average velocity
c) Average velocity= $\sqrt{\frac{8RT}{\pi m}}$
d) $C_P > \bar{C} > C$
a) b, c b) a, d c) c, d d) a, c

294. At 21.50 C decrease in volume(B-C) doesn't result into increase in pressure because
a) The compression causes increase in solidification
b) At point B only all gases convert into solid
c) The compression causes further increase in condensation
d) Carbon dioxide is real gas

295. The interaction energy of London force is inversely proportional to sixth power of the distance between two interacting particles but their magnitude depends upon:
a) charge of interacting particles b) mass of interacting particles
c) polaris ability of interacting particles
d) strength of permanent dipoles in the particles.

296. The kinetic energy of 'N' molecules of H_2 is 3J at -73°C. The kinetic energy of the same sample of H_2 at 127°C is:

a) 12 J b) 6 J c) 9 J d) 3 J

297. A liquid can exist only
a) between triple point and critical point b) at any temperature above melting point
c) between melting point and critical point d) between boiling and melting points

298. The vapour density of a gas is 11.2. The volume occupied by 10g of the gas at STP is
a) 10 L b) 1 L c) 11.2 L d) 5.6 L

299. Equal moles of hydrogen and oxygen gases are placed in a container with a pin-hole through which both can escape. What fraction of the oxygen escapes' in the time required for one-half of the hydrogen to escape?
a) $\frac{3}{8}$ b) $\frac{1}{2}$ c) $\frac{1}{8}$ d) $\frac{1}{4}$

300. The values of critical volumes of four gases A, B, C and D are 0.025 L, 0.312L, 0.245L and 0.432 L respectively. The gas with larger molecular diameter will be
a) A b) D c) B d) C

301. R.M.S velocity of ethane molecules when one mole of ethane is present in 10 litre vessel at 10 arm is:
a) 10^2 cm/ sec b) 10^3 cm/ sec c) 10^4 cm/ sec d) 10^5 cm/ sec

302. At 127°C, for helium, if time of flight is 0.1 nanosec, the mean free path of helium (in A) is
a) 15.8 b) 158 c) 1580 d) 158000

303. Which of the following is NOT a postulate of the kinetic molecular theory of gases?
a) The molecules possess a volume that is negligibly samll compared 0 the container
b) The pressue and volume of a gas are inversely related
c) Gases consist of discrete particles that are in constant chaotic motion
d)
The average kinetic energy of the molecules is directly proportional to the temperature

304. NH_3 gas is liquified more easily than N_2. Hence
a) Vander Waal's constant a and b of NH_3 > that of N_2
b) Vander Walal's constant a and b of NH_3 < that of N_2
c) a(NH_3) > a (N_2) but b (NH_3) < b (N_2) d) a (NH_3) < a (N_2) but b (NH_3) > b (N_2)

305. Weight of CO_2 in a 10 L cylinder at 5 atm and 27°C is
a) 200 g b) 224 g c) 44 g d) 89.3 g

306. Assertion : The normal boiling point of water is 100°C and standard boiling point of water is 99.6°C,
Reason: The temperature at which vapour pressure of liquid is equal to the external pressure is called boiling temperature at that pressure.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

307. If n represents number of moles, n_0 is number of molecules per unit volume, k is Boltzmann constant, R is molar gas constant, T is absolute temperature and N_A is Avogadro's number then which of the following relations is wrong?

a) $P=n_0kT$ b) $P=n_0RT$ c) $P = \frac{nKN_AT}{V}$ d) $n_0 = N_a = \frac{n}{V}$

308. It is easier to liquefy ammonia than oxygen because

a) it is easier to compress oxygen than NH_3

b) NH_3 has a very low critical temperature as compared to O_2

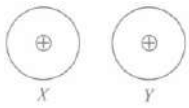
c)

O_2 has a higher value of van der Waals constant a and higher critical temperature than NH_3

d)

NH_3 has a higher value of van der Waals constant a and higher critical temperature than oxygen.

309. Two atoms X and Y are non-polar and elctrically symmetrical.



What type of intermolecular forces of attraction can be developed between them?

a) Dipole-induced dipole forces b) London forces or dispersion forces

c) Dipole-dipole forces d) No forces of any kind.

310. The beans are cooked earlier in pressure cooker, because:

a) B.P. increase with increasing pressure b) B.P. decrase with increasing pressure

c) Extra pressure of pressure cooker, softens the beans

d) Internal energy is not lost while cooking is pressure cooker

311. At constant temperature, in a given mass of ideal gas:

a) The ratio of pressure and volume always remains constant

b) Volume always remains constant c) Pressure always remains constant

d) The product of pressure and volume always remains constant

312. What is SI unit of viscosity coefficient (η)?

a) pascal b) N s m^{-2} c) km^{-2} s d) N m^{-2}

313. Assertion: Windowpanes of old buildings become thicker at the bottom than at the top.
Reason: Glass is an extremely viscous liquid

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

314. Vapour pressure of a liquid increases with

a) decrease in temperature b) increase in temperature c) increase in surface area

d) increase in volume

315. If CP; $\bar{C}$ and C of CO_2 gas are equal at T_1, T_2 and T_3 temperatures then
a) $T_1<T_2<T_3$ b) $T_1>T_2>T_3$ c) $T_3>T_1>T_2$ d) $T_1=T_2=T_3$

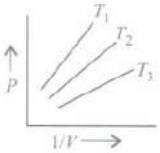
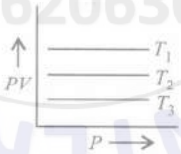
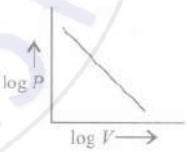
316. A gas of volume 2000ml is kept in a vessel at a pressure of 10^3 pascals at a temperature of 27^{a}C.· If the pressure is increased to 10^5; pascals at the same temperature, the volume of the gas becomes
a) 1000ml b) 20ml c) 2ml d) 200ml

317. According to Avogadro's law the correct statements are
a) Volume of gas is proportional to the no. of moles at constant T and P
b) The pressure of a gas is directly proportional to temp. of the gas under all conditions
c) Equal volumes of different gases under similar conditions consist of equal no. of molecules
d) Equal volumes of different gases under same conditions have equal no. of atoms
a) b,c b) a,c c) d,p d) c,d

318. Volume of a molecule is related to Vander Waal's constant 'b' and Avagadro Number 'No' by the equation:
a) $V = \frac{b}{N_0}$ b) V = 4bN$_o$ c) $V = \frac{4b}{N_O}$ d) $V = \frac{b}{4N_O}$

319. Select one correct statement. In the gas equation pV = nRT
a) n is the number of molecules of a gas b) V denotes volume of one mole of the gas
c) n moles of the gas have a volume V
d) p is the pressure of the gas when only one mole of the gas is present

320. Graphs between pressure and volume are plotted at different temperatures. Which of the following isotherms represents Boyle's law as PV=constant?

(i)  (ii) (iii)  (iv) 

a) Only (ii) is correct representation of Boyle's law
b) Only (iv) is correct representation of Boyle's law
c) All are correct representations of Boyle's law
d) None of these representations is correct for Boyle's law

321. Pick out the wrong statement(s).
(i) Vapour pressure of a liquid is the measure of the strength of intermolecular attractive forces.
(ii) Surface tension of a liquid acts perpendicular to the surface of the liquid.
(iii) Vapour pressure of all liquids is same at their freezing points
(iv) Liquids with stronger intermolecular attractive forces are more viscous than those with weaker intermolecular force.
a) (ii), (iii) and (iv) b) (ii) and (iii) c) (i), (ii) and (iii) d) (iii) only

322. A gas that follows Boyle's law, Charles' law and Avogadro's law is called an ideal gas. Under what conditions a real gas behaves as ideal gas?

a) Under low pressure and temperature b) Under high pressure and temperature
c) Under high pressure and low temperature
d) Under low pressure and high temperature

323. Representing P, V and T as pressure, volume and temperature respectively, which of the following is the correct representation of Boyle's law?
a) $V \propto \frac{1}{T}$ (P constant) b) $V \propto \frac{1}{P}$ (T constant) c) PV=RT d) PV=nRT

324. The compressibility factor for N_2 at -50DC and 800 atm pressure is 1.95. Number of moles of N_2 required to fill a balloon of 100 L capacity is
a) $2.244X10^3$ b) $2.24X10^2$ c) 2.244 d) 22.44

325. F_2 is gas I_2 is solid because.
a) Larger london forces are present in I_2 when compared to F_2
b) Lesser number of london forces are present in I_2 when compared to F_2
c) F_2 and I_2 has same extent of london forces d) I_2 has low bond dissociation energy

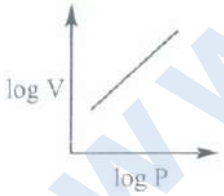
326. When electrons are trapped into the crystalline anion vacancy, the defect is known as
a) Schottky defect b) Stoichiometric defect c) Frenkel defect d) F-centres

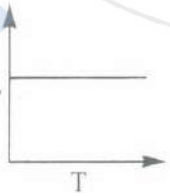
327. Absolute zero can be defined as the temperature at which:
a) pressure becomes zero b) volume becomes zero c) mass becomes zero
d) density becomes zero.

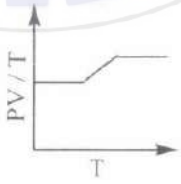
328. A flask of capacity 2 L is heated from 35°C to 45°C. What volume of air will escape from the flask?
a) 10 mL b) 20 mL c) 60 mL d) 50 mL

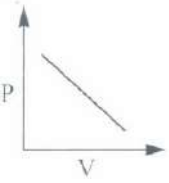
329. A mixture contains 16g of oxygen. 2Rg or nitrogen and 8g of methane. Total pressure of the mixture is 740mm. What is the partial pressure of nitrogen in mm?
a) 185 mm b) 370 mm c) 555 mm d) 740 mm

330. Which among the following indicates change in the chemical composition due to dissoctation

a) 

b) 

c) 

d) 

331. If the molecules of SO_2 effuse a distance of 150 cm in a certain period 0 f time, the distance travelled by the molecules of CH_4 effusing in the same time is:
a) 300 cm b) 600 cm c) 37.5 cm d) 75 cm

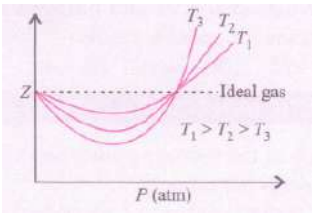
332. In the corrections made to ideal gas equation for real gases, the reductions in pressure due to forces of attractions between the molecules is directly proportional to
a) $\frac{n}{V}$ b) $\frac{n^2}{V^2}$ c) V-nb d) nb

333. Cyclopropane and oxygen at partial pressure 170 torr and 570 torr are mixed in a gas cylinder. What is the ratio of the number of moles of cyclopropane to the number of moles of oxygen?
a) $\frac{170\times42}{570\times32} = 0.39$ b) $\frac{170}{42} / \left(\frac{170}{42} + \frac{570}{32}\right) \approx 0.19$ c) $\frac{170}{140}$=0.23 d) $\frac{170}{570}$=0.30

334. Which of the following values does not represent the correct value of R
a) 8.314 Pa m^3 K^{-1} mol^{-1} b) 8.314 x 10^{-2} bar L K^{-1} mol^{-1} c) 0.0821 J K^{-1} mol^{-1}
d) 8.314 J K^{-1} $rnol^{-1}$

335. A gas deviates from ideal behaviour at a high pressure because its molecules
a) have kinetic energy b) are bound by covalent bonds c) attract one another
d) show the Tyndall effect

336. Boyle's temperature or Boyle point is the temperature at which a real gas starts behaving like an ideal gas over a particular range of pressure. A graph is plotted between compressibility factor Z and pressure P.



What is the deviation of real gas from ideal behaviour in terms of compressibility factor, Z?
a)
As the temperature increases, Z approaches a value close to one and gas starts behaving ideally.
b) Z continuously decreases with increase in pressure.
c) Z continuously increases with increase in pressure.
d) At high pressure, every gas has value Z =l.

337. Atmospheric pressures recorded in different cities are as follows:

Cities	Shimla	Bangalore	Delhi	Mumbai
pinN/m^2	1.01x10^5	1.2x10^5	1.02x10^5	1.21x10^5

Consider the above data and mark the place at which liquid will boil first.
a) Shimla b) Bangalore c) Delhi d) Mumbai

338. Assertion: Molar volume of an ideal gas at 273.15 K and 1 bar is 22.4 L.
Reason: Volume of a gas is inversely proportional to temperature
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

339. If a gas expands at constant temperature, it indicates that:
a) Kinetic energy of molecules decreases b) Pressure of the gas increases
c) Kinetic energy of molecules remains the same
d) Number of the molecules of gas increases

340. Assertion: The lowest hypothetical or imaginary temperature at which gases are supposed to occupy zero volume is called absolute zero.
Reason: Volume of the gas at -273.15°C becomes zero i.e. gas does not exist at this

temperature.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

341. If for two gases of molecular weights M_A and M_B at temperature T_A and T_B, respectively, $T_AM_B = T_BM_A$, then which property has the same magnitude for both the gases?
a) PV if mass of gases taken are same b) pressure c) KE per mol d) V_{rms}

342. Assertion: Compressibility factor (Z) is the ratio of actual molar volume of a gas to the molar volume of it, if it were an ideal gas at that temperature and pressure.
Reason: At high pressure all the gases have Z < 1 and can be easily compressed.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

343. Which has the maximum viscosity?
a) Water b) Glycol c) Acetone d) Ethanol

344. Molecular mass of a gas is 78. Its density at 98°C and 1 atm will be
a) $200gL^{-1}$ b) $2.56gL^{-1}$ c) $256gL^{-1}$ d) $78gL^{-1}$

345. The correct statements regarding kinetic molecular theory are
a) The distance between the molecules is high compared to size of the gaseous molecules
b) The motion of the gaseous molecules are affected by gravitational force
c) The attractive forces between the gaseous molecules are very high.
d) The total K.E of a sample of gaseous molecules remains constant at a given temperature
a) b, d b) b, c c) a, d d) c, d

346. Let u_{av}' u_{rms} and u_{mp} are average, root means square and most probable speed of the rnolculcs in an ideal mono atomic gas at absolute temperature T. The mass of molecule is m, then:
a) none of the moelcules can have a speed greater than $\sqrt{2}u_{rms}$
b) none of the molecules can have a speed less than $\sqrt{2}u_{mp}$ c) $u_{av} < u_{rms} < u_{mp}$
d) the average kinetic energy of molecule is $\frac{3}{4}mu_{mp}^2$

347. The unit of surface tension is
a) dynes cm^{-2} b) ergs/cm c) joules m^{-1} d) $N.m^{-1}$

348. At which one of the following conditions a boundary between a liquid and its vapour disappears

a) When liquid in a open vessel heated to its critical temperature

b) When liquid in a open vessel heated to its boiling point

c) When liquid in a closed vessel at temperature less than critical temperature

d) When a liquid in a closed vessel heated to its critical temperature

349. The correction factor 'a' to the ideal gas equation corresponds to :

a) Electric field present between the gas molecules b) Volume of the gas molecules

c) Density of the gas molecules d) Forces of attraction between the gas molecules

350. At Boyle's temperature, compressibility factor Z for a real gas is

a) 1 b) 0 c) > 1 d) < 1

351. The gas that is heated up during Joule Thomson effect at ordinary temperture is

a) O_2 b) CO_2 c) H_2 d) SO_2

352. Which is/are correct for real gases?

a) $\underset{P\to 0}{Lt}\,(PV_m)$ = constant at constant high temperature

b) $\underset{V_m\to 0}{Lt}\,(PV_m)$ = constant at constant low temperature

c) As the temperature is reduced, the pressure decreases

d) A point is reached where, theoretically, the volume becomes zero

353. The molecules of a gas are in constant _____ (i) _____motion. They move in _____ (ii) _____ lines until they collide with another molecule. The collisions are perfectly _____ (iii) _____ in nature. A real gas behaves as an ideal gas at _____ (iv) _____ temperature and _____ (v) _____ pressure.

a)

(i)	(ii)	(iii)	(iv)	(v)
random	vertical	straight	high	low

b)

(i)	(ii)	(iii)	(iv)	(v)
straight	random	elastic	low	high

c)

(i)	(ii)	(iii)	(iv)	(v)
random	straight	elastic	high	low

d)

(i)	(ii)	(iii)	(iv)	(v)
ideal	round	elastic	low	high

354. What is the effect on chemical properties and physical properties of water when temperature is changed?

a)

Chemical properties of water remain same but the physical state changes with change in temperature.

b)

Chemical properties of water change with change in temperature but physical properties remain same.

c)

There is no effect on chemical or physical properties of water when temperature is changed

d) Both chemical and physical properties of water change with change in temperature

355. Two samples of gases 'a' and 'b ' are at the same temperature. The molecules of 'a' are travelling 4 times faster than molecules of 'b '. The ratio of M_a/M_b will be
a) 1/4 b) 16/1 c) 4/1 d) 1/16

356. What are the most favourable conditions to liquefy a gas?
a) High temperature and high pressure b) Low temperature and high pressure
c) Low temperature and low pressure d) High temperature and low pressure

357. What is the density of N_2 gas at 227°C and 5.00 atm pressure? (R = 0.0821 atm K^{-l} mol^{-l}):
a) 0.29 g/ml b) 1.40 g/ml c) 2.81 g/ml d) 3.41 g/ml

358. The correct expression of partial pressure in terms of mole fraction is
a) $P_1 = X_1P_{total}$, $P_2 = X_2P_{total}$ b) $P = X_1X_2\ P_{total}$ c) $P_{total} = P_1X_1$, $P_{total} = P_2X_2$
d) $P_1 + P_2 = X_1 + X_2$

359. Which of the following indicates Kinetic gas equation?
a) $PV = \frac{3M}{C^2}$
b) $PV = \frac{1}{3}mnC^2$
c) $P = \frac{1}{2}dc^2$
d) $KE = \frac{3}{2}RT$
a) a, c b) b, d c) a, b d) b, c

360. Dipole-dipole forces act between the molecules possessing permanent dipole. Ends of dipoles possess partial charges: The partial charge is
a) more than unit electronic charge b) equal to unit electronic charge
c) less than unit electronic charge d) double the unit electronic charge

361. An open vessel at 27°C is heated until three-fourths mass of the air in it has been expelled. Neglecting the expansion of the vessel, the temperature to which the vessel the temperature to which the vessel has been heated is
a) 927°C b) 108°C c) 1000°C d) 477°C

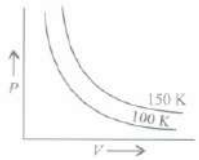
362. In a gaseous mixture at 4 atm pressure, 25°% of molecules are Nitrogen, 40% of molecules ar carbon dioxide and the rest are oxygen The partial pressure of oxygen in the mixture is
a) 1.40 atm b) 1.6 atm c) 1 atm d) 0.9 atm

363. In deriving the kinetic gas equation, use is made of the root mean square velocity of the molecules because it is
a) the average velocity of the molecules
b) the most probable velocity of the molecules
c) the square root of the average square velocity of the molecules
d) the most accurate form in which velocity can be used in these calculations

364. The kinetic energy of 1 mole of oxygen molecules in cal mol' at 27°C
a) 300 b) 600 c) 900 d) 800

365. For an ideal gas, a number of moles per litre in terms of its pressure, P, gas constant R temperature T is:
a) PT/R b) P/RT c) PRT d) RT/P

366. A graph is plotted between pressure and volume at different temperatures. On the basis of the graph what changes will you observe in the volume if
(i) the pressure is increased at constant temperature.
(ii) the temperature is decreased at constant pressure.



a) volume increases in both the cases b) volume decreases in both the cases
c) volume increases in (i) and decreases in (ii)
d) volume decreases in (i) and increases in (ii),

367. 44g of CO_2 gas is present in 10 litre vessel at TK. The pressure exerted by CO_2 is how many torrs less than the pressure exerted by ideal gas (a = 3.6 lt^2 atm. $mole^2$, b = 0.043 lt/mol).
a) 0.036 b) 27.4 c) 0.36 d) 274

368. Assertion : On cooling, ammonia liquifies first where as CO_2 requires more cooling.
Reason : Critical temperatures of ammonia and carbon dioxide are 405.5 K and 304.10 K respectively
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If assertion is true but reason is false.

369. An open flask has Helium gas at 2 atm and 327° C. The flask is heated to 527°C the same pressure. The fraction of original gas remaining in the flask is:
a) 3/4 b) 1/4 c) 1/2 d) 2/5

370. The critical temperature of a substance is defined as:
a) the temperature above which the substance decomposses
b) the temperature above which a substance can exist only as a gas
c) melting point of the substance d) boiling point of the substance

371. The approximate energy required to break. $^+AB^-$ type ionic crystal into its ions is in the range of
a) 10 to 100 kJ/mole b) 500 to 1000 kJ/mole c) 50 to 150 kJ/mole
d) 2 to 50 kJ/mole

372. Assuming the molecules of gas as hard spheres of radius 2.0 x 10^{-10} m the fraction of volume occupied by the molecules to the total volume of a given amount of gas at 27°C and at 1 bar pressure and 10 bar pressure respectively are:
a) 99.9%, 99% b) 0.082%, 0.82% c) 99%, 90% d) 11%, 10%

373. Volume of a given mass of gas at 17°C is measured as 200 cm^3. The volume of the same mass of gas at same pressure and a temperature of 47°C will be:
a) 77.5 cm^3 b) 13.45 cm^3 c) 220.6 cm^3 d) 320 cm^3

374. A and B are ideal gases. The molecular weights of A and B are in the ratio of 1 : 4. The pressure 0 a gas mixture containing equal weights of A and B is P atm. What is the partial pressure (in atm) 0 B in the mixture?
a) P/5 b) P/2 c) P/2.5 d) 3P/4

375. The temperature of the gas is raised from 27°C to 927°C the root mean square Velocity is
a) $\sqrt{\frac{927}{27}}$ times of the earlier value b) same as before c) halved d) doubled

376. Collision frequency (Z) of a gas at a particular pressure:
a) decreases with the rise in temperature b) increases with the rise in temperature
c) decreases intial1y and thereafter increases d) unpredictable.

377. Which of the following properties of water can be used to explain the spherical shape of rain droplets?
a) Viscosity b) Surface tension c) Critical phenomena d) Pressure

378. At 25°C and 730 mm pressure, 380 mL of dry oxygen was collected. If the temperature is constant, what volume will the oxygen occupy at 760 mm pressure?
a) 365 mL b) 2 mL c) 10 mL d) 20 mL

RAVI MATHS TUITION CENTRE , WHATSAPP - 8056206308

Time : 1 Mins **SURFACE CHEMISTRY 1** **Marks : 692**

1. Which of the following is less than zero during adsorption?
   a) △G b) △S c) △H d) All of these
2. The coagulation value in millimoles per liter of the electrolytes used for the coagulation of As_2S_3 are given below:
   I. (NaCl) = 52
   II. ($BaCl_2$) = 0.69
   III. ($MgSO_4$) = 0.22
   The correct order of their coagulating power is
   a) I > II > III b) II > I > III c) III > II > I d) III > I > II
3. Which of the following forms cationic micelles above certain concentration?
   a) Sodium dodecyl sulphate b) Sodium acetate c) Urea
   d) Cetyl timethyl ammonium bromide
4. The values of colligative properties of colloidal solution are of small order in comparison to those shown by true solutions of same concentration because of colloidal particles
   a) exhibit enormous surface area b) remain suspended in the dispersion medium
   c) form lyophilic colloids d) are comparatively less in number
5. Which of the following processes does not occur at the interface of phases?
   a) Crystallisation b) Heterogeneous catalysis c) Homogeneous catalysis
   d) Corrosion
6. Why is gelatin mixed with gold sol?
   a) Gold sol is lyophobic sol, gelatin acts as stabilising agent.
   b) Gold sol is lyophilic sol, gelatin acts as stabilising agent.
   c) Gelatin produces negative charge on gold particles in gold sol.
   d) Gelatin helps gold sol to get its critical micelle concentration.
7. **Assertion:** Physical adsorption increases with increase in temperature.
   Reason: Physical adsorption is an endothermic process.
   a)
   If both assertion and reason are true and reason is the correct explanation of assertion.
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion.
   c) If assertion is true but reason is false. d) If both assertion and reason are false.
8. According to the adsorption theory of catalysis, the speed of the reaction increases because

a) Adsorption lowers the activation energy of the reaction

b)

The concentration of reactant molecules at the active centres of the catalyst becomes high due to strong adsorption

c) In the process of adsorption, the activation energy of the molecules becomes large.

d) Adsorption produces heat which increase the speed of the reaction

9. Shape-selective catalysis is a reaction catalysed by

a) zeolites b) enzymes c) platinum d) Ziegler- Natta catalyst

10. Which of the following is not the correct difference between lyophobic and lyophilic sols?

a)

Lyophobic sols	Lyophilic sols
Require special methods for preparation	Can be prepared by shaking with the solvent

b)

Lyophobic sols	Lyophilic sols
Are reversible	Are irreversible

c)

Lyophobic sols	Lyophilic sols
Easily coagulated by electrolytes	coagulated

d)

Lyophobic sols	Lyophilic sols
Are less stable	Are more stable

11. At high concentration of soap in water, soap behaves as _____

a) molecular colloid b) associated colloid c) macromolecular colloid

d) lyophilic colloid

12. $Fe(OH)_3$ sol can be more easily coagulated by Na_3PO_4 in comparison to KCl because

a) mass of Na_3PO_4 is more than KCl hence it is more effective than KCl

b)

phosphate ion (PO^{3-}_4) has higher negative charge than Cl ion hence are more effective for coagulation

c) KCl is more soluble than Na_3PO_4 hence less effective for coagulation

d) Na+ ions are more effective than K+ ions for coagulation

13. **Assertion:** Solids in finely divided state act as good adsorbents.

Reason: Adsorption is a surface phenomenon.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

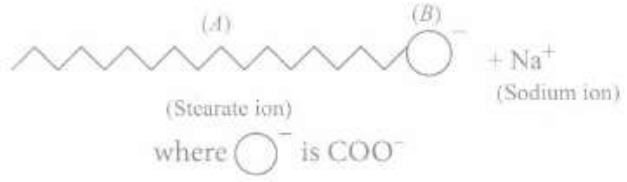
14. Fill in the blanks by putting appropriate choices:

During adsorption there is _____ in enthalpy and _____ in the entropy of a system but adsorption is a spontaneous process and thus II G must be_____ .Rate of physisorption _____ with increase in pressure.

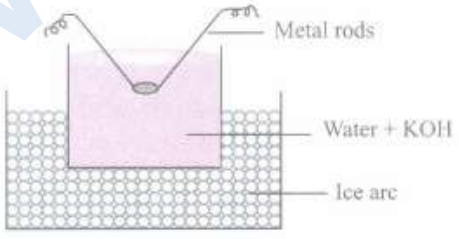
a) decrease, decrease, negative, increases b) increase, increase, positive, decreases

c) decrease, increase, negative, decreases d) increase, decrease, positive, increases

15. Which of the following statements is/are correct regarding stability of sol?
    (i) Lyophilic sols are stabilised due to a layer of solvent around sol particles.
    (ii) Lyophobic sols are stabilised due to presence of charge.
    (iii) Addition of lyophilic brings in more stability to lyophobic.
    (iv) Addition of lyophobic brings in more stability to lyophobic.
    a) (ii) only b) (i) and (iv) only c) (i), (ii) and (iii) only d) All of these.
16. In the given figure label the parts.



    a) A - Hydrophilic tail, B - hydrophobic head
    b) A - Hydrophobic tail, B - hydrophobic head
    c) A - Hydrophobic tail, B - hydrophilic head d) A - Hydrophilic tail, B - hydrophilic head
17. Tyndall effect is not observed in
    a) smoke b) emulsions c) sugar solution d) gold sol.
18. **Assertion:** Lyophilic colloids have a unique property of protecting lyophobic colloids.
    Reason: Lyophilic colloids are extensively solved.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false
19. Which of the following is not a favourable condition for physical adsorption?
    a) High pressure b) Negative $\triangle H$ c) Higher critical temperature of adsorbate
    d) High temperature
20. Some medicines are more effective in the colloidal form because of
    a) the charged colloidal particles present in it
    b) the large surface area and easy assimilation
    c) precipitation of medicine in the blood
    d) the stabilisation of medicine in colloidal form
21. In Bredig's arc method an electric arc is struck between the metal electrodes under the surface of water containing some stabilizing agent. The process involves



    a) mechanical dispersion b) condensation c) both dispersion and condensation
    d) ultrasonic dispersion.
22. Which of the following statements is correct about solid catalysts?

a) Catalyst is required in equal amount as the reactants present in the reaction.

b)

Catalytic activity of a solid catalyst does not depend upon the extent of chemisorption.

c) Desorption is not important for a solid to act as good catalyst.

d) Same reactants may give different products by using different catalysts.

23. Movement of dispersion medium under the influence of electric field is known as

a) electrodialysis b) electrophoresis c) electroosmosis d) cataphoresis.

24. The term activation of adsorbent is used when

a)

adsorbing power is increased by increasing surface area by making the surface rough

b) adsorbing power is increased by dipping the surface in acid to make it smooth

c) adsorbing power is increased by dissolving it in water

d) adsorbing power is decreased to reduce the extent of adsorption

25. If a beam of light is passed through true solution, then it is

a) visible b) scatter c) not visible d) None of the above

26. Plot of log xlm against log p is a straight line inclined at an angle of 45°. When the pressure is 0.5 atm and Freundlich parameter, k is 10, the amount of solute adsorbed per gram of adsorbent will be (log 5 = 0.6990).

a) 5g b) 3g c) 6g d) 12g

27. Which of the following factors contribute towards higher stability of lyophilic colloid?

a) Charge on their particles b) Attractive forces between particles

c) Small size of their particles d) High solvation due to a layer of dispersion medium

28. At the equilibrium position in the process of adsorption _____

a) $\Delta H>O$ b) $\Delta H=T\Delta S$ c) $\Delta H> T\Delta S$ d) $\Delta H< T\Delta S$

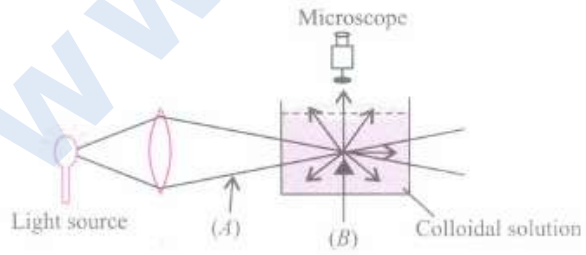
29. Which of the following is not correct regarding the adsorption of a gas on the surface of solid?

a) On increasing pressure, adsorption keeps on increasing.

b) Enthalpy and entropy changes are negative.

c) Chemisorption is more specific than physisorption. d) It is a reversible reaction.

30. When a colloidal solution is viewed from the direction at right angles of light beam, the path of the beam is illuminated due to scattering of light. In the figure (A) and (B) are



a) A - Tyndall cone, B - Scattered light b) A - Scattered light, B - Tyndall cone

c) A - Tyndall cone, B - Blind spot d) A - Tyndall effect, B - Tyndall cone

31. **Assertion:** Zeolites are good shape-selective catalysts.

Reason: Zeolites have honeycomb-like structures.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

32. Powdered substances are more effective adsorbents than their crystalline form because
a) adsorption is an exothermic process
b) they become inert and do not react with the adsorbate
c) the extent of adsorption increases with increase in surface area of the adsorbent
d) adsorption is more if the size of adsorbent is small.

33. Position of non-polar and polar part in micelle is
a) Polar at outer surface and non-polar at inner surface.
b) Polar at inner surface and non-polar at outer surface
c) Distributed all over the surface d) Present in the surface only

34. Which of the following statements is not correct for chemisorption and physisorption?
a)
Physical adsorption occurs at a low temperature and chemisorption occurs at all temperatures.
b)
Magnitude of chemisorption decreases with rise in temperature while physisorption increases with rise in temperature.
c) Chemisorption is irreversible and physisorption is reversible.
d) In physisorption activation energy is low while in chemisorption it is high

35. Which one of. the following statements is incorrect about enzyme catalysis?
a) Enzymes are mostly proteinous in nature b) Enzyme action is specific
c) Enzymes are denaturated by UV - rays and at high temperature
d) Enzymes are least reactive at optimum temperature

36. Which of the following electrolytes will have maximum coagulating value for AgI/ Ag^+ sol?
a) Na_2S b) Na_3PO_4 c) Na_2SO_4 d) NaCl

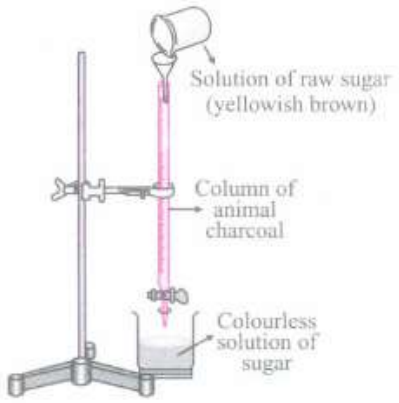
37. The oxide of nitrogen which acts as a catalyst in lead chamber process is
a) NO b) NO_2 c) NP_4 d) N_2

38. **Assertion:** In physical adsorption, enthalpy of adsorption is very low.
Reason: In physical adsorption, attraction between gas molecules and solid surface is due to weak van der Waals forces.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

39. Why is alum added to water containing suspended impurities?

a) To make a colloidal solution b) To coagulate the suspended impurities
c) To remove impurities of calcium and magnesium
d) To protect the colloidal solution from getting precipitated

40. Which of the following phenomenon is applicable to the process shown in the figure?



a) Absorption b) Adsorption c) Coagulation d) Emulsification

41. Which of the following gases is least adsorbed on charcoal?
a) HCl b) NH_3 c) O_2 d) CO_2

42. On adding $AgNO_3$ solution to KI solution, a negatively charged colloidal sol will be formed in which of the following conditions?
a) 100 mL of 0.1 M $AgNO_3$ + 100 mL of 0.1 M KI
b) 100 mL of 0.1 M $AgNO_3$ + 50 mL of 0.2 M KI
c) 100 mL of 0.2 M $AgNO_3$ + 100 mL of 0.1 M KI
d) 100 mL of 0.1 M $AgNO_3$ + 100 mL of 0.15 M KI

43. The protecting power of lyophilic colloidal sol is expressed in terms of
a) Oxidation number b) Coagulation value c) Gold number
d) Critical miscelle concentration

44. If x is amount of adsorbate and m is amount of adsorbent, which of the following relations is not related to adsorption process?
a) $\frac{x}{m}$ = f (T) at constant p b) p = f (T) at constant $\left(\frac{x}{m}\right)$ c) $\frac{x}{m}$ = p x T
d) $\frac{x}{m}$ = f (p) at constant T

45. Which of the following forms cationic micelles above certain concentration?
a) Sodium ethyl sulphate b) Sodium acetate c) Urea
d) Cetyl trimethyl ammonium bromide

46. Fill in the blanks by putting appropriate choices. Blood is a colloidal solution of an ____(i)_____ substance. The styptic action of _____(ii)_____ and ____(iii)_____ solution is due to _____(iv)_____ of blood forming a clot which stops further bleeding.

a)

(i)	(ii)	(iii)	(iv)
albumoid	aluminium	ferrous chloride	peptization

b)

(i)	(ii)	(iii)	(iv)
albumoid	alum	ferric chloride	coagulation

c)

(i)	(ii)	(iii)	(iv)
electrolytic	alum	ferric chloride	circulation

d)

(i)	(ii)	(iii)	(iv)
negatively charged	chrome alum	sodium chloride	coagulation

47. Which of the following statements does not show correct difference between adsorption and absorption?

a)
In adsorption, the substance is concentrated only at the surface while in absorption it is uniformly distributed in the bulk.

b) Adsorption is instantaneous while absorption is a slow process

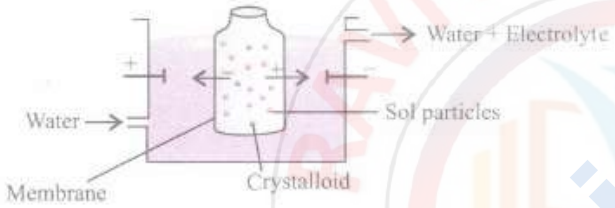
c)
A substance can be adsorbed as well as absorbed simultaneously and the process is called sorption.

d) Only gases are adsorbed while solids and liquids are absorbed.

48. Which of the following is application of adsorption in chemical analysis?

a) Adsorption indicators b) Thin layer chromatography c) Qualitative analysis
d) All of these

49. Which of the processes is being shown in the figure?



a) Electrodialysis b) Dialysis c) Electroosmosis d) Electrophoresis

50. Why is ferric hydroxide colloid positively charged when prepared by adding ferric chloride to hot water?

a) Due to precipitation of ferric hydroxide there is an excess of Fe^{3+} ions.
b) Due to preferential adsorption of Fe^{3+} ions by the sol of $Fe(OH)_3$.
c) Due to absence of any negatively charged ion.
d) Due to adsorption of OH^- and Cl^- ions, the remaining sol has only Fe^{3+} ions.

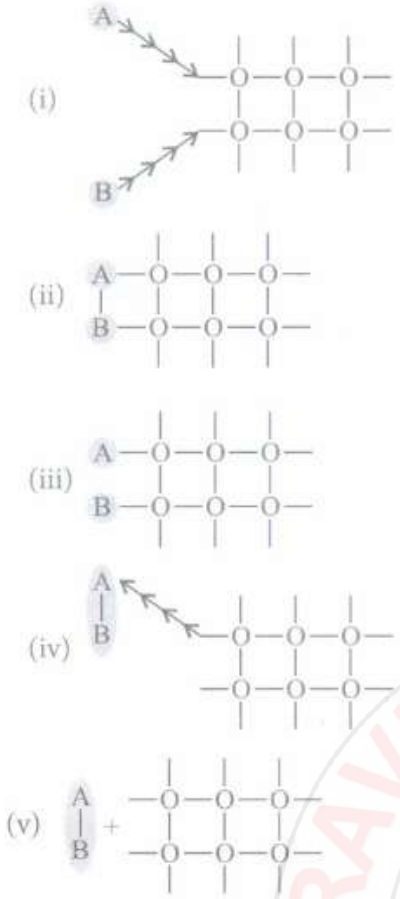
51. A lyophobic colloid cannot be formed by

a) mixing dispersed phase and dispersion medium
b) chemical reactions like hydrolysis c) exchange of solvent d) peptisation

52. The formation of micelles takes place only above

a) critical temperature b) Kraft temperature c) inversion temperature
d) absolute temperature

53. Arrange the following diagrams in correct sequence of steps involved in the mechanism of catalysis, in accordance with modern adsorption theory.



a) (i)⟶(ii)⟶ (iii)⟶(iv)⟶(v) b) (i)⟶(iii)⟶(ii)⟶ (iv)⟶(v)
c) (i)⟶ (iii)⟶(ii)⟶(v)⟶(iv) d) (i)⟶(ii)⟶ (iii)⟶(v)⟶(iv)

54. Physical adsorption of a gaseous species may change to chemical adsorption with_____.
a) decrease in temperature b) increase in temperature
c) increase in surface area of adsorbent d) decrease in surface area of adsorbent

55. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Water-loving colloids	(i)	Irreversible
(B)	Liquid dispersed in gas	(ii)	Emulsifying agent
(C)	Hydrophobic sol	(iii)	Hydrophilic
(D)	Soap	(iv)	Aerosol
(E)	Micelles	(v)	Coagulation
(F)	Hardy-Schulze rule	(vi)	Associated colloids

a) (A)⟶ (iii), (B)⟶ (iv), (C)⟶ (i), (D)⟶ (ii), (E)⟶ (vi), (F)⟶ (v)
b) (A)⟶ (i), (B)⟶ (vi), (C)⟶ (v), (D)⟶ (iii), (E)⟶ (iv), (F)⟶ (ii)
c) (A) ⟶ (vi), (B) ⟶ (iv), (C) ⟶ (v), (D) ⟶ (ii), (E) ⟶ (iii), (F) ⟶ (i)
d) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (v), (E) ⟶ (vi), (F) ⟶ (i)

56. For adsorption of a gas on a solid, the plot of log x/m vs log p is linear with slope equal to (n being whole number):
a) k b) log k c) n d) 1/n

57. Which of the following systems will show Tyndall effect?
a) Aqueous solution of sodium chloride b) Aqueous solution of aluminium hydroxide
c) Aqueous solution of glucose d) Aqueous solution of urea

58. Which of the following statements are correct?
(i) When an animal hide, which has negatively charged particles, is soaked in tannin, which contains positively charged colloidal particles, mutual coagulation does not take place.
(ii) Photographic films are prepared by coating an emulsion of the light-sensitive silver bromide in gelatin over glass plates or celluloid films.
(iii) Latex is a colloidal solution of rubber particles which are negatively charged.
(iv) In Cottrell precipitator, the smoke, before it comes out from the chimney, is led through a chamber containing plates having a charge opposite to that carried by smoke particles. The particles on coming in contact with these plates acquire some charge and do not get precipitated.
a) (i) and (iv) only b) (ii) and (iii) only c) (ii), (iii) and (iv) only d) All of these.

59. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	Friedel Crafts reaction	(i)	Silica gel
(B)	Humidity control	(ii)	$\frac{x}{m}=kp^{1/n}$
(C)	Gas masks	(iii)	Anhydrous aluminium chloride
(D)	Freundlich adsorption isotherm	(iv)	Adsorb poisonous gas

a) (A)⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶(iv)
b) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶(iv)
c) (A) ⟶ (iii), (B)⟶ (i), (C) ⟶ (iv), (D) ⟶ (ii)
d) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii)

60. Which of the following interfaces cannot be obtained?
a) Liquid-Liquid b) Solid-Liquid c) Liquid-Gas d) Gas-Gas

61. Which of the following will not form a colloidal system?
a) Solid-gas b) Liquid-gas c) Gas-gas d) Gas-liquid

62. Colloidal solutions of metals like gold can be prepared when their salt solutions react with certain substances like $SnCl_2$, formaldehyde, phenylhydrazine, etc.

$$2AuCl_3 + 3SnCl_2 \longrightarrow 3SnCl_4 + \underset{sol}{2Au}$$

The above method is an example of
a) hydrolysis method b) double decomposition method. c) reduction method
d) oxidation method

63. Which of the following statements given about emulsions is incorrect?
a)
The droplets in emulsions are often negatively charged and can be precipitated by electrolytes.
b)
Emulsion can be diluted with any amount of the dispersed liquid. On the other hand, the dispersion medium when mixed, forms a separate layer.

c)

Emulsions can be broken into constituent liquids by heating, freezing, centrifuging, etc.

d) Emulsions also show Brownian movement and Tyndall effect.

64. Match the column I and column II and mark the appropriate choice

Column I		Column II	
(A)	Diastase	(i)	Proteins⟶ peptones
(B)	Pepsin	(ii)	Glucose ⟶ ethyl alcohol
(C)	Ptyalin	(iii)	Starch ⟶ maltose
(D)	Zymase	(iv)	Starch ⟶ sugar

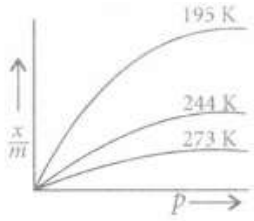
a) (A) ⟶ (iv), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶(iii)

b) (A) ⟶ (ii), (B) ⟶ (i), (C)⟶ (iv), (D)⟶ (iii)

c) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D)⟶ (iv)

d) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (ii)

65. Observe the given adsorption isotherm carefully and choose the correct option.



(i) These curves indicate that at a fixed temperature, there is a decrease in physical adsorption with increase in pressure.

(ii) These curves always seem to approach saturation at high pressure.

(iii) $\frac{x}{m} = k.p^{1/n}(n > 1)$ is generally represented by m this isotherm.

(iv) These curves indicate that at a fixed pressure, there is a decrease in physcial adsorption with increase in temperature.

a) (i) and (iii) only b) (ii) and (iv) only c) (ii), (iii) and (iv) only d) All of these.

66. White of an egg whipped with water acts as

a) macromolecular colloid b) associated colloid c) molecular colloid

d) normal electrolytic solution

67. Match the column I with column II and mark the correct option.

Column I		Column II	
(p)	Silver sol	(i)	Kalaazar
(q)	Colloidal gold	(ii)	Stomach disorder
(r)	Milk of magnesia	(iii)	Eye lotion
(s)	Colloidal antimony	(iv)	Intramuscular injection

a) (p) - (iv), (q) - (iii), (r) -(ii), (s) - (i) b) (p) - (iv), (q) - (i), (r) -(iii), (s) - (ii)

c) (p) - (iii), (q) - (iv), (r) -(ii), (s) - (i) d) (p) - (i), (q) - (ii), (r) -(iv), (s) - (iii)

68. fog is an example of colloidal system of

a) liquid in gas b) gas in liquid c) solid in gas d) gas in solid.

69. In physisorption adsorbent does not show specificity for any particular gas because

a) involved van der Waals forces are universal

b) gases involved behave like ideal gases c) enthalpy of adsorption is low

d) it is a reversible process

70. Which one of the following statements is not correct?
a) Catalyst does not initiate any reaction
b)
The value of equilibrium constant is changed in the presence of a catalyst in the reaction equilibrium
c) Enzymes catalyze mainly biochemical reaction
d) Coenzymes increase the catalytic activity of enzyme

71. Extent of adsorption of adsorbate from solution phase increases with
a) increase in amount of adsorbate in solution
b) decrease in surface area of adsorbent c) increase in temperature of solution
d) decrease in amount of adsorbate in solution

72. Which one of the following characteristics is associated with adsorption?
a) ΔG and ΔH are negative but ΔS is positive.
b) ΔG and ΔS are negative but ΔH is positive
c) ΔG is negative but ΔH and ΔS are positive d) ΔG, ΔH and ΔS all are negative

73. Which of the following is not correctly matched?
a) Gelatin - Lyophilic colloid b) Gold sol - Lyophilic colloid
c) Arsenious sulphide - Lyophobic colloid d) Ferric hydroxide - Lyophobic colloid

74. What is the role of adsorption in froth floatation process used especially for concentration of sulphide ores?
a) Shape selective catalysts b) Adsorption of pine oil on sulphide ore particles
c) Adsorption of pine oil on impurities
d) Production of heat in the process of exothermic reaction

75. The incorrect statement about physical adsorption is
a) it lacks specificity b) it is generally reversible
c) porous surfaces are good adsorbent d) heat of adsorption is quite high

76. Which of the following is not a method for coagulation of lyophobic sols?
a) By electrophoresis b) By mixing oppositely charged sols c) By adding electrolyte
d) By adding a protective colloid

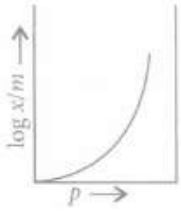
77. At low pressure, the fraction of the surface covered follows
a) zero-order kinetics b) first-order kinetics c) second-order kinetics
d) fractional order kinetics.

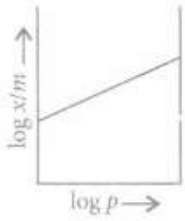
78. The ratio of the number of moles of $AgNO_3$, $Pb(NO_3)_2$ and $Fe(NO_3)_3$ required for coagulation of a definite amount of a colloidal sol of silver iodide prepared by mixing $AgNO_3$ with excess of KI will be
a) 1: 2 : 3 b) 3: 2: 1 c) 6: 3 : 2 d) 2: 3 : 6

79. Which of the following can adsorb larger volume of hydrogen gas?
a) Finely divided platinum b) Colloidal solution of palladium
c) Small pieces of palladium d) A single metal surface of platinum

80. Which of the following curves is in accordance with Freundlich adsorption isotherm?

a)

b) 

c) 

d)

81. Which one of the following is not applicable to the phenomenon of adsorption?
a) $\Delta H>O$ b) $\Delta G<O$ c) $\Delta S < 0$ d) $\Delta H < 0$

82. The substances which behave as colloidal solutions at higher concentration are called
a) associated colloids b) multimolecular colloids c) macromolecular colloids
d) protective colloids.

83. When an excess of a very dilute aqueous solution of KI is added to a very dilute aqueous solution of silver nitrate, the colloidal particles of silver iodide are associated with which of the following Helmholtz double layer?
a) AgI/ Ag^+ :I^- b) AgI /K^+ :NO^-_3 c) AgI/ NO^-_3 :Ag^+ d) AgI/ I^- :K^+

84. Which of the following is not an explanation for the origin of charge on the colloidal particles?
a) Due to frictional electrification b) Due to dissociation of surface molecules
c) Due to electrophoresis d) Due to selective adsorption of ions

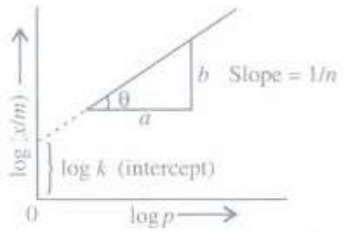
85. In the adsorption of a gas on solid, Freundlich isotherm is obeyed. The slope of the plot is zero. Thus, the extent of adsorption is
a) directly proportional to the pressure of gas
b) inversely proportional to the pressure of the gas
c) independent of the pressure of the gas
d) proportional to the square of the pressure of the gas.

86. Match the column I with column II with respect to applications of properties of colloids in different fields and mark the appropriate choice.

Column I		Column II	
(A)	Coagulation	(i)	Colloidal medicines
(B)	Adsorption	(ii)	Photographic films
(C)	Electrophoresis	(iii)	Sewage disposal
(D)	Emulsions	(iv)	Smoke precipitator

a) (A)⟶ (iii), (B) ⟶(i), (C) ⟶(ii), (D) ⟶(iv)
b) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶ (iv)
c) (A)⟶ (iii), (B)⟶ (i), (C)⟶ (iv), (D)⟶ (ii) d) (A)⟶ (i), (B)⟶ (iv), (C)⟶ (iii), (D)⟶ (ii)

87. A graph is plotted between log (x/m) and log p according to the equation $\frac{x}{m} = kp^{1/n}$



Which of the following statements about this graph is not correct?

a) The figure shows Freundlich adsorption isotherm.
b) The figure shows Langmuir adsorption isotherm.
c) The adsorption varies directly with pressure.
d) The factor l/n can have values between 0 and 1.

88. According to adsorption theory of catalysis, the rate of reaction increases with the use of a catalyst because:
a) the heat liberated during adsorption increases the rate of reaction
b) the kinetic energy of reactants increases which increases the rate of reaction
c) the activation energy of reaction increases which increases the rate of reaction
d)
the concentration of reactants at the active centres becomes high due to adsorption resulting in increase in the rate of reaction

89. Mark the incorrect combination out of the following examples of colloidal solutions
a)

Colloid	Dispersion medium	Dispersed phase
Smoke	Gas	Solid

b)

Colloid	Dispersion medium	Dispersed phase
Mist	Gas	Liquid

c)

Colloid	Dispersion medium	Dispersed phase
Gel	Liquid	Liquid

d)

Colloid	Dispersion medium	Dispersed phase
Emulsion	Liquid	Liquid

90. Lyophilic sols are also called reversible colloids because
a)
they can be reformed by mixing residue (dispersed phase) in dispersion medium even after drying
b) they can be easily precipitated from the colloidal system
c) once formed, the dispersion medium and dispersed phase cannot be separated
d) special reversible reactions are used to prepare them.

91. Identify the correct statement regarding enzymes.
a) Enzymes are specific biological catalysts that possess well defined active sites.
b) Enzymes are normally heterogeneous catalysts that are very specific in their action.
c) Enzymes are specific biological catalysts that cannot be poisoned.
d)
Enzymes are specific biological catalysts that can normally function at very high temperature (T = 1000 K).

92. Which of the following acts as the best coagulating agent for ferric hydroxide sol?
a) Potassium ferrocyanide b) Potassium chloride c) Potassium oxalate
d) Aluminium chloride

93. Soap mixed with water below critical micelle concentration behaves as:
    a) associated colloid b) macromolecular colloid c) normal electrolytic solution
    d) multimolecular colloid.

94. The method usually employed for the precipitation of a colloidal solution is:
    a) dialysis b) addition of electrolytes c) diffusion through animal membrane
    d) condensation

95. Which of the following gases present in a polluted area will be adsorbed most easily on the charcoal gas mask?
    a) H_2 b) O_2 c) N_2 d) SO_2

96. Fog is a colloidal solution of:
    a) Solid in gas b) gas in gas c) liquid in gas d) gas in liquid

97. Which of the following is an example of heterogeneous catalysis?
    a) $4NH_3 + 5O_2 \overset{Pt}{\rightarrow} 4NO + 6H_2O$ b) $2SO_2 + O_2 \overset{NO}{\rightarrow} 2SO_3$
    c) $CH_3COOCH_3 + H_2O \overset{HCl}{\rightarrow} CH_3COOH + CH_3OH$
    d) $C_{12}H_{22}O_{11} + H_2O \overset{H_2SO_4}{\rightarrow} C_6H_{12}O_6 + C_6H_{12}O_6$

98. Select the correct statements
    (i) Physical adsorption is weak, multilayer, non-directional and non-specific.
    (ii) Chemical adsorption is strong, unilayer, directional and strong.
    (iii) Chemical adsorption decreases with temperature.
    (iv) Chemical adsorption is more stronger than physical adsorption.
    a) (i) and (iii) only b) (i), (ii) and (iv) only c) (iii) only d) All of these.

99. Which of the following is not a correct match?
    a) Butter - O/W type emulsion b) Vanishing cream - O/W type emulsion
    c) Milk - O/W type emulsion d) Cream - W/O type emulsion

100. Adsorption is accompanied by the evolution of heat.So according to Le-Chatelier principle, the amount of substance adsorbed should
    a) increase with decrease in temperature b) increase with increase in temperature
    c) decrease with decrease in temperature d) be equal at all temperatures

101. Which of the following process is not responsible for the presence of electric charge on the sol particles?
    a) Electron capture by sol particles b) Adsorption of ionic species from solution
    c) Formation of Helmholtz electrical double layer
    d) Absorption of ionic species from solution

102. Method by which lyophobic sol can be protected
    a) by addition of oppositely charged sol. b) by addition of an electrolyte
    c) by addition of lyophilic sol d) by boiling.

103. **Assertion:** Physisorption of a gas adsorbed at low temperature may change into chemisorption at a high temperature.
    Reason: Usually low pressure is also favourable for chemisorption.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

104. Chemisorption involves formation of bond between gaseous molecules or atoms and the solid surface for which high energy is required. Thus it is also referred as:
a) chemical adsorption b) positive adsorption c) activated adsorption
d) passive adsorption.

105. **Assertion:** A colloidal sol scatters light but a true solution does not.
Reason: The particles in a colloidal sol move slowly than in a true solution.
a) If assertion is true but reason is false. b) If both assertion and reason are false.
c)
If both assertion and reason are true and reason is the correct explanation of assertion.
d)
If both assertion and reason are true but reason is not the correct explanation of assertion.

106. During dialysis
a) only solvent molecules can diffuse
b) solvent molecules, ions and colloidal parficles can diftuse
c) all kinds of particles can diffuse through the semi permeable membrane
d) solvent molecules and ions can diffuse

107. Which of the following is not a method of removing impurities from a colloidal sol?
a) Electrodialysis b) Ultrafiltration c) Ultra centrifugation d) Distillation

108. The correct statement(s) pertaining to the adsorption of a gas on a solid surface is(are)
(i) adsorption is always exothermic
(ii) physisorption may transform into chemisorption at high temperature
(iii) physisorption increases with increasing temperature but chemisorption decreases with increasing temperature.
(iv) chemisorption is more exothermic than physisorption, however it is very slow due to higher energy of activation.
a) (i) and (iv) only b) (ii) and (iii) only c) (i), (ii) and (iv) only d) All of these

109. The ability of anion to bring about coagulation of a given colloid depends upon
a) its charge b) the sign of the charge alone c) the magnitude of its charge
d) both magnitude and sign of its charge

110. Which one of the following forms micelles in the aqueous solution above certain concentration?
a) Urea b) Dodecyl trimethyl ammonium chloride c) Pyridinium chloride d) Glucose

111. Which property of colloids is not dependent on the charge on colloidal particles?
a) Coagulation b) Electrophoresis c) Electro-osmosis d) Tyndall effect

112. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	V_2O_5	(i)	Haber's process
(B)	Ni	(ii)	Preparation of O_2 from $KClO_3$
(C)	MnO_2	(iii)	Conversion of SO_2 to SO_3
(D)	Fe	(iv)	Hydrogenation of oils

a) (A)⟶ (i), (B)⟶ (iii), (C) ⟶ (ii), (D)⟶ (iv)
b) (A) ⟶ (ii), (B) ⟶ (i), (C)⟶ (iii), (D)⟶ (iv)
c) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (i)
d) (A) ⟶ (iv), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iii)

113. The protecting power of lyophilic colloidal sol is expressed in terms of:
a) coagulation value b) gold number c) critical micelle concentration
d) oxidation number

114. Which one of the following statements is correct for the spontaneous adsorption of a gas?
a) △S is negative and therefore, △H should be highly positive.
b) △S is negative and therefore, △H should be highly negative
c) △S is positive and therefore, △H should be negative
d) △S is positive and, therefore, △H should also be positive.

115. The size of colloidal particles ranges between:
a) 10^{-7} - 10^{-9} cm b) 10^{-9} - 10^{-11} cm c) 10^{-5} - 10^{-7} cm d) 10^{-2} - 10^{-3} cm

116. **Assertion:** Amylase in the presence of sodium chloride i.e., Na^+ions are catalytically very active.
Reason: Metal ions such as Na^+, Mn^{2+},CO^{2+},Cu^{2+}, etc. act as activators.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

117. In which of the following reactions heterogeneous catalysis is involved?
(I) $2SO_{2(g)} + O_{2(g)} \xrightarrow{NO_{(g)}} 2SO_{3(g)}$
(II) $2SO_{2(g)} \xrightarrow{Pt_{(s)}} 2SO_{3(g)}$
(III) $N_{2(g)} + 3H_{2(g)} \xrightarrow{Fe_{(s)}} 2NH_{3(g)}$
(IV)
$$CH_3COOCH_{3(l)} + H_2O_{(l)} \xrightarrow{HCl_{(l)}} CH_3COOH_{(aq)} + CH_3OH_{(aq)}$$
a) (II), (III) b) (II), (III), (IV) c) (I), (II), (III) d) (IV)

118. **Assertion:** Silica gel is used to dry air.
Reason: Silica gel absorbs moisture from air.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

119. On the basis of data given below predict which of the following gases shows least adsorption on a definite amount of charcoal?

Gas	CO_2	SO_2	CH_4	H_2
Critical temp./K	304	630	190	33

a) CO_2 b) SO_2 c) CH_4 d) H_2

120. **Assertion:** When KI solution is added to $AgNO_3$ solution, negatively charged sol results.
Reason: Negative charge of sol is due to preferential adsorption of iodide ions from the dispersion medium.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

121. Which of the following statements about zeolites is not correct?
a)
Zeolites are open structures of silica in which trivalent aluminium is substituted by a fraction of silicon atoms.
b) Shape selectivity of zeolites depends upon porous structure of the catalyst.
c) Zeolites are synthetic microporous aluminosilicates which do not exist naturally.
d) Zeolites are aluminosilicates having three-dimensional network.

122. **Assertion:** Lyophilic sols are reversible sols.
Reason: Lyophilic sols can be reconstituted by simply remixing the dispersed phase and dispersion medium.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

123. Which of the following statements is not correct about physisorption?
a) It is a reversible process. b) It requires less heat of adsorption.
c) It requires activation energy. d) It takes place at low temperature.

124. The dispersed phase in colloidal iron (III) hydroxide and colloidal gold is positively and negatively charged respectively. Which of the following statements is not correct?
a) Magnesium chloride solution coagulates gold sol readily than iron (III) hydroxide sol.
b) Sodium sulphate solution causes coagulation in both sols.

c) Mixing of the two sols has no effect.
d) Coagulation in both sols can be brought about by electrophoresis.

125. The Langmuir adsorption isotherm is deduced by using the assumption that:
a) the adsorption takes place in multi-layers
b) the adsorption sites are equivalent in their ability to adsorb the particles.
c) the heat of adsorption varies with coverage
d) the adsorbed molecules interact with each other

126. A colloidal system having a solid substance as a dispersed phase and a liquid as a dispersion medium is classified as_____.
a) solid sol b) gel c) emulsion d) sol

127. Which of the following is a property of physisorption?
a) High specificity b) Irreversibility c) Non-specificity d) None of these.

128. The critical micelle concentration (CMC) is defined as
a) the concentration at which micellization starts
b) the concentration at which micelle starts behaving like an electrolyte
c) the concentration at which dispersed phase is separated from dispersion medium
d) the concentration at which a colloid is converted to suspension

129. At CMC (critical micelle concentration) the surface molecules
a) dissociate b) associate c) become bigger in size due to adsorption
d) become smaller in size due to decomposition

130. When a small quantity of $FeCl_3$ solution is added to the fresh precipitate of $Fe(OH)_3$ a colloidal sol is obtained. The process through which this sol is formed is known as
a) exchange of solvent b) chemical double decomposition c) peptization
d) electrophoresis.

131. The combination of two layers of opposite charges around the colloidal particle is called Helmholtz electrical double layer. The potential difference between the fixed layer and the diffused layer of opposite charge is called
a) electrode potential b) zeta potential c) adsorption potential d) diffused potential.

132. What is the role of activated charcoal in gas masks used in mines?
a) It acts as an adsorbent for poisonous gases present in coal mines.
b) It acts as an adsorbent for coal particles present in coal mines.
c) It acts as a mask through which exhaled gases are diffused out
d) It acts as a base for scattering the light.

133. After the reaction is over between adsorbed reactants, it is important to create space for the other reactant molecules to approach the surface and react. The process responsible for this is known as
a) sorption b) desorption c) physisorption d) chemisorption

134. Freshly prepared precipitate sometimes gets converted to colloidal solution by_____.
a) coagulation b) electrolysis c) diffusion d) peptisation

135. **Assertion:** Hydrolysis of ester is an example of auto-catalytic reaction.
Reason: A catalyst speeds up the process without participating in the mechanism.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

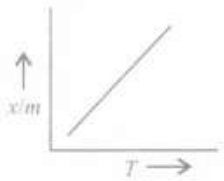
136. Which kind of catalysis can be explained on the basis of adsorption theory?
a) Homogeneous catalysis b) Heterogeneous catalysis c) Negative catalysis
d) Autocatalysis

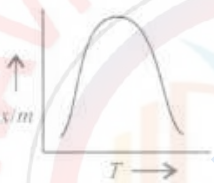
137. Which of the following graphs would yield a straight line?
a) x/m vs p b) log x/m vs p c) x/m vs log p d) log x/m vs log p

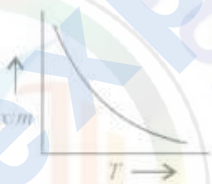
138. The activity of an enzyme becomes ineffective
a) at low temperature b) at atmospheric pressure c) at high temperature
d) in aqueous medium

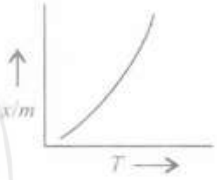
139. The separation of an emulsion into its constituent liquids is known as
a) emulsification b) protection of colloid c) coagulation d) demulsification.

140. Which of the plots is adsorption isobar for chemisorption?

a) 

b) 

c) 

d) 

141. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	Cheese	(i)	Liquid in gas
(B)	Dust	(ii)	Liquid in solid
(C)	Milk	(iii)	Solid in gas
(D)	Fog	(iv)	Liquid in liquid

a) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (i)
b) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)
c) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv)
d) (A)⟶ (ii), (B)⟶ (iii), (C)⟶ (iv), (D)⟶ (i)

142. The term 'sorption' stands for_____.
a) absorption b) adsorption c) both absorption and adsorption d) desorption

143. Which out of the following electrolyte solutions having the same concentration will be most effective in causing the coagulation of arsenic sulphide sol?
a) KCl b) $MgCl_2$ c) $AlCl_3$ d) Na_3PO_4

144. Traces of molybdenum are used with finely divided iron which acts as a catalyst during Haber's process for synthesis of ammonia. The Mo
a) acts as a promoter to increase the activity of the catalyst
b) acts as a poison to decrease the activity of the catalyst
c) provides a new pathway to the reaction
d) forms another intermediate compound with lesser activation energy.

145. Which of the following statement is correct for the spontaneous adsorption of a gas?
a) ΔS is negative and therefore, ΔH should be highly positive.
b) ΔS is negative and therefore, ΔH should be highly negative.
c) ΔS is positive and therefore, ΔH should be negative.
d) ΔS is positive and therefore, ΔH should be highly positive.

146. Substances which behave as normal electrolytes in solution at low concentration and exhibit colloidal properties at higher concentration are called
a) lyophilic colloids b) lyophobic colloids c) macromolecular colloids
d) associated colloids.

147. On which of the following properties does the coagulating power of an ion depend?
a) Both magnitude and sign of the charge on the ion b) Size of the ion alone
c) The magnitude of the charge on the ion alone
d) The sign of charge on the ion alone

148. Tyndall effect is observed only when
(i) the diameter of the dispersed particles is not much smaller than the wavelength of the light used.
(ii) the refractive indices of dispersed phase and dispersion medium differ greatly in magnitude.
(iii) the size of the particles is generally between 10-11 and 10-9 m in diameter.
(iv) the dispersed phase and dispersion medium can be seen separately in the system.
a) (i) and (iii) b) (i) and (iv) c) (ii) and (iii) d) (i) and (ii)

149. **Assertion:** In the coagulation of a negative sol the flocculating power is in the order: $Al^{3+} > Ba^{2+} > Na^{+}$
Reason: Greater the valence of the flocculating ion added, greater is its power to cause precipitation.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

150. Mixing of positively charged colloidal solution with negatively charged colloidal solution brings _____. The decreasing order of coagulating power of Na^{+}, Ba^{2+} and Al^{3+} for negatively charged colloidal solution is_____.
a) mutual coagulation, $Na^{+} > Ba^{2+} > Al^{3+}$ b) mutual coagulation, $Al^{3+} > Ba^{2+} > Na^{+}$
c) coagulation, $Na^{+} > Ba^{2+} > Ae^{+}$ d) peptization, $Al^{3+} > Ba^{2+} > Na^{+}$

151. Which of the following is not correct for enzyme catalysis?
a) The enzyme activity is maximum at optimum pH which is between 5-7.
b) Each enzyme is specific for a given reaction.
c) The favourable temperature range of enzyme activity is between 50-60°C.
d)
The enzymatic activity is increased in presence of certain substances called co-enzymes

152. In Freundlich adsorption equation $x/m = kp^{1/n}$, the value of n is
a) always greater than one b) always smaller c) always smaller
d) greater than one at low temperature and smaller than one at high temperature.

153. Presence of traces of arsenious oxide (AS_2O_3) in the reacting gases SO_2 and O_2 in presence of platinised asbestos in contact process acts as
a) catalytic promoter b) catalytic poison c) dehydrating agent d) drying agent.

154. At the critical micelle concentration (CMC) the surfactant molecules
a) decompose b) dissociate c) associate d) become completely soluble

155. Among the electrolytes Na_2SO_4, $CaCl_2$, $Al_2(SO_4)$ and NH_4Cl, the most effective coagulating agent for Sb_2S_3 sol is
a) Na_2SO_4 b) $CaCl_2$ c) $Al_2(SO_4)_3$ d) NH_4Cl

156. Few reactions of industrial importance are listed below. Which of the following catalysts is not correctly matched with the reaction
a) Haber's process: Finely divided Fe + Mo as promoter b) Contact process: V_2O_5
c) Ostwald's process: Fe_2O_3 d) None of these.

157. Which propers of collidal solution is independent of charge on the colloidal particles?
a) Electrophoresis b) Electro-osmosis c) Tyndall effect d) Coagulation

158. Which of the following is not an example of an emulsifying agent?
a) Proteins b) Gums c) Soaps d) Electrolytes

159. The cause of Brownian movement which is not shown by true solutions or suspensions is due to

a) unbalanced bombardment of particles by molecules of the dispersion medium
b) attractive forces between dispersed phase and dispersion medium
c) larger size of the particles due to which they keep colliding and settling down
d) conversion currents formed in the sol.

160. Which is correct in case of van der Waals adsorption?
a) High temperature, low pressure b) High temperature, high pressure
c) Low temperature, low pressure d) Low temperature, high pressure

161. Which of the following is not characteristic of chemisorption?
a) Adsorption is specific. b) Heat of adsorption is of the order of 200 kJ mol^{-1}
c) Adsorption is irreversible. d) Adsorption may be multimolecular layers.

162. Which is not correct regarding the adsorption of a gas on surface of solid
a) On increasing temperature, adsorption increase continuously
b) Enthalpy and entropy change are -ve.
c) Adsorption is more for some specific substances d) This phenomenon is reversible

163. **Assertion:** The values of colligative properties are of smaller order as compared to values shown by true solutions at same concentrations.
Reason: Colloidal particles show Brownian movement.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If assertion is true but reason is false.

164. Which of the following process is responsible for the formation of delta at a place where rivers meet the sea?
a) Emulsification b) Colloid formation c) Coagulation d) Peptisation

165. Measuring Zeta Potential is useful in determining which property of collodial solution
a) Size of the colloidal particles b) Viscosity c) Solubility
d) Stability of colloidal particles

166. Which of the following examples is correctly matched?
a) Butter - gel b) Smoke - emulsion c) Paint - foam d) Milk - aerosol

167. When iron hydroxide colloidal sol which is positively charged, and colloidal gold which is negatively charged are mixed, which of the following observations is not correct?
a) There is no effect of mixing the sols.
b) Mutual coagulation in both can be takes place. c) Ferric hydroxide is coagulated.
d) Gold sol is coagulated.

168. In Freundlich adsorption isotherm, the value of 1/n is:
a) between 0 and 1 in all cases b) between 2 and 4 in all cases
c) 1 in cases of physical adsorption d) 1 in case of chemisorption

169. What happens when a lyophilic sol is added to a lyophobic sol?
a) Lyophilic sol is protected. b) Lyophobic sol is protected.
c) Both the sols are coagulated. d) Electrophoresis takes place.

170. In these colloids, a large number of small atoms or smaller molecules of a substance aggregate to form colloidal particles having size in colloidal range. These colloids are known as
a) multimolecular colloids b) macromolecular colloids c) associated colloids
d) lyophilic colloids

171. **Assertion:** For stabilisation of an emulsion a third component called emulsifying agent is usually added.
Reason: Emulsions of oil in water are unstable and sometimes they separate into two layerson standing.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

172. Extent of physisorption of a gas increases with_____.

a) increase in temperature b) decrease in temperature
c) decrease in surface area of adsorbent
d) decrease-in strength of van der Waals forces

173. Which of the following is an example of absorption?
a) Water on silica gel b) Water on calcium chloride
c) Hydrogen on finely divided nickel d) Oxygen on metal surface

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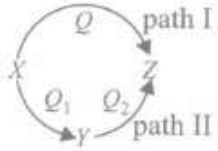
1. A reaction proceeds through two paths I and II to convert X → Z.



What is the correct relationship between Q, Q_1 and Q_2?

a) $Q = Q_1 \times Q_2$ b) $Q = Q_1 + Q_2$ c) $Q = Q_2 - Q_1$ d) $Q = Q_1/Q_2$

2. Consider the following reactions

(i) $H^+_{(aq)} + OH^-_{(aq)} \longrightarrow H_2O_{(l)}$, $- x_l$ kJ mol^{-l}

(ii) $H_{2(g)} + \frac{1}{2} O_{2(g)} \longrightarrow H_2O_{(l)}$, $- x_2$ kJ mol^{-1}

(iii) $CO_{2(g)} + H_{2(g)} \longrightarrow CO_{(g)} + H_2O_{(l)}$, $- x_3$ kJ mol^{-l}

(iv) $C_2H_{2(g)} + \frac{5}{2} O_{2(g)} \longrightarrow 2CO_{2(g)} + H_2O_{(l)}$, $+ x_4$ kJ mol^{-1}

Enthalpy of formation of $H_2O_{(l)}$ is :

a) $+ x_1$ kJ mol^{-1} b) $- x_2$ kJ mol^{-l} c) $+ x_3$ kJ mol^{-1} d) $- x_4$ kJ mol^{-1}

3. $PbO_2 \longrightarrow PbO$, $\Delta G_{298} < 0$

$SnO_2 \longrightarrow SnO$, $\Delta G_{298} > 0$

Most probable oxidation state of Pb and Sn will be:

a) Pb^{4+}, Sn^{4+} b) Pb^{4+}, Sn^{2+} c) Pb^{2+}, Sn^{2+} d) Pb^{2+}, Sn^{4+}

4. Which one of the following is correct option for free expansion of an ideal gas under adiabatic condition?

a) $q \neq 0, \Delta T = 0, W = 0$ b) $q = 0, \Delta T = 0, W = 0$ c) $q = 0, \Delta T = 0, W \neq 0$

d) $q = 0, \Delta T \neq 0, W = 0$

5. Which is the correct relationship between $\triangle$ G and equilibrium constant K_p?

a) $K_p = -RT \log \triangle G^o$ b) $K_p = [e/RT]^{\triangle Go}$ c) $K_p = -\triangle G^o/RT$ d) $K_p = e^{-\triangle G^0/RT}$

6. Which of the following reactions will have the value of enthalpy of neutralisation as -57.1 kJ mol^{-1}?

a) $CH_3COOH + NaOH \longrightarrow CH_3COONa + H_2O$ b) $HCl + NaOH \longrightarrow NaCl + H_2O$

c) $HCl + NH_4OH \longrightarrow NH_4Cl + H_2O$ d) $HCOOH + NaOH \longrightarrow HCOONa + H_2O$

7. What will be ΔH for the reaction, $CH_2C1_2 \longrightarrow$ C + 2H + 2C1? (B.E. of C - H and C - Cl bonds are 416 kJ mol^{-1} and 325 kJ mol^{-1} respectively)

a) 832 kJ b) 1482 kJ c) 650 kJ d) 1855 kJ

8. Dissociation of water takes place in two steps:

$H_2O \longrightarrow H^+ + OH^-$; $\triangle$ H = +497.8 kJ

$OH^- \longrightarrow H^+ + O^{2-}$; $\triangle$ H= +428.5 kJ

What is the bond energy of O - H bond?

a) 463.15 kJ mol^{-1} b) 428.5 kJ mol^{-1} c) 69.3 kJ mol^{-1} d) 926.3 kJ mol^{-1}

9. Consider the following reaction occurring in an automobile

$2C_8H_{18}(g) + 25O_2(g) \rightarrow 16CO_2(g) + 18H_2O(g)$ The sign of $\Delta H, \Delta S \text{ and } \Delta G$ would be

a) +, -, + b) -, +, - c) -, +, + d) +, +, -

10. The factor of ΔG values is important in metallurgy. The ΔG values for the following reactions at 800° C are given as

$S_2(g) + 2O_2(g) \rightarrow 2SO_2(g)$; ΔG = -544kJ

$2Zn(S) + S_2(g \rightarrow 2Z_nS_{(s)}$;ΔG = -293kJ

$2Zn(s) + O_2(g) \rightarrow 2ZnO(s)$; ΔG = -480kJ

The ΔG for the reaction,

$2ZnS(g) + 3O_2(g) \rightarrow 2ZnO(g) + 2SO_2(g)$ Will be:

a) -357 kJ b) -731 kJ c) -773 kJ d) - 229 kJ

11. Standard enthalpy of vaporisation $\Delta_{vap} H^\circ$ for water at 100°C is 40.66 kJ mol^{-l}. The internal energy change of vaporisation of water at 100°C (in kJ mol^{-1}) is:

a) +37.55 b) -43.76 c) +43 .76 d) +40.66

12. Which of the following pairs of a chemical reaction is certain to result in a spontaneous reaction?

a) Exothermic and decreasing disorder b) Endothermic and increasing disorder

c) Exothermic and increasing disorder d) Endothermic and decreasing disorder

13. Which of the following expressions is correct to calculate enthalpy of a reaction?

a) $\triangle H_{reaction} = \sum B.E_{reactants} - \sum B.E_{products}$ b) $\triangle H_{reaction} = \triangle H_1 x \triangle H_2 x \triangle H_3 ...$

c) $\triangle H_{reaction} = \sum \triangle_f H_{reactants} - \sum \triangle_f H_{products}$ d) $\triangle H_{reaction} = \sum B.E_{products} - \sum B.E_{reactants}$

14. The pressure-volume work for an ideal gas can be calculated by using the expression $W = -\int_{v_1}^{v_1} P_{ex} dV$ The work can also be calculated from the PV - plot by using the area under the curve within the specified limits. When an ideal gas is compressed (i) reversibly or (ii) irreversibly from volume V_i to V_f. Choose the correct option.

a) $W_{reversible} = W_{irreversible}$ b) $W_{reversible} < W_{irreversible}$ c) $W_{reversible} > W_{irreversibe}$

d) $W_{reversible} = W_{irreversible} + P_{ex} \Delta V$

15. Which of the following is not a correct statement about enthalpy of solution?

a)

For most ionic compounds, $\triangle H^o_{soln}$. is positive and the dissociation process is endothermic.

b) Solubility of most salts increases with increase in temperature.

c) If the lattice enthalpy is very high, the dissolution of compound becomes very easy.

d)

Enthalpy of solution is determined by the selective values of the lattice enthalpy and hydration enthalpy

16. Two litres of an ideal gas at a pressure of 10 atm expands isothermally into a vacuum until its total volume is 10 litres. How much heat is absorbed and how much work is done in the expansion?

a) 10 J, 10 J b) 18 J, 10 J c) 18 J, 10 J d) 0 J, 0 J

17. **Assertion:** There is no change in internal energy in a cyclic process.
Reason: Internal energy is a state function.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

18. Enthalpy change for the process,
$H_2O(ice) \rightleftharpoons H_2O(water)$ is 6.01 kJ mol^{-1} . The entropy change of l mole of ice at its melting point will be
a) 12 J k^{-1} mol^{-1} b) 22 J $k^{-1}mol^{-1}$ c) 100 J $k^{-1}mol^{-1}$ d) 30 J k^{-1} mol^{-1}

19. For reversible reaction: $X_{(g)}+3Y_{(g)} \rightleftharpoons 2Z_{(g)}$; $\triangle$ H=-40 kJ
Standard entropies of X, Y and Z are 60, 40 and 50 J $K^{-1}mol^{-1}$ respectively. The temperature at which the above reaction is in equilibrium is
a) 273 K b) 600 K c) 500 K d) 400 K

20. At 373 K, steam and water are in equilibrium and $\triangle$ H = 40.98 kJ mol^{-1}. What will be $\triangle$ S for conversion of water into steam?
$H_2O_{(l)} \longrightarrow H_2O_{(g)}$
a) 109.8 JK^{-1} mol^{-1} b) 31 $JK^{-1}mol^{-1}$ c) 21.98 JK^{-1} mol^{-1} d) 326 $JK^{-1}mol^{-1}$

21. For a reaction, P + Q ⟶ R + S. The value of $\triangle H^0$ is -30 kJ mol^{-1} and $\triangle$ S is -100 J K^{-1} mol^{-1}. At what temperature the reaction will be at equilibrium?
a) 27°C b) 52 °C c) 30°C d) 45°C

22. For the combustion of 1 mole of liquid benzene at 25°C, the heat of reaction at constant pressure is -780.9 kcal
$C_6H_{6(l)}+7\frac{1}{2}\ O_{2(g)} \longrightarrow 6CO_{2(g)}+3H_2O_{(l)}$
The heat of reaction at constant volume
a) -781.8 kcal b) -780.0 kcal c) + 781.8 kcal d) + 780.0 kcal

23. **Assertion:** Heat added to a system at lower temperature causes greater randomness than when the same quantity of heat is added to it at higher temperature.
Reason: Entropy is a measure of the degree of randomness or disorder in the system.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

24. Given that:
$$(i)\ C_{(graphite)} + O_2(g) \rightarrow CO_2(g); \qquad \Delta_r H^\circ = x\ kJ\ mol^{-1}$$
$$(ii)\ C_{(graphite)} + \tfrac{1}{2}O_2(g) \rightarrow CO(g) \qquad \Delta_r H^\circ = y\ kJ\ mol^{-1}$$
$$(iii)\ CO(g) + \tfrac{1}{2}O_2(g) \rightarrow CO_2(g) \qquad \Delta_r H^\circ = z\ kJ\ mol^{-1}$$
Based on the given thermochemical equations, find out which one of the following algebraic relationships is correct?
a) x = y - z b) z = x + y c) x = y + z d) y = 2z - x

25. The bond dissociation energies of X_2, Y_2 and XY are in the ratio of 1: 0.5: 1. ΔH for the formation of XY is - 200 kJ mol^{-1}. The bond dissociation energy of X_2 will be :

a) 200 kJ mol^{-1} b) 100 kJ mol^{-1} c) 800 kJ mol^{-1} d) 400 kJ mol^{-1}

26. Given that,
$C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$, ΔH^0 = - x kJ
$2CO_{(g)} + O_{2(g)} \longrightarrow 2CO_{2(g)}$ ΔH^0 = -y kJ
The enthalpy of formation of carbon monoxide will be:
a) y-2x b) 2x-yt c) $\frac{y-2x}{2}$ d) $\frac{2x-y}{2}$

27. During an isothennal expansion of an ideal gas, its
a) internal energy increases b) enthalpy decreases c) enthalpy remains unaffected
d) enthalpy reduces to zero

28. The entropy change in the fusion of one mole of a solid melting at 27^0C (latent heat of fusion is 2930 J mol^{-1}) is:
a) 9.77 JK^{-1} mol^{-1} b) 10.73 JK^{-1} mol^{-1} c) 2930 JK^{-1} mol^{-1} d) 108.5 JK^{-1} mol^{-1}

29. $\triangle$ U= q + w, is mathematical expression for:
a) first law of thermodynamics b) second law of thermodynamics
c) third law of thermodynamics d) zeroth law of thermodynamics

30. 2 mole of an ideal gas at 27^oC temperature is expanded reversibly from 2 lit to 20 lit. Find the entropy change (R = 2 cal/mol K).
a) 92.1 b) 0 c) 4 d) 9.2

31. Standard.entropies of $X2, Y2$ and $XY3$ are 60,40 and $50 JK^{-1}\ mol^{-1}$ respectively. For the reaction $\frac{1}{2}X_2 + \frac{3}{2}Y_2 \rightleftharpoons XY_3, \Delta H = -30$ kJ to be at equilibriurn, at temperature should be:
a) 750 K b) 1000 K c) 1250 K d) 500 K

32. A gaseous system is initially characterised by 500 mL volume and 1 atm pressure at 298 K. This system is allowed to do work as
(i) In isobaric conditions it expands to 800 mL resulting a decrease in pressure and temperature to 0.6 atm and 273 K respectively.
(ii) In adiabatic conditions it is allowed to expand upto 800 mL and results a decrease in pressure and temperature to 0.6 atm and 273 K respectively.
If Gibbs energy change in (i) is $\triangle G_a$ and in (ii) is $\triangle G_b$ then what will be the ratio of $\frac{\triangle G_a}{\triangle G_b}$?
a) 0 b) 1 c) between 0-1 d) >1

33. The correct thermodynamic conditions for the spontaneous reaction at all temperatures is :
a) $\Delta H < 0$ and $\Delta S > 0$ b) $\Delta H < 0$ and $\Delta S > 0$ c) $\Delta H < 0$ and $\Delta S = 0$ d) $\Delta H > 0$ and $\Delta S < 0$

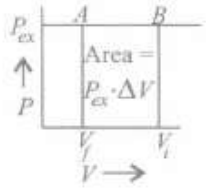
34. Read the following statements regarding spontaneity of a process and mark the appropriate choice.
(i) When enthalpy factor is absent then randomness factor decides spontaneity of a process.
(ii) When randomness factor is absent then enthalpy factor decides spontaneity of a process.
(iii) When both the factors take place simultaneously, the magnitude of both of factors decide spontaneity of a process.
a) Statements (i) and (ii) are correct and (iii) is incorrect.
b) Statement (iii) is correct, (i) and (ii) are incorrect.
c) Statements (i), (ii) and (iii) are correct. d) Statements (i), (ii) and (iii) are incorrect

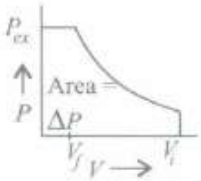
35. In thermodynamics, which one of the following properties is not an intensive property?
a) Pressure b) Temperature c) Volume d) Density

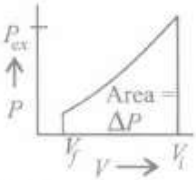
36. An ideal gas does work on its surroundings when it expands by 2.5 L against external pressure 2 atm. This work done is used to heat up 1 mole of water at 293 K. What would be the final temperature of water in kelvin if specific heat for water is 4.184 $Jg^{-1}K^{-1}$?
a) 300 b) 600 c) 200 d) 1000

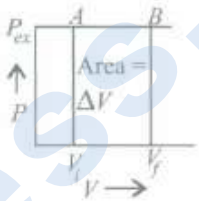
37. Work done on an ideal gas in a cylinder when it is compressed by an external pressure in a single step is shown below:

Which of the following graphs will show the work done on the gas?

a) 

b) 

c) 

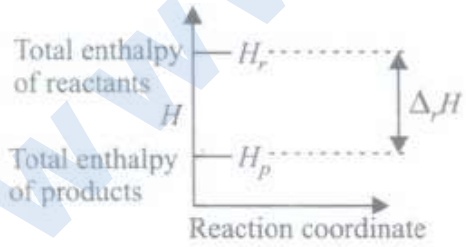
d) 

38. Which of the following statements is not correct?
a) For a spontaneous process, △G must be negative.
b) Enthalpy, entropy, free energy etc. are state variables.
c) A spontaneous process is reversible in nature.
d) Total of all possible kinds of energy of a system is called its internal energy.

39. For the reaction :
$X_2O_4(l) \rightarrow 2XO_2(g)$
$\Delta U = 2.1k \text{ cal}, \Delta S = 20 \text{ cal K}^{-1} \text{ at } 300 \text{ K}$
Hence ΔG is :
a) 2. 7 cal b) -2.7 cal c) 9.3 cal d) -9.3 cal

40. Which is the correct order of bond energy of single, double and triple bonds between carbon atoms?
a) C - C > C= C> C≡C b) C = C > C ≡ C > C - C c) C ≡ C > C - C > C = C
d) C≡C > C = C > C - C

41. The given enthalpy diagram represents which of the following reactions?



a) Enthalpy diagram for endothermic reaction b) Enthalpy diagram for exothermic reaction
c) Enthalpy diagram for reversible reaction
d) Enthalpy diagram for non-spontaneous reaction

42. The Bond dissociation energies of gaseous H_2, Cl_2 and HCl are 104, 58 and 103 kcal/ mole respectively. Calculate the enthalpy of formation of HCl gas.
a) -22 kcal b) + 22 kcal c) + 184 kcal d) -184 kcal

43. Given ire following entropy values $\left(\text{ in } JK^{-1}\ mol^{-1}\right)$ at 298 K and 1 atm : $H_2(g) : 130.6, Cl_2(g) : 223.0, HCl(g) : 186.7$ The entropy change (in $JK^{-1}\ mol^{-1}$) for the reaction $H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$, is
a) +540.3 b) +727.0 c) -166.9 d) +19.8

44. The amount of heat evolved when 0.50 mole of HCl is mixed with 0.30 mole of NaOH solution is
a) 57.1 kJ b) 28.55 kJ c) 11.42 kJ d) 17.13 kJ

45. For the reaction:
$H_{2(g)}+Cl_{2(g)} \rightarrow 2HCl$; $\triangle$ H=-44 kcal
What is the enthalpy of decomposition of HCl?
a) + 44 kcal/mol b) - 44 kcal/mol c) - 22 kcal/mol d) + 22 kcal/mol

46. For the reactions, $N_2 + 3H_2 \rightarrow 2NH_3$, ΔH = ?
a) $\Delta E + 2RT$ b) $\Delta E - 2RT$ c) $\Delta H = RT$ d) $\Delta E - RT$

47. If, ΔE is the heat of reaction for $C_2H_5OH_{(l)} + 3O_{2(g)} \rightarrow 2CO_{2(g)} + 3H_2O_{(l)}$ at constant volume, the ΔH (heat of reaction at constant pressure), then the correct relation is :
a) $\Delta H = \Delta E + RT$ b) $\Delta H = \Delta E - RT$ c) $\Delta H = \Delta E - 2RT$ d) $\Delta H = \Delta E + 2RT$

48. In an endothermic reaction, the value of H is
a) zero b) positive c) negative d) constant

49. What will be the enthalpy change of conversion of graphite into diamond?
Given $C_{graphite}$, $\triangle_{comb}$ H=-391.25 kJ;
$C_{diamond}$, $\triangle_{comb}$ H=-393.12 kJ
a) zero b) -391.25 kJ c) -393.12 kJ d) -1.87 kJ

50. Dissolution of ammonium chloride in water is an endothermic reaction, yet it is a spontaneous process. This is due to the fact that:
a) $\triangle$H is +ve, $\triangle$S is -ve b) $\triangle$H is -ve, $\triangle$S is +ve
c) $\triangle$H is +ve, $\triangle$S is +ve and $\triangle H < T\triangle S$ d) $\triangle$ H is +ve and $\triangle H > T\triangle S$

51. Enthalpy change for the reaction
$4H_{(g)} \rightarrow 2H_{2(g)} \Delta h - 869.6\ kJ$
The dissociation energy of H_H
a) -434.8kJ b) -869.6kJ c) +434.8kJ d) +217.4kJ

52. Match List-1 (equations) with List-II (Type of processes) and select the correct option
$\Delta G^{\circ} < RT \ln Q$
a) Spontaneous and endothermic b) Equilibrium c) Non spontaneous d) Spontaneous

53. From the given reactions,
$S_{(s)} + \frac{3}{2} O_{2(g)} \rightarrow SO_{3(g)}$ + 2x kcal
$SO_{2(s)} + \frac{1}{2} O_{2(g)} \rightarrow SO_{3(g)}$ + y kcal The heat of formation of SO_2 is:
a) (x + y) b) (x-y) c) (2x + y) d) (2x - y)

54. In endothermic reactions, the reactants
a) have more energy than products b) have as much energy as the products
c) are at lowe temperature than products d) have less energy than the products

55. **Assertion:** An exothermic process which is nonspontaneous at high temperature may become spontaneous at low temperature.
Reason: Spontaneous process is an irreversible process and may be reversed by some external agency.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

56. For a reaction,
$CaCo_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$
$\triangle \int H^0(CaO) = -635.1 kJmol^{-1}$
$\triangle \int H^0(CO_2) = -393.5 kJmol^{-1}$ and
$\triangle \int H^0(CaCO_3) = -1206.9 kJmol^{-1}$
Which of the following is a correct statement?
a) A large amount of heat is evolved during the decomposition of $CaCO_3$
b)
Decomposition of $CaCO_3$ is an endothermic process and heat is provided for decomposition.
c) The amount of heat evolved cannot be calculated from the data provided.
d) $\triangle_r H^o = \sum \triangle_f H^o$(reactants) $-\sum \triangle_f H^o$(products)

57. What will be the change in internal energy when 12 kJ of work is done on the system and 2 kJ of heat is given by the system?
a) +10 kJ b) +5 kJ c) -10 kJ d) -5 kJ

58. Bond energies of some bonds are given below:
Cl- Cl = 242.8 kJ mol^{-1}, H - Cl = 431.8 kJ mol^{-1},
O- H = 464 kJ mol^{-1},O = O = 442 kJ mol^{-1}
Using the B.E., calculate tlH for the following reactoin, $2Cl_2+2H_2O \rightarrow 4HCl+O_2$
a) 906 kJ mol^{-1} b) 172.4 kJ mol^{-1} c) 198.8 kJ mol^{-1} d) 442 kJ mol^{-1}

59. What will be the heat of reaction for the following reaction? Will the reaction be exothermic or endothermic?
$Fe_2O_{3(g)}+3H_{2(g)} \rightarrow 2Fe_{(s)}+3H_2O_{(l)}$
$\triangle_f H^o(H_2O,l)$=-285.83 kJ mol^{-1}
$\triangle_f H^o(Fe_2O_3,s)$=- 824.2 kJ mol^{-1}
a) -824.2 kJ mol^{-1}, exothermic b) +33.3 kJ] mol^{-1} endothermic
c) -33.3 kJ mol^{-1}, exothermic d) +824.2 kJ mol^{-1}, endothermic

60. In thermodynamics, a process is called reversible when:
a) surrounding and system change into each other
b) there is no boundary between system and surroundings
c) The surroundings are always in equilibrium with the system
d) The system changes into surroundings spontaneously

61. Match the column I with column II and mark the appropriate choice.

Column I	Column II

(A)	$H_{2(g)}+Br_{2(g)} \longrightarrow 2HBr_{(g)}$	(i)	$\triangle H=\triangle U-2RT$
(B)	$PCl_{5(g)} \longrightarrow PCl_{3(g)}+Cl_{2(g)}$	(ii)	$\triangle H=\triangle U+3RT$
(C)	$N_{2(g)}+3H_{2(g)} \longrightarrow 2NH_{3(g)}$	(iii)	$\triangle H=\triangle U$
(D)	$2N_2O_{5(g)} \longrightarrow 4NO_{2(g)}+O_{2(g)}$	(iv)	$\triangle H=\triangle U+RT$

a) (A) →(iii), (B)→(i), (C)→ (ii), (D)→ (iv) b) (A)→(iii), (B) → (iv), (C)→ (i), (D) → (ii)
c) (A) → (ii), (B) →(i), (C)→ (iv), (D) → (iii) d) (A) → (iv), (B) → (ii), (C)→ (i), (D)→ (iii)

62. At dynamic equilibrium condition, the reaction on both the sides occurs at the same rate and the mass on both sides of the equilibrium does not undergo any change. This condition can be achieved only when the value of $\triangle$ G is
a) -1 b) +1 c) +2 d) 0

63. 200 joules of heat was supplied to a system at constant volume. It resulted in the increase in temperature of the system from 298 to 323 K. What is the change in internal energy of the system?
a) 400 J b) 200 J c) 50 J d) 150 J

64. What will be the amount of heat evolved by burning 10L of methane under standard conditions? (Given heats of formation of CH_4, CO_2 and H_2O are -76.2, -398.8 and -241.6 kJ mol^{-1} respectively)
a) 805.8 kJ b) 398.8 kJ c) 359.7 kJ d) 640.4 kJ

65. $\triangle$ H for the reaction, $OF_2 + H_2O \longrightarrow O_2 + 2HF$ (B.E. of O- F, O - H, H - F and O = O are 44, 111, 135 and 119 kcal mol^{-1}respectively)
a) - 222 kcal b) - 88 kcal c) - 111 kcal d) - 79 kcal

66. **Assertion:** The presence of reactants in a closed vessel made of conducting material is an example of a closed system.
Reason: In a closed system, there is no exchange of matter but exchange of energy is possible between the system and the surroundings.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

67. A reaction occurs spontaneous if :
a) $T\Delta S < \Delta H$ and both ΔH and ΔS are +ve b) $T\Delta S > \Delta H$ and both ΔH and ΔS are +ve
c) $T\Delta S = \Delta H$ and both ΔH and ΔS are +ve d) $T\Delta S > \Delta H$ and ΔH is +ve and ΔS is -ve

68. A reaction attains equilibrium state under standard conditions, then what is incorrect for this?
a) Equilibrium constant K = 0 b) Equilibrium constant K = 1 c) $\triangle G^o = 0$ and $\triangle H^o = T\triangle S^o$
d) $\triangle G = 0$ and $\triangle H = T\triangle S$

69. For a sample of perfect gas when its pressure is changed isothermally from P_i to P_f the entropy change is given by :
a) $\Delta S = nR \ln\left(\frac{p_f}{p_i}\right)$ b) $\Delta S = nR \ln\left(\frac{p_i}{p_f}\right)$ c) $\Delta S = nRT \ln\left(\frac{p_f}{p_i}\right)$ d) $\Delta S = RT \ln\left(\frac{p_i}{p_f}\right)$

70. If the enthalpy change for transition of liquid water to steam is 30 $kJmol^{-1}$ at 27^0C the entropy change for the process would be :
a) 1.0 J mol^{-1} K^{-1} b) 0 .1 J mol^{-1} K^{-1} c) 100 J mol^{-1} K^{-1} d) 10 J mol^{-1} K^{-1}

71. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	State function	(i)	At constant pressure
(B)	△H=q	(ii)	Specific heat
(C)	△U=q	(iii)	Entropy
(D)	Intensive property	(iv)	At constant volume

a) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶(ii) b) (A)⟶ (ii), (B)⟶ (iv), (C) ⟶ (i), (D) ⟶ (iii)
c) (A) ⟶ (ii), (B) ⟶ (iv), (C) ⟶ (iii), (D) ⟶ (i) d) (A) ⟶ (iii), (B) ⟶ (ii), (C)⟶(i), (D) ⟶ (iv)

72. For the reaction, $X_2O_{4(1)} \longrightarrow 2XO_{2(g)}$, ΔU = 2.1 kcal, ΔS = 20 cal K^{-1} at 300K. Hence, ΔG is :
a) 2.7 kcal b) -2.7 kcal c) 9.3 kcal d) - 9.3 kcal

73. Heat of combustion ΔH^o for C(s),$H_2(g)$ and $CH_4(g)$ are -94, -68 and -213 kcal/mol respectively. Then, ΔH^o for $C(s) + 2H_2(g) \longrightarrow CH_4$ is :
a) -17 kcal/mol b) -111 kcal/mol c) -170 kcal/mol d) -85 kcal/mol

74. Which of the following statements regarding Gibb's energy change is correct?
a) If △G is negative (< 0), the process is nonspontaneous.
b) If △G is positive (> 0), the process is spontaneous.
c) If △G is negative (< 0), the process is spontaneous.
d) If △G is positive (> 0), the process is in equilibrium.

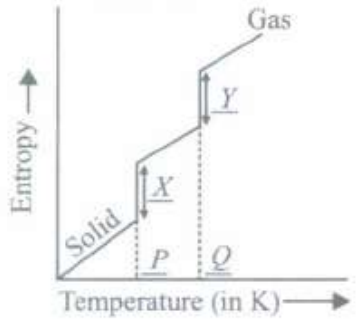
75. For the reaction ;
$C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l)$ at constant temperature
$\Delta H - \Delta E$ is
a) -RT b) +RT c) -3RT d) +3RT

76. The following two reactions are known:
$Fe_2O_{3(s)} + 3CO(g) \longrightarrow 2Fe_{(s)} + 3CO_{2(g)} \quad \Delta H = -26.8\ kJ$
$FeO_{(s)} + CO(g) \longrightarrow Fe_{(s)} + CO_{2(g)} \quad \Delta H = -16.5\ kJ$
The value of ΔH for the following reaction
$Fe_2O_{3(s)} + CO(g) \longrightarrow 2FeO_{(s)} + CO_{2(g)}$ is;
a) $+6.2\ kJ$ b) $+10.3\ kJ$ c) $-43.3\ kJ$ d) $-10.3\ kJ$

77. The entropy change can be calculated by using the expression, $\triangle S = \frac{q_{rev}}{T}$. When water freezes in a glass beaker, choose the correct statement amongst the following:
a) Δ S (system) decreases but Δ S (surroundings) remains the same
b) Δ S (system) increases but Δ S (surroundings) decreases
c) Δ S (system) decreases but Δ S (surroundings) increases
d) △ S (system) decreases but △ S (surroundings) also decreases

78. Considering entropy (S) as a thermodynamic parameter, the criterion for the spontaneity of any process is :
a) $\Delta S_{system} + \Delta S_{surrounding} > 0$ b) $\Delta S_{system} - \Delta S_{surrounding} > a$ c) $\Delta S_{system} > 0$
d) $\Delta S_{surrounding} > 0$

79. Study the following graph and fill in the blanks.



a)

X	Y	P	Q
Liquid	Gas	Freezing point	Melting point

b)

X	Y	P	Q
Boiling	Melting	Boiling point	Melting point

c)

X	Y	P	Q
Fusion	Vapori-sation	Melting point	Boiling point

d)

X	Y	P	Q
Evaporation	Vapori-sation	Fusion	Boiling

80. Standard Gibb's free energy change for the isomerisation reaction

$\text{cis-2-pen tene} \rightleftharpoons (\text{rans-2-pentene is } -3.67\text{kj/mol at } 400\text{ K.}$ If more frans-2-pentene is added to the reaction vessel, then

a) more cis-2-pentene is formed b) equilibrium remains unaffected

c) additional trans-2-pentene is formed d) equilibrium is shifted in forward direction

81. **Assertion:** The enthalpy change for the reaction

$CaO_{(s)} + CO_{2(g)} \longrightarrow CaCO_{3(s)}$ is called enthalpy of formation of calcium carbonate.

Reason: The reaction involves formation of 1 mole of $CaCO_3$ from its constituent elements.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false

82. For the reaction given below the values of standard Gibbs free energy of formation at 298 K are given. What is the nature of the reaction?

$I_2 + H_2S \longrightarrow 2HI + S$

$\triangle G_f^o$ (HI) = 1.8 kJ mol^{-1}, $\triangle G_f^o$ (H_2S)= 33.8 kJ mol^{-1}

a) Non-spontaneous in forward direction. b) Spontaneous in forward direction.

c) Spontaneous in backward direction

d) Non-spontaneous in both forward and backward directions.

83. The correct option for free expansion of an ideal gas under adiabatic condition is

a) $q > 0, \Delta T > 0 \text{ and } w > 0$ b) $q > 0, \Delta T = 0 \text{ and } w = 0$

c) q = 0, ΔT = 0 and w = 0 d) $q < 0, \Delta T = 0 \text{ and } w = 0$

84. Assume each reaction is carried out in an open container. For which reaction will $\Delta H = \Delta E$?

a) $C(s) + 2H_2O(g) \rightarrow 2H_2(g) + CO_2(g)$

b) $PCl_5(g) \rightarrow PCl_3(g) \rightarrow Cl_2(g)$ c) $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$

d) $H_2(g) + Br_2(g) \mapsto 2HBr(g)$

85. Assume each reaction is carried out in an open container. For which reaction will $\Delta H = \Delta E$?

a) $H_{2(g)} + Br_{2(g)} \longrightarrow 2HBr_{(g)}$ b) $C_{(s)} + 2H_2O_{(g)} \longrightarrow 2H_{2(g)} + CO_{2(g)}$

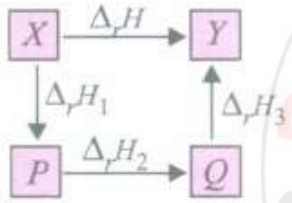
c) $PCl_{5(g)} \longrightarrow PCl_{3(g)} + Cl_{2(g)}$ d) $2CO_{(g)} + O_{2(g)} \longrightarrow 2CO_{2(g)}$

86. Which of the following statements is correct?
a) The presence of reacting species in a covered beaker is an example of open system.
b)
There is an exchange of energy as well as matter between the system and the surroundings in a closed system.
c)
The presence of reactants in a closed vessel made up of copper is an example of a closed system.
d)
The presence of reactants in a thermos flask or any other closed insulated vessel is an example of a closed system.

87. Bond dissociation enthalpies of $H_{2(g)}$ and $N_{2(g)}$ are 436.0 kJ mol^{-1} and 941.8 kJ mol^{-1}, respectively, and enthalpy of formation of $NH_{3(g)}$ is -46 kJ mol^{-1} . What are the enthalpy of atomisation of $NH_{3(g)}$ and the average bond enthalpy of N - H bond respectively (in kJ mol^{-1})?
a) 1170.9,390.3 b) 117,300 c) 300,200 d) 2000,1975

88. Hess's law is applicable for the determination of heat of
a) transition b) formation c) reaction d) all of these.

89. Which thermochemical process is shown by the following figure?



a) Standard enthalpy of a reaction b) Born - Haber cycle of lattice enthalpy
c) Hess's law of constant heat summation d) Standard enthalpy of a solution

90. The correct relationship between free energy change in a reaction and the corresponding equilibrium constant K is:
a) $\Delta G^0 = -RT\ InK$ b) $\Delta G = RTInK$ c) $\Delta G = -RT\ ln\ K$ d) $-\Delta G^\circ = RT\ ln\ K_C$

91. One mole of an ideal gas at 300 K is expanded isothermally from an initial volume of 1 L to 10 L. The ΔE for this process is (R = 2 cal mol^{-1} K^{-1}) :
a) 163.7cal b) zero c) 1381.1cal d) 8 L atm

92. What is the enthalpy change for the given reaction, if enthalpies of formation of Al_2O_3 and Fe_2O_3 are -1670 kJ mol^{-1} and -834 kJ mol^{-1} respectively?
$Fe_2O_3+2Al \rightarrow Al_2O_3+2Fe$
a) -836 kJ mol^{-1} b) + 836 kJ mol^{-1} c) - 424 kJ mol^{-1} d) + 424 kJ mol^{-1}

93. The enthalpy of hydrogenation of cyclohexane is - 119.5 kJ mol^{-1}. If resonance energy of benzene is -150.4 kJ mol^{-l}, its enthalpy of hydrogenation would be:
a) -208.1 kJ mol^{-1} b) -269.9 kJ mol^{-1} c) -358.5 kJ mol^{-1} d) -508.9 kJ mol^{-1}

94. The enthalpies of elements in their standard states are taken as zero. The enthalpy of formation of a compounds
a) may be positive or negative b) is never negative. c) is always negative
d) is always positive

95. At what temperature liquid water will be in equilibrium with water vapour?
$\triangle H_{vap}$=40.73 kJ mol^{-1}; $\triangle S_{vap}$=0.109 kJ k^{-1} mol^{-1}
a) 282.4 K b) 373.6 K c) 100 K d) 400 K

96. Which of the following expressions regarding entropy is not correct?
a) $\triangle S_{system} = \frac{q}{T}$ b) $\triangle S_{system} = \triangle S_{total} + \triangle S_{surrounding}$ c) $\triangle S = S_{final} + S_{initial}$
d) $\triangle S_{total} = \triangle S_{system} + \triangle S_{surrounding}$

97. Which of the following does not represent enthalpy change during phase transformation?
a) Standard enthalpy of fusion b) Standard enthalpy of vaporisation
c) Standard enthalpy of sublimation d) Standard enthalpy of formation

98. Which of the following reactions will have the value of $\triangle$ S with a negative sign?
a) $H_2O_{(l)} \longrightarrow H_2O_{(g)}$ b) $2SO_{2(g)}+O_{2(g)} \longrightarrow 2SO_{3(g)}$ c) $Cl_{2(g)} \longrightarrow 2Cl_{(g)}$
d) $CaCO_{(g)} \longrightarrow CaO_{(s)}+CO_{2(g)}$

99. A system absorbs 50 kJ heat and does 20 kJ of work. What is the net change in the internal energy of the system?
a) Increase by 30 kJ b) Decrease by 30 kJ c) Increase by 70 kJ d) Decrease by 70 kJ

100. The state of a gas can be described by quoting the relationship between_____.
a) pressure, volume, temperature b) temperature, amount, pressure
c) amount, volume, temperature d) pressure, volume, temperature, amount

101. Consider the following reaction:
$CO_{(g)}+\frac{1}{2}O_{2(g)} \longrightarrow CO_{2(g)}$
How are $\triangle$ U and $\triangle$ H related for the reaction?
a) $\triangle$H = $\triangle$U- 0.5RT b) $\triangle$H = $\triangle$U-RT c) $\triangle$H = $\triangle$U+ 0.5RT d) $\triangle$H = $\triangle$U- 1.5RT

102. Which of the following are not state functions?
(I) q + w
(II) q
(III) w
(IV) H - TS
a) (I) and (IV) b) (I), (III) and (IV) c) (I),(II) and (III) d) (II) and (III)

103. What will be the signs of $\triangle$ H and $\triangle$ S when NaOH is dissolved in water?

a)

$\triangle$H	$\triangle$S
-	-

b)

$\triangle$H	$\triangle$S
+	-

c)

$\triangle$H	$\triangle$S
-	+

d)

$\triangle$H	$\triangle$S
+	+

104. For a given reaction ΔH = 35.5 kJ mol^{-1} and ΔS= 83.6 JK-1 mol^{-1}. The reaction is spontaneous at: (Assume that ΔH and ΔS do not vary with temperature)
a) T < 425 K b) T > 425 K c) all temperature d) T > 298K

105. The enthalpy of solution of sodium chloride is 4 kJ mol^{-1} and its enthalpy of hydration of ions is -784 kJ mol^{-1}. What will be the lattice enthalpy of sodium chloride?
a) +780 kJ mol^{-1} b) +394 kJ mol^{-1} c) +788 kJ mol^{-1} d) +398 kJ mol^{-1}

106. What will be the melting point of KCl if enthalpy change for the reaction is 7.25 J mol^{-1} and entropy change is 0.007 J K^{-1} mol^{-1}?
a) 1835.2 K b) 173 K c) 1035.7 K d) 1285.2 K

107. **Assertion:** If both $\triangle H^o$ and $\triangle S^o$ are positive then reaction will be spontaneous at high temperature.
Reason: All processes with positive entropy change are spontaneous.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

108. Bond energies of H - H and Cl-Cl are 430 kJ mol^{-1} and 242 kJ mol^{-1} respectively. $\triangle H_f$ for HCl is 91 kJ mol^{-1}. What will be the bond energy of H - Cl?
a) 672 kJ b) 182 kJ c) 245 kJ d) 88 kJ

109. The molar heat capacity of water at constant pressure is 75 JK^{-1} mol^{-1} . When 1 kJ of heat is supplied to 100 g of water, which is free to expand, the increase in temperature of water is :
a) 6.6 K b) 1.2 K c) 2.4 K d) 4.8 K

110. Bond dissociation enthalpy of H_2Cl_2 and HCl are 434, 242 and 431 kJ mol^{-1} respectively.
a) 93 kJ mol^{-1} b) -245 kJ mol^{-1} c) -93 kJ mol^{-1} d) 245 kJ mol^{-1}

111. System in which there is no exchange of matter, work or energy from surroundings is:
a) closed b) adiabatic c) isolated d) isothermal.

112. Bond dissociation enthalpy of H_2, Cl_2 and HCl are 434, 242 and 431 kJ mol^{-1} respectively. Enthalpy of formation of HCl is:
a) 245 kJ mol^{-1} b) 93 kJ mol^{-1} c) -245 kJ mol^{-1} d) - 93 kJ mol^{-1}

113. Given that bond energies of H-H and Cl-Cl are 430 kJ mol^{-1} and 240 kJ mol^{-1} respectively and ΔH_f for HCl is -90 kJ mor^{-1}. Bond enthalpy of HCl is :
a) 290 kJ mol^{-1} b) 380 kJ mol^{-1} c) 425 kJ mol^{-1} d) 245 kJ mol^{-1}

114. A chemical reaction will be spontaneous if is accompanied by a decrease in
a) entropy of the systern b) enthalpy of the system c) internal energy of the system
d) free energy of the systern

115. How much heat is evolved if 3.2 g of methane is burnt and if the heat of combustion of methane is -880 kJ mol^{-1}?
a) 88 kJ b) 264 kJ c) 176 kJ d) 440 kJ

116. Under isothermal condition, a gas at 300 K expands from 0.1 L to 0.25 L against a constant external pressure of 2 bar. The work done by the gas is
(Given that 1 L bar = 100 J)
a) 5 KJ b) 25 J c) 30 J d) -30 J

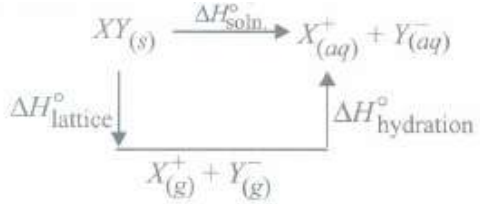
117. At absolute zero, the entropy of a pure crystal is zero. This is
a) first law of thermodynamics b) second law of thermodynamics
c) third law of thermodynamics d) zeroth law of thermodynamics.

118. For the reaction $2Cl(g) \rightarrow Cl_2(g)$, the correct option is:
a) $\Delta_r H < 0$ and $\Delta_r S < 0$ b) $\Delta_r H < 0$ and $\Delta_r S > 0$
c) $\Delta_r H > 0$ and $\Delta_r S < 0$ d) $\Delta_r H > 0$ and $\Delta_r S > 0$

119. **Assertion:** For the change, $H_2O_{(l)} \rightarrow H_2O_{(s)}$, $\triangle H = \triangle U$.
Reason: No enthalpy change is involved in this process.

a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

120. Study the figure given below and mark the correct expression.



The enthalpy of solution of XY(s). ΔH^{o}_{soln} in water can be determined by
a) $\Delta H^{o}_{lattice} = \Delta H^{o}_{hyd} + \Delta H^{o}_{soln.}$ b) $\Delta H^{o}_{hyd} = \Delta H^{o}_{lattice} + \Delta H_{soln.}$
c) $\Delta H^{o}_{soln.} = \Delta H^{o}_{lattice} + \Delta H^{o}_{hyd}$ d) $\Delta H^{o}_{soln.} = \Delta H^{o}_{lattice} X \Delta H^{o}_{hyd}$

121. What will be the work done when one mole of a gas expands isothermally from 15 L to 50 L against a constant pressure of 1 atm at 25°C?
a) - 3542 cal b) - 843.3 cal c) - 718 cal d) - 60.23 cal

122. When 5 litres of gas mixture of methane and propane is perfectly combusted at O°C and I atmosphere, 16 litre of oxygen at the same temperature and pressure is consumed. The amount of heat released from this combustion in kJ,
$(\Delta H_{comb}\,(CH_4) = 890\ kJ\ mol^{-1}, \Delta H_{comb}\,(C_3H_8) = 2220\ kJ\ mol^{-1}$ is :
a) 32 b) 38 c) 317 d) 477

123. The enthalpy of combustion of H_2, cyclohexene (C_6H_{10}) and cyclohexane (C_6H_{12}) are -241, -3800 and - 3920 kJ per mol respectively. Heat of hydrogenation of cyclohexene is :
a) - 121 kJ per mole b) + 121 kJ per mole c) + 242 kJ per mole d) - 242 kJ per mole

124. For the reaction, $C_3H_{8(g)} + 5O_{2(g)} \longrightarrow 3CO_{2(g)}\, 4H_2O_{(l)}$ at constant temperature, $\Delta H - \Delta E$ is :
a) + 3RT b) - RT c) + RT d) - 3RT

125. **Assertion:** Third law of thermodynamics is confined to pure crystalline solids.
Reason: Theoretical arguments and practical evidences have shown that entropy of solutions and super cooled liquids is not zero at 0 K.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

126. $\triangle$ G is the net energy available to do useful work and is a measure of free energy. If a reaction has positive enthalpy change and positive entropy change, under what conditions will the reaction be spontaneous?
a) $\triangle$G will be positive at low temperature hence reaction is spontaneous at low temperature.
b) $\triangle$G is negative at high temperature hence reaction is spontaneous at high temperature.
c) $\triangle$G is negative at low temperature hence reaction is spontaneous at low temperature.
d) $\triangle$G is negative at all temperatures hence reaction is spontaneous at all temperatures.

127. The value of ΔH and ΔS for the reaction, $C_{(graphite)} + CO_{2(g)} \longrightarrow 2CO_{(g)}$ are 170 kJ and 170 JK^{-1}, retpectively. This reaction will be spontaneous at:

a) 710 K b) 910 K c) 1010 K d) 510 K

128. In a closed insulated container a liquid is stirred with a paddle to increase the temperature, which of the following is true?
a) $\Delta E = \Delta W \neq 0, q = 0$ b) $\Delta E = W = 0, q \neq 0$ c) $\Delta E = 0, W = 0, q \neq 0$
d) $W = 0, \Delta E = 0, q \neq 0$

129. Standard enthalpy of vaporisation $\Delta_{vap} H^0$ for water at 100°C is 40.66 kJ mol^{-1}. The internal energy of vaporization of water at 100°C (in kJ mol^{-1}) is: (assume water vapour to behave like an ideal gas).
a) +37.56 b) -43.76 c) +43.76 d) +40.66

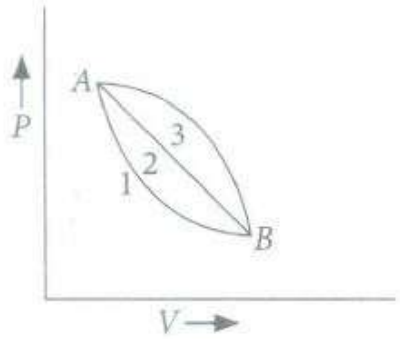
130. Identify the correct statement regarding entropy.
a)
At absolute zero temperature, entropy of a perfectly crystalline substance is taken to be zero
b) At absolute zero temperature, the entropy of a perfectly crystalline substance is positive
c) At absolute zero temperature, the entropy of all crystalline substances is to be zero
d) At 0°C. the entrop,v of a perfectly crystalline substance is taken to be zero

131. **Assertion:** Heat of neutralisation of HNO_3 and NaOH is same as that of HCl and KOH.
Reason: Both HNO_3 and HCl are strong acids and NaOH and KOH are strong bases.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

132. The enthalpy and entropy change for the reaction
$Br_2(l) + Cl_2(g) \rightarrow 2BrCl(g)$ are
$30\ kJ\ mol^{-1}$ and $105 JK^{-1}\ mol^{-1}$ respectively. The temperature at which the reaction will be in equilibrium is
a) 273 K b) 450 K c) 300 K d) 285.7 K

133. **Assertion:** $\triangle$ H for an exothermic reaction is negative and for an endothermic reaction is positive.
Reason: Enthalpy is an extensive property.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

134. A given mass of gas expands from state A to state B by three paths 1, 2 and 3 as shown in the figure:



If w_1, w_2 and w_3 respectively, be the work done by the gas along three paths, then
a) $w_1 > w_2 > w_3$ b) $w_1 < w_2 < w_3$ c) $w_1 = w_2 = w_3$ d) $w_12; w_13$

135. The enthalpy change of a reaction does not depend upon:
a) state of reactants and products b) nature of reactants and products
c) different intermediate reaction d) initial and final enthalpy change of a reaction.

136. The heat of combustion of ethane and benzene is -1560 and -3268 kJ mol^{-1} respectively. Which of two has higher efficiency as fuel per gram and the amount of heat produced per gram?
a) Benzene, 41.9 kJ g^{-1} b) Ethane, 52 kJ g^{-1} c) Benzene, 78 kJ g^{-1} d) Ethane, 30 kJ g^{-1}

137. Given the following entropy values (in JK^{-1} mol^{-1}) at 298 K and 1 atm $H_2(g)$: 130.6, $Cl_2(g)$: 223.0, HCl(g) : 186.7.The entropy change (in JK^{-1} mol^{-1}) for the reaction $H_{2(g)} + Cl_{2(g)} \longrightarrow 2HCl_{(g)}$, is :
a) + 540.3 b) +727.0 c) -166.9 d) + 19.8

138. Enthalpy change for the reaction, $4H_{(g)} \longrightarrow 2H_{2(g)}$ is - 869.6 kJ This dissociation energy of H-H bond is :
a) - 869.6 kJ b) + 434.8 kJ c) + 217.4 kJ d) - 434.8 kJ

139. For the reaction,
$N_2 + 3H_2 \rightleftharpoons 2NH_3, \quad \Delta H = ?$
a) $\Delta E + 2RT$ b) $\Delta E - 2RT$ c) $\Delta H = RT$ d) $\Delta E - RT$

140. Which is the correct thermal stability order for H_2E (E = O, S, Se, Te and Po)
a) $H_2O < H_2S < H_2Se < H_2Te < H_2Po$
b) $H_2Po < H_2Te < H_2Se < H_2S < H_2O$ c)
d) $H_2S < H_2O < H_2Se < H_2Te < H_2Po$

141. For the gas phase reaction,
$PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$
which of the following conditions are correct?
a) $\Delta H = 0$ and $\Delta S < 0$ b) $\Delta H > 0$ and $\Delta S > 0$
c) $\Delta H < 0$ and $\Delta S < 0$ d) $\Delta H > 0$ and $\Delta S < 0$

142. Formation of ammonia is shown by the reaction,
$N_{2(g)} + 3H_{2(g)} \longrightarrow 2NH_{3(g)}$; $\triangle_r H^o = -91.8$ kJ mol^{-1}
What will be the enthalpy of reaction for the decomposition of NH_3 according to the reaction?
$2NH_{3(g)} \longrightarrow N_{2(g)} + 3H_{2(g)}$; $\triangle_r H^o = ?$
a) -91.8 kJ mol^{-1} b) + 91.8 kJ mol^{-1} c) - 45.9 kJ mol^{-1} d) + 45.9 kJ mol^{-1}

143. The total entropy change ($\triangle S_{total}$) for the system and surrounding of a spontaneous process is given by
a) $\triangle S_{total} = \triangle S_{system} \triangle S_{surr} > 0$ b) $\triangle S_{total} = \triangle S_{system} \triangle S_{surr} < 0$
c) $\triangle S_{system} = \triangle S_{total} \triangle S_{surr} > 0$ d) $\triangle S_{surr} = \triangle S_{total} \triangle S_{system} > 0$

144. According to the first law of thermodynamics, $\triangle U = q + w$. In special cases the statement can be expressed in different ways. Which of the following is not a correct expression?
a) At constant temperature: q = -w b) When no work is done: $\triangle U = q$
c) In gaseous system: $\triangle U = q + P\triangle V$ d) When work is done by the system: $\triangle U = q + w$

145. Match the following columns and mark the appropriate choice.

Column I		Column II	
(A)	Exothermic	(i)	△H=0.△E=0
(B)	Spontaneous	(ii)	△G=0
(C)	Cyclic process	(iii)	△H is negative
(D)	Equilibrium	(iv)	△G is negative

a) (A) →(ii), (B) → (iii), (C)→ (i), (D)→ (iv) b) (A) → (iv), (B) → (i), (C) → (iii), (D) → (ii)
c) (A)→ (i), (B) → (ii), (C)→ (iv), (D) → (iii) d) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

146. According to the third law of thermodynamics which one of the following quantities for a perfectly crystalline solid is zero at absolute zero?
a) Free energy b) Entropy c) Enthalpy d) Internal energy

147. The enthalpy of fusion of water is 1.435 kcal/mole. The molar entropy change for the melting of ice at 0^0C is:
a) 10.52 cal/mol K b) 21.04 cal/mol K c) 5.260 cal/mol K d) 0.526 cal/mol K

148. △ U^o of combustion of $CH_{4(g)}$ at certain temperature is - 393 kJ mol^{-1}. The value of △ H^o is
a) zero b) <△U^o c) >△U^o d) equal to △U^o

149. For a reaction to be spontaneous at any temperature, the conditions are
a) $\triangle H = +ve, \triangle S = +ve$ b) $\triangle H = -ve, \triangle S = -ve$ c) $\triangle H = +ve, \triangle S = -ve$
d) $\triangle H = -ve, \triangle S = +ve$

150. A reaction is at equilibrium at 100°C and the enthalpy change for the reaction is 42.6 kJ mol^{-1}. What will be the value of △ S in J K^{-1} mol^{-1}.
a) 120 b) 426.2 c) 373.1 d) 114.2

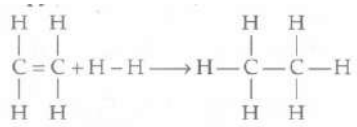
151. What will be the enthalpy of combustion of carbon to produce carbon monoxide on the basis of data given below:
$C_{(s)}+O_{2(g)} \longrightarrow CO_{2(g)}$-393.4 kJ
$CO_{(g)}+\frac{1}{2} O_{2(g)} \longrightarrow CO_{2(g)}$-283.0 kJ
a) + 676.4 kJ b) - 676.4 kJ c) -110.4 kJ d) + 110.4 kJ

152. Enthalpy of $CH_4 + \frac{1}{2}O_2 \rightarrow CH_3OH$ is negative. If enthalpy of combustion of CH_4 and CH_3OH are x and y respectively, then which relation is correct
a) $x > y$ b) $x < y$ c) $x = y$ d) $x \geq y$

153. Consider the reactions given below. On the basis of these reactions find out which of the algebric relations given in options (a) to (d) is correct?
(i) $C_{(g)} + 4H_{(g)} \longrightarrow CH_{4(g)}$; △ $_rH$ = x kJ mol^{-1}
(ii) $C_{(graphites,)} + 2H_{2(g)} \longrightarrow CH_{4(g)}$; △ $_rH$= Y kJ mol^{-1}
a) x=y b) x=2y c) x>y d) x > y

154. From the following bond energies
H-H bond energy: 431.37 kJ mol^{-1}
C=C bond energy: 606.10 kJ mol^{-1}
C-C bond energy: 336.49 kJ mol^{-1}
C-H bond energy: 410.50 kJ mol^{-1}

Enthalpy for the reaction,



will be :

a) 1523.6 kJ mol^{-1} b) - 243.6 kJ mol^{-1} c) -120.0 kJ mol^{-1} d) 553.0 kJ mol^{-1}

155. Equal volumes of molar hydrochloric acid and sulphuric acid are neutralized by dilute NaOH solution and x kcal andy kcal of heat are liberated respectively. Which of the following is true?

a) x = y b) $x = \frac{1}{2}y$ c) x = 2y d) none of the above

156. Unit of entropy is :

a) JK^{-1} mol^{-1} b) J mol^{-1} c) $J^{-1}K^{-1}$ mol^{-1} d) JK mol^{-1}

157. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	$CH_{4(g)}+2O_{2(g)} \longrightarrow CO_{2(g)}$	(i)	$\triangle_{sol}H^o$
(B)	$H_{2(g)} \longrightarrow 2H_{(g)}$	(ii)	$\triangle_{lattice}H^o$
(C)	$NaCl_{(s)} \longrightarrow Na^+ + Cl^-$	(iii)	$\triangle_c H^o$
(D)	$NaCl_{(s)} \longrightarrow Na^+_{(aq)} + Cl^-_{(aq)}$	(iv)	$\triangle_{bond}H^o$

a) (A)⟶ (iv), (B) ⟶ (iii), (C)⟶ (i), (D) ⟶(ii) b) (A) ⟶ (ii), (B) ⟶(i), (C) ⟶ (iv), (D) ⟶ (iii)

c) (A) ⟶ (i), (B) ⟶ (ii), (C)⟶ (iii), (D)⟶(iv) d) (A)⟶ (iii), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (i)

158. Change in enthalpy for reaction, $2H_2O_2(l) \longrightarrow 2H_2O(1) + O_2(g)$ If heat of formation of $H_2O_2(1)$ and $H_2O(l)$ are -188 and -286 kJ/mol respectively:

a) -196 kJ/mol b) + 196 kJ/mol c) + 948 kJ/mol d) - 948 kJ/mol

159. Consider entropy (S) as a thermodynamic parameter, the criterion for the spontaneity of any process is

a) $\Delta S_{system} + \Delta S_{surroundings} > 0$ b) $\Delta S_{system} - \Delta S_{surroundings} > 0$

c) $\Delta S_{system} > 0$ only d) $\Delta S_{surroundings} > 0$ only

160. The absolute enthalpy of neutralization of the reaction will be: $MgO_{(s)} + 2HCl_{(aq)} \longrightarrow MgCl_2(aq) + H_2O(l)$

a) less than -57.33 kJ mol^{-l} b) -57.33 kJ mol^{-1} c) greater than -57.33 kJ mol^{-1}

d) 57.33 kJ mol^{-1}

161. **Assertion:** The difference between $\triangle$ H and $\triangle$ U is not Significant for systems consisting of only solids and/or liquids.

Reason: Solids and liquids do not suffer any significant volume changes upon heating.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false

162. For the cell reaction

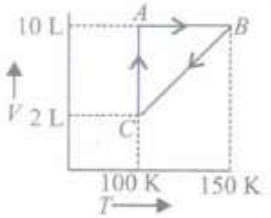
$2Fe^{3+}(aq)2I^{-}(aq) \rightarrow 2Fe^{2+}(aq)I_2(aq)E^{-}_{cell} = 0.24\ V$ at 298 k The standard Gibbs energy $(\Delta_r G^{-})$ of the cell reaction is:

[Given that Faraday constant F = 96500 C mol^{-1}]

a) $-23.16\ kJ\ mol^{-1}$ b) $46.32\ kJ\ mol^{-1}$ c) $23.16\ kJ\ mol^{-1}$
d) $-46.32\ kJ\ mol^{-1}$

163. If enthalpy of an overall reaction X ⟶Y along one route is △ _rH and △ $_rH_1$, △ $_rH_2$, △ $_rH_3$... representing enthalpies of reactions leading to same product Y then △ $_rH$ is
a) $\triangle_rH=\triangle_rH_1+\triangle_rH_2+\triangle_rH_3$... b) $\triangle_rH=\triangle_rH_1x\triangle_rH_2x\triangle_rH_3$... c) $\triangle_rH=\triangle_rH_1+\triangle_rH_2-\triangle_rH_3$...
d) $\triangle_rH=\frac{\triangle_rH_1\times\triangle_rH_2\times\triangle_rH_3}{2}$

164. Consider the given diagram for 1 mole of a gas X and answer the following question.



The process A ⟶ B represents
a) isobaric change b) isothermal change c) adiabatic change d) isochoric change

165. The work done during the expansion of a gas from a volume of 4 dm^3 to 6 dm^3 against a constant external pressure of 3 atm, is:
a) - 6 J b) - 608 J c) + 304 J d) - 304 J

166. Enthalpy of the reaction, $CH_4 + \frac{1}{2} O_2 \longrightarrow CH_3OH$, is negative. If enthalpy of combustion of CH_4 and CH_3OH are X and Y respectively, then which relation is correct?
a) x> y b) x < y c) x = y d) x ≥ y

167. For a reaction: X⟶ Y + Z
Absolute entropies are X = 120 J K^{-1} mol^{-1},
Y = 213.8 J K^{-1} mol^{-1} and Z = 197.9 J K^{-1} mol^{-1}.
What will be the entropy change at 298K and 1atm?
a) 291.7 J K^{-1} b) 255 J K^{-1} c) 213.8 J K^{-1} d) 257.3 J K^{-1}

168. For a given reaction, $\Delta H = 35.5\ kJ\ mol^{-1}$ and $\Delta S = 83.6JK^{-1}\ mol^{-1}$.
The reaction is spontaneous at : (Assume that ΔH and ΔS do not vary with temperature:
a) T > 425 K b) All temperatures c) T > 298 K d) T < 425 K

169. When the system does not exchange heat with the surroundings, the process is:
a) isothermal b) adiabatic c) thermal d) isochoric.

170. What is the entropy change when 1 mole oxygen gas expands isothermally and reversibly from an initial volume of 10 L to 100 L at 300 K?
a) 19.14 J K^{-1} b) 109.12 J K^{-1} c) 29.12 J K^{-1} d) 10 J K^{-1}

171. The correct thermodynamic conditions for the spontaneous reaction at all temperatures is
a) $\Delta H < 0$ and $\Delta S = 0$ b) $\Delta H > 0$ and $\Delta S < 0$
c) $\Delta H < 0$ and $\Delta S > 0$ d) $\Delta H < 0$ and $\Delta S < 0$

172. For an isothermal reversible expansion process, the value of q can be calculated by the expression
a) q = 2.303nRT log $\frac{V_2}{V_1}$ b) q = -2.303nRT log $\frac{V_2}{V_1}$ c) q = 2.303nRT log $\frac{V_1}{V_2}$
d) q = -P_{exp}nRT log $\frac{V_1}{V_2}$

173. The work done during the expansion of a gas from a volume of 4 dm^3 to 6 dm^3 against a constant external pressure of 3 atm is:
a) -6 J b) -608 J c) + 304 J d) - 304 J

174. What will be $\triangle$ G for the reaction at 25°C when partial pressures of reactants H_2, CO_2, H_2O and CO are 10, 20, 0.02 and 0.01 atm respectively. (Given: $G^o_{H_2O}$ = -228.58 kJ, G^o_{CO} = -137.15 kJ, $G^o_{CO_2}$ = -394.37 kJ.
a) +5.61 kJ b) -5.61 kJ c) 7.09 kJ d) -8.13 kJ

175. Which of the following is correct option for free expansion of an ideal gas under adiabatic condition?
a) q = 0; ΔT = 0; w = 0 b) $q \neq 0, \Delta T = 0, w = 0$ c) $q = 0, \Delta T \neq 0, w = 0$
d) $q = 0, \Delta T < 0, w \neq 0$

176. What will be the standard internal energy change for the reaction at 298 K?
$OF_{2(g)}+H_2O_{(g)} \longrightarrow O_{2(g)}+2HF_{(g)}$; $\triangle H^o$ = -310 KJ
a) -312.5 kJ b) -125.03 kJ c) -310 kJ d) -156 kJ

177. Which of the following relationships is not correct for the relation between $\triangle$ H and $\triangle$ U?
a) When $\triangle n_g = 0$ then $\triangle H = \triangle U$ b) When $\triangle n_g > 0$ then $\triangle H > \triangle U$
c) When $\triangle n_g < 0$ then $\triangle H < \triangle U$ d) When $\triangle n_g RT = 0$ then $\triangle H > \triangle U$

178. What is the entropy change (in JK^{-1} mol^{-1}) when one mole of ice is converted into water at 0^0C? (The enthalpy change for the conversion of ice to liquid water is 6.0 kJ mol^{-1} at 0^0C)
a) 2.198 JK^{-1} mol^{-1} b) 21.98 JK^{-1} mol^{-1} c) 21.98 JK^{-1} mol^{-1} d) 2.013 JK^{-1} mol^{-1}

179. Match List-1 (Equations) with List-II (Type of processes) and select the correct option
$K_p > Q$
a) Spontaneous and endothermic b) Equilibrium c) Non spontaneous d) Spontaneous

180. If the heat change at constant volume for decomposition of silver oxide is 80.25 kJ, what will be the heat change at constant pressure?
a) 80.25 kJ b) > 80.25 kJ c) < 80.25 kJ d) 160.50 kJ

181. For a reaction: $C_{(s)}+O_{2(g)} \longrightarrow CO_{2(g)}$
What is the relation between enthalpy of reaction ($\triangle H_r$), enthalpy of formation of CO_2 ($\triangle H_f$) and enthalpy of combustion of carbon ($\triangle H_{comb}$)?
a) $\triangle H_r > \triangle H_f = \triangle H_{comb}$ b) $\triangle H_r = \triangle H_f = \triangle H_{comb}$ c) $\triangle H_r = \triangle H_f + \triangle H_{comb}$ d) $\triangle H_r = 2 \times \triangle H_f$

182. Two reactions are given below:
$C_{(graphite)}+O_{2(g)} \longrightarrow CO_{2(g)}$; $\triangle$ H=-393.7 kJ;
$C_{(diamond)} \longrightarrow C_{(graphite)}$; $\triangle$ H=-2.1 kJ
What quantity of diamond will give 800 kJ of heat on burning?
a) 24.25 g b) 15.24 g c) 2 g d) 12.12 g

183. Equal volumes of two monoatomic gases, A and B, at same temperature and pressure are mixed. The ratio of specific heats (C_p/C_v) of the mixture will be
a) 0.83 b) 1.50 c) 33 d) 1.67

184. **Assertion:** In adiabatic system $\triangle U = w_{ad}$.
Reason: In adiabatic system, no transfer of heat takes place.

a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

185. The densities of graphite and diamond at 298 K are 2.25 and 3.31 g cm^{-3}, respectively. If the standard free energy difference (ΔG^0) is equal to 1895 J mol^{-1}, the pressure at which graphite will be transformed into diamond at 298 K is :
a) 9.92 x 10^6 Pa b) 9.92 x 10^5 Pa c) 9.92 x 10^8 Pa d) none of these

186. Thermodynamics is not concerned about _____.
a) energy changes involved in a chemical reaction
b) the extent to which a chemical reaction proceeds
c) the rate at which a reaction proceeds d) the feasibility of a chemical reaction

187. Reaction of methanol with dioxygen was carried out and $\triangle$ U was found to be - 726 kJ mol^{-1} at 298 K. The enthalpy change for the reaction will be
$CH_3OH_{(l)} + \frac{3}{2} O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$;
$\triangle$ H=-726 kJmol^{-1}
a) -741.5 kJ mol^{-1} b) -727 kJ mol^{-1} c) +741.5 kJ mol^{-1} d) +727.2 kJ mol^{-1}

188. If the bond energies of H-H, Br-Br and H-Br are 433,192 and 364 kJ mol^{-1} respectively, then ΔH^0 for the reaction $H_{2(g)} + Br_{2(g)} \rightarrow 2HBr_{(g)}$ is:
a) -261 kJ b) +103 kJ c) +261 kJ d) -103 kJ

189. For a reaction, $2K_{(g)} + L_{(g)} \rightarrow 2M_{(g)}$; $\triangle U^0$ = -10.5 kJ and $\triangle S^0$ = - 44.1 J K^{-1}. Calculate $\triangle G^o$ for the reaction and predict whether the reaction will be spontaneous or non-spontaneous?
a) $\triangle$G = + 0.16 kJ, non-spontaneous b) $\triangle$G = - 0.16 kJ, spontaneous
c) $\triangle$G = + 26.12 kJ, non-spontaneous d) $\triangle$G = -26.12 kJ, spontaneous

190. The heat of combustion of carbon to CO_2 is - 393.5 kJ/mol. The heat released upon formation of 35.2 g of CO_2 from carbon and oxygen gas is :
a) + 315 kJ b) - 630 kJ c) - 3.15 kJ d) - 315 kJ

191. Three moles of an ideal gas expanded spontaneously into vacuum. The work done will be :
a) Zero b) Infinite c) 3 Joules d) 9 Joules

192. In which of the following reactions, standard entropy change (ΔS°) is positive and standard Gibb's energy change (ΔS°) decreases sharply with increasing temperature?
a) $\mathrm{C\ graphite} + \frac{1}{2}\mathrm{O_2(g)} \rightarrow \mathrm{CO(g)}$ b) $\mathrm{CO(g)} + \frac{1}{2}\mathrm{O_2(g)} \rightarrow \mathrm{CO_2(g)}$
c) $\mathrm{Mg(s)} + \frac{1}{2}\mathrm{O_2(g)} \rightarrow \mathrm{MgO(s)}$
d) $\frac{1}{2}\mathrm{C\ graphite} + \frac{1}{2}\mathrm{O_2(g)} \rightarrow \frac{1}{2}\mathrm{CO_2(g)}$

193. When 1 mol of a gas is heated at constant volume, temperature is raised from 299 to 30g K. If heat supplied to the gas is 500 J, then which statement is correct?
a) $q = w = 500\ \mathrm{J}, \Delta\mathrm{U} = 0$ b) $q = \Delta\mathrm{U} = 500\ \mathrm{J}, w = 0$
c) $\mathrm{q} = -w = 500\ \mathrm{J}, \Delta\mathrm{U} = 0$ d) $\Delta\mathrm{U} = 0, q = w = -500\ \mathrm{J}$

194. The equilibrium constant for a reaction is 10. What will be the value of $\triangle G^\theta$?
R = 8.314 JK^{-1} mol^{-1}T = 300K.

a) -5.744 kJ b) -574 kJ c) + 11.48 kJ d) + 5.74 kJ

195. Match List-1 (equations) with List-II (Type of processes) and select the correct option

$T > \frac{\Delta H}{\Delta S}$

a) Equilibrium b) Spontaneous and endothermic c) Non spontaneous d) spontaneous

196. The value for $\triangle$ U for the reversible isothermal evaporation of 90 g water at 100°C will be ($\triangle H_{evap}$ of water = 40.8 kJ mol^{-1} , R = 8.314 J K^{-l} mol^{-1})

a) 125.03 kJ b) 4800 kJ c) 188.494 kJ d) 40.8 kJ

197. What is the enthalpy change for ,

$2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$ if heat of formation of $H_2O_2(l)$ and $H_2O(l)$ are -188 and -286 kJ/mol respectively?

a) -196 kJ/mol b) $+948$ kJ/mol c) $+196$ kJ/mol d) -948 kJ/mol

198. For vaporisation of water I atmospheric pressure, the values of

ΔH and ΔS are 40.63 kJ mol^{-1} and 108.8JK^{-1} mol^{-1}, respectively. The temperature when Gibbs energy change (G) for this transformation will be zero is;

a) 293.4 K b) 273.4 K c) 393.4 K d) 373.4 K

199. Consider the following reaction:

(i) $H^+_{(aq)} + OH^-_{(aq)} = H_2O(l)$

$\Delta H = -X_1$ kJ mol^{-1}

(ii) $H_{2(g)} + \frac{1}{2}O_{2(g)} = H_2O(l)$

$\Delta H = -X_2$ kJ mol^{-1}

(iii) $CO_{2(g)} + H_{2(g)} = CO_{(g)} + H_2O_2$

$\Delta H = -X_3$ kJ mol^{-1}

(iv) $C_2H_{2(g)} + \frac{5}{2}O_{2(g)} = 2CO_{2(g)} + H_2O(l)$

$\Delta H = +4X_4$ kJ mol^{-1}

Enthalpy of formation of H_2On is

a) $+X_3$ kJ mol^{-1} b) $-X_4 kJmol^{-1}$ c) $+X_1 kJmol^{-1}$ d) $-X_2 kJmol^{-1}$

200. In an adiabatic expansion of ideal gas:

a) W=-$\triangle$ U b) W=$\triangle$ E c) $\triangle$ U=0 d) W=0

201. H_2 gas is mixed with air at 25°C under a pressure of 1 atmosphere and exploded in a closed vessel. The heat of the reaction, $H_{2(g)} + \frac{1}{2} O_{2(g)} \longrightarrow H_2O(v)$ at constant volume, $\triangle$ U298 K = -240.60 kJ mol^{-1} and C_v values for H_2O vapour and N_2 in the temperature range 298 K and 3200 K are 39.06 $JK^{-1}mol^{-1}$ and 26.40 $JK^{-1}mol^{-1}$ respectively. The explosion temperature under adiabatic conditions is (Given: nN_2 = 2)

a) 2900 K b) 2900°C c) 2917 K d) 3000°C

202. Which of the following relationships is not correct?

a) $\triangle H = \triangle U + \triangle n_g RT$ b) $\triangle H_{sub} = \triangle H_{fusion} + \triangle H_{vap}$ c) $\triangle H_r^o = \Sigma H^o_{f(reactants)} - \Sigma H^o_{f(products)}$

d) $\triangle H_r^o = \Sigma B.E.$ of reactants-$\sum$B.E of products

203. The enthalpy of formation of ammonia when calculated from the following bond energy data is (B.E. of N - H, H - H, N≡N is 389 kJ mort, 435 kJ mol^{-1}, 945.36 kJ mol^{-1} respectively)

a) 41.82 kJ mol^{-1} b) + 83.64 kJ mol^{-1} c) - 945.36 kJ mol^{-1} d) - 833 kJ mol^{-1}

204. Enthalpy of sublimation of a substance is equal to
a) enthalpy of fusion + enthalpy of vapourisation b) enthalpy of fusion
c) enthalpy of vapourisation d) twice the enthalpy of vapourisation .

205. In the reaction : S + 3/2 O_2 ⟶ SO_3 + 2x kcal and SO_2 + 1/2O_2⟶ SO_3 + Y kcal, heat of formation of SO_2 is
a) (x + y) b) (x-y) c) (2x +y) d) (2x - y)

206. Identify the correct statement for change of Gibbs energy for a system (ΔG_{system}) at constant temperature and pressure :
a) If $\Delta G_{system} = 0$, the system has attained equilibrium.
b) If $\Delta G_{system} = 0$ the system is still moving in a particular direction
c) If $\Delta G_{system} < 0$, the process is not spontaneous
d) If $\Delta G_{system} > 0$, the process is not spontaneous

207. Match List-1 (equations) with List-II (Type of processes) and select the correct option
$K_P = Q$
a) Non spontaneous b) Spontaneous c) Spontaneous and endothermic d) Equilibrium

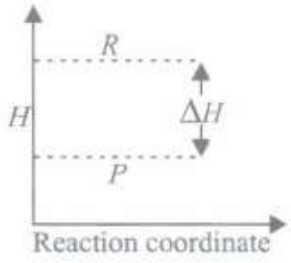
208. If the enthalpy change or the transition of liquid water to steam is $30\ kJ\ mol^{-1}$ at $27^\circ C$, the entropy change for the process would be:
a) $10\ J\ mol^{-1}\ K^{-1}$ b) $10\ J\ mol^{-1}\ K^{-1}$ c) $0.1\ J\ mol^{-1}\ K^{-1}$
d) $100\ J\ mol^{-1}\ K^{-1}$

209. **Assertion:** The solubility of must salts in water increases with rise of temperature.
Reason: For most of the ionic compounds, $\triangle_{sol}H^o$ is positive and the dissociation process is endothermic.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

210. Consider the following processes:
$\Delta H(kJ/mol)$
$1/2\ A \rightarrow B \quad +150$
$3B \rightarrow 2C + D \quad -125$
$E + A \rightarrow 2D \quad +350$
For $B + D \rightarrow E + 2C, \Delta H$ will be:
a) $525\ kJ/mol$ b) $-175\ kJ/mol$ c) $-325\ kJ/mol$ d) $325\ kJ/mol$

211. Consider the following reaction occurring in an automobile $2C_8H_{18(g)} + 25O_{2(g)} \longrightarrow 16CO_{2(g)} + 18H_2O_{(g)}$ The sign of ΔH, ΔS and ΔG would be :
a) +, -, + b) -, +, - c) -, +, + d) +, +, -

212. Study the given graph and choose the correct option.



a) ΔH =Net heat absorbed from the surroundings

b) ΔH is the Net heat given to the surroundings c) ΔH =+ve for the reaction

d) ΔH =Total energy possessed by the reactants

213. **Assertion:** In the process, $H_{2(g)} \longrightarrow 2H_{(g)}$, entropy increases.

Reason: Breaking of bonds is an endothermic process.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false

214. For the gas phase reaction, $PCl_{5(g)} \text{-} PCl_{3(g)} + Cl_{2(g)}$ Which of the following conditions are correct?

a) $\Delta H = 0$ and $\Delta S < 0$ b) $\Delta H > 0$ and $\Delta S > 0$ c) $\Delta H < 0$ and $\Delta S < 0$ d) $\Delta H > 0$ and $\Delta S < 0$

215. Two reactions are given below:

(i) $CO_{(g)} + \frac{1}{2} O_2(g) \longrightarrow CO_2(g)$

(ii) $Ag_2O_{(s)} \longrightarrow 2Ag_{(s)} + \frac{1}{2} O_{2(g)}$

Which of the following statements is true?

a) For (i) $\triangle H < \triangle E$ and for (ii) $\triangle H > \triangle E$ b) For (i) $\triangle H > \triangle U$ and for (ii) $\triangle H < \triangle U$

c) For both (i) and (ii) $\triangle H > \triangle U$ d) For both (i) and (ii) $\triangle H < \triangle U$

216. The statement" The change of enthalpy of a chemical reaction is same whether the reaction takes place in one or several steps" is

a) Le Chatelier's law b) van't Hoff's law c) first law of thermodynamics d) Hess's law.

217. In a reaction P + Q ⟶ R + S, there is no change in entropy. Enthalpy change for the reaction ($\triangle$ H) is 12 kJ mol^{-1}. Under what conditions, reaction will have negative value of free energy change?

a) If $\triangle H$ is positive. b) If $\triangle H$ is negative c) If $\triangle H$ is 24kJ mol^{-1}

d) If temperature of reaction is high.

218. For which one of the following equation is ΔH°_{react} equal to ΔH°_{f} for the product?

a) $Xe_{(g)} + 2F_{2(g)} \longrightarrow XeF_{4(g)}$ b) $2CO_{(g)} + O_{2(g)} \longrightarrow 2CO_{2(g)}$ c) $N_{2(g)} + 3O_{(g)} \longrightarrow N_2O_{3(g)}$

d) $CH_{4(g)} + 2Cl_{2(g)} \longrightarrow CH_2Cl_{2(1)} + 2HCl_{(g)}$

219. For an ideal gas, consider only P- V work in going from an initial state X to the final state Z. The final state Z can be reached by either of the two paths shown in the figure. Which of the following choice(s) is (are) correct? [Take Ao as change in entropy and W as work done]

a) $\Delta S_{X \to Z} = \Delta S_{X \to Y} + \Delta S_{Y \to Z}$ b) $w_{X \to Z} = w_{X \to Y} + w_{Y \to Z}$ c) $w_{X \to Y \to Z} \neq w_{X \to Y}$ d) $\Delta S_{X \to Y \to Z} = \Delta S_{X\text{-}Y}$

220. A reaction having equal energies of activation for forward and reverse reactions has:

a) $\Delta S = 0$ b) $\Delta G = 0$ c) $\Delta H = 0$ d) $\Delta H = \Delta G = \Delta S = 0$

221. A system changes from state X to Y with a change in internal energy measuring to 25 kJ mol^{-1}, by a reversible path and returns from Y to X by an irreversible path. What will be the net change in internal energy?
a) 25 kJ b) > 25 kJ c) < 25 kJ d) zero

222. Which of the following are not state functions?
(I) q + W, (II) q, (III) W, (IV) H - TS
a) I and IV b) II, III and IV c) I, II and III d) II and III

223. If ΔH is the change in enthalpy and ΔE, the change in internal energy accompanying a gaseous reaction?
a) ΔH is always greater than ΔE
b)
ΔH < ΔE only if the number of moles of products is greater than the number of moles of the reactants
c) ΔH is always less than ΔE
d)
ΔH < ΔE only if the number of moles of products is less than the number of moles of the reactants

224. The heat of combustion of C, S and CS_2 are -393.3 kJ, -293.7 kJ and -1108.76 kJ. What will be the heat of formation of CS_2?
a) -128.02 kJ b) +1108.7kJ c) +970 kJ d) +12kJ

225. A gas is allowed to expand in a well insulated container against a constant external pressure of 2.5 atm from an initial volume of 2.50 L to a final volume of 4.50 L. The change in internal energy △U of the gas in joules will be:
a) -500 J b) -505 J c) +505 J d) 1136.25 J

226. Which of the following statements is correct for the spontaneous absorption of a gas?
a) ΔS is negative and therefore, ΔH should be highly positive
b) ΔS is negative and therefore, ΔH should be highly negative.
c) ΔS is positive and therefore, ΔH should be negative.
d) ΔS is positive and therefore, ΔH should also be highly positive.

227. One word answer is given for the following definitions. Mark the one which is incorrect.
a) The process in which temperature remains constant: Isobaric
b) The process in which volume remains constant: Isochoric
c)
The relation between △H and △U when all the reactants and products are solid: △H = △U
d) The relation between △G, △H and S△ : △G = △H - T△S

228. If enthalpies of formation of $C_2H_4(g)$, $CO_2(g)$ and $H_2O(l)$ at 25°C and 1 atm pressure are 52, -394 and - 286 kJ/mol^{-1}respectively, then the enthalpy of combustion of $C_2H_4(g)$ will be:
a) -141.2 kJ/mol b) -1412 kJ/mol^{-1} c) + 14.2 kJ/mol d) + 1412 kJ/mol

229. Which of the following processes is a nonspontaneous process?
a) Dissolution of salt or sugar in water b) Mixing of different gases through diffusion
c) Precipitation of copper when zinc rod is dipped in aqueous solution of copper sulphate
d) Flow of heat from a cold body to a hot body in contact

230. The volume of gas is reduced to half from its original volume. The specific heat will _____.

a) be reduced to half b) be doubled c) remain constant d) be increased four times

231. Standard enthalpy and standard entropy changes for the oxidation of ammonia at 298 K are -382.64 kJ mol^{-1} and -145.6 kJ mol^{-1}, respectively. Standard Gibb,s energy change for the same reaction at 298 K is

a) -22.1 kJ mol^{-1} b) -339.3 kJ mol^{-1} c) -439.3 kJ mol^{-1} d) -523.2 kJ mol^{-1}

232. **Assertion:** Work done during free expansion of an ideal gas whether reversible or irreversible is positive.

Reason: During free expansion, external pressure is always less than the pressure of the system.

a) Both assertion and reason are correct and reason is the correct explanation for assertion.

b)

Both assertion and reason are correct but reason is not the correct explanation for assertion.

c) Assertion is incorrect but Reason is correct d) Both Assertion and Reason are incorrect

233. In an adiabatic process, no transfer of heat takes place between system and surroundings. Choose the correct option for free expansion of an ideal gas under adiabatic condition from the following.

a) $q=0,\Delta T\neq 0,W=0$ b) $q\neq 0,\Delta T=0,W=0$ c) $q=0,\Delta T=0,W=0$ d) $q=0,\Delta T<0,W\neq 0$

234. The enthalpy and entropy change for the reaction, $Br_{2(l)} + Cl_{2(g)} \longrightarrow 2BrCl_{(g)}$ Are 30 kJ mol^{-1} and 105 JK- mol^{-1} respectively. The temperature at which the reaction will be in equilibrium is :

a) 285.7 K b) 273 K c) 450 K d) 300 K

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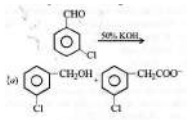
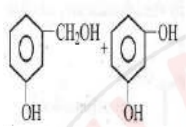
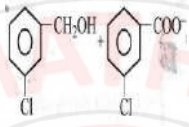
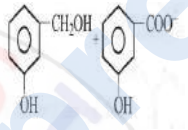
Time : 1 Mins **ALDEHYDES' KETONES CARBOXYLIC ACIDS 1** **Marks : 767**

1. Ozonolysis of an organic compound gives formaldehyde as one of the products. This confirms the presence of
   a) two ethylenic double bonds b) a vinyl group c) an isopropyl group
   d) an acetylenic triple bond.
2. Predict the production in the given reaction:
   a)  b)  c)  d) 
3. Aldehydes other than formaldehyde react with Grignard reagent to give addition products which on hydrolysis give
   a) tertiary alcohols b) secondary alcohols c) primary alcohols d) carboxylic acids.
4. **Assertion :** Phenol and benzoic acid can be distinguished by Na_2CO_3.
   Reason: Benzoic acid is stronger acid than phenol, hence reacts with Na_2CO_3.
   a) If both assertion and reason are true and reason is the correct explanation of assertion.
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion.
   c) If assertion is true but reason is false d) If both assertion and reason are false.
5. Assertion: Most carboxylic acids exist as dimers in the vapour phase or in aprotic solvents.
   Reason : Higher carboxylic acids are practically insoluble in water due to the increased hydrophobic interaction of hydrocarbon part
   a) If both assertion and reason are true and reason is the correct explanation of assertion.
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion.
   c) If assertion is true but reason is false. d) If both assertion and reason are false.
6. **Assertion:** Acetaldehyde can be prepared by addition of water to ethyne in the presence of H_2SO_4 and $HgSO_4$.
   Reason: Higher alkynes give higher aldehydes
   a) If both assertion and reason are true and reason is the correct explanation of assertion.
   b) If both assertion and reason are true but reason is not the correct explanation of assertion
   c) If assertion is true but reason is false d) If both assertion and reason are false.
7. Which of the following represents the correct order of acidity in the given compounds?

a) $FCH_2COOH > CH_3COOH > BrCH_2COOH > ClCH_2COOH$
b) $BrCH_2COOH > ClCH_2COOH > FCH_2COOH > CH_3COOH$
c) $FCH_2COOH > ClCH_2COOH > BrCH_2COOH > CH_2COOH$
d) $CH_2COOH > BrCH_2COOH > ClCH_2COOH < FCH_2COOH$

8. What happens when a carboxylic acid is treated with lithium aluminium hydride?
a) Aldehyde is formed b) Primary alcohol is formed c) Ketone is formed
d) Grignard reagent is formed.

9. -OH group present in alcohols is neutral while it is acidic in carboxylic acid because
a) in carboxylic acid -OH group is attached to electron withdrawing carbonyl group
b) in alcohols -OH group is attached to alkyl group which is electron withdrawing
c) carboxylic group is an electron releasing group
d) alcoholic group is an electron withdrawing group.

10. An ester (A) with molecular formula $C_9H_{10}O_2$ was treated with excess of CH_3MgBr and the complex so formed was treated with H_2SO_4 to give an olefin (B). Ozonolysis of (B) gave a ketone with molecular formula C_8H_8O which shows positive iodoform test. The structure of (A) is _____.
a) $C_6H_5COOC_2H_5$ b) $C_6H_5COOC_eH_5$ c) $H_3CCOOC_5H_5$ d) p-$H_3COC_6H_4COCH_3$

11. In the following reaction, product (P) is

$$R - \overset{O}{\overset{||}{C}} - CI \xrightarrow{H_2} Pd/BaSO_4 P$$

a) RCHO b) RCH_3 c) RCOOH d) RCH_2OH

12. Propanal on treatment with dilute sodium hydroxide gives
a) $CH_3CH_2CH_2CH_2CH_2CHO$ b) $CH_3CH_2CH(OH)CH_2CH_2CHO$
c) $CH_3CH_2CH(OH)CH(CH_3)CHO$ d) CH_3CH_2COOH

13. **Assertion:** In the presence of alkaline $KMnO_4$ 4-methylacetophenone is oxidised to benzoic acid.
Reason: Keto group is oxidised to -COOH group.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false.

14. Which of the following statements is correct regarding formic acid?
a) It is a reducing agent b) It is a weaker acid than acetic acid. c) It is an oxidising agent
d) When its calcium salt is heated, it forms acetone.

15. The best oxidising agent for oxidation of CH_3-CH=CH-CHO to CH_3-CH=CH-COOH is
a) Baeyer's reagent b) Tollens'reagent c) Schiff's reagent d) acidified dichromate.

16. In which of the following the number of carbon atoms does not remain same when carboxylic acid is obtained by oxidation?
a) CH_3COCH_3 b) CCl_3CH_2CHO c) $CH_3CH_2CH_2OH$ d) CH_3CH_2CHO

17. Which of the following statements is not correct?

a) Aldehydes and ketones are functional isomers.

b) Formaldehyde reacts with ammonia to form hexamethylenetetramine.

c) $LiAlH_4$ converts ketones into see-alcohols.

d) Ethanal and propanal give positive iodoform test.

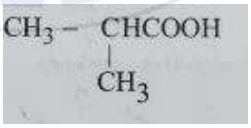
18. Which of the following will not give aldol condensation?
a) Phenyl acetaldehyde b) 2-Methylpentanal c) Benzaldehyde d) l-Phenylpropanone

19. **Assertion :** Aromatic aldehydes and ketones undergo electrophilic substitution reaction at metaposition.
Reason: Carbonyl group activates the ring towards electrophilic substitution reactions.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

20. Which of the following reagents would distinguish cis-cyclopenta-1, 2-diol from the trans-isomer?
a) MnO_2 b) Aluminium isopropoxide c) Acetone d) Ozone

21. An organic compound X having molecular formula $C_5H_{10}O$ yields phenyl hydrazone and gives negative response to the iodoform test and Tollen's test. It produces n-pentane on reduction. X could be:
a) pentanal b) 2-pentanone c) 3-pentanone d) n-amyl alcohol

22. $3CH_3COCH_3 \xrightarrow[H_2O]{HCl} (CH_3)_2 C = CH - CO_B - CH = C (CH_3)_2$ This polymer (B) is the obtained when acetone is saturated with HCl gas, B can be:
a) phorone b) formose c) diacetone alcohol d) mesityl oxide

23. An organic compound 'A' on treatment with NH, gives 'B' which on heating gives 'C', 'C' when treated with Br, in the presence of KOH produces ethylamine. Compound 'A' is _____.
a) CH_3COOH b) $CH_3CH_2CH_2COOH$ c)  d) CH_3CH_2COOH

24. $(CH_3)_2C = CHCOCH_3$ can be oxidised to $(CH_3)_2 C= CHCOOH$ by _____.
a) chromic acid b) NaOI c) Cu at 300°C d) $KMnO_4$

25. **Assertion:** β - hydrogen atom of carbonyl compounds is acidic in nature.
Reason: β - hydrogen is directly attached to carbon next to carbonyl carbon
a) If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

26. **Assertion:** Aromatic aldehydes and formaldehyde undergo Cannizzaro reaction.
Reason : Those aldehydes which have a- H atom undergo Cannizzaro reaction

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

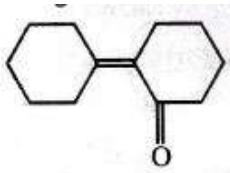
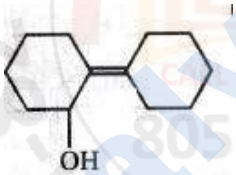
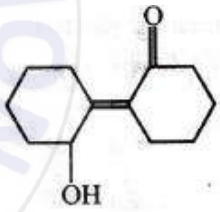
27. If form aldehyde is heated with KOH, then we get _____.
a) methane b) methyl alcohol c) ethyl formate d) acetylene

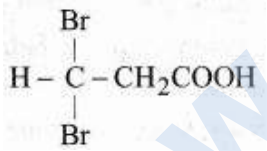
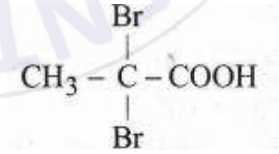
28. Which of the following is correct?
a) All the above b) Diastase is an enzyme c) Acetophenone is an ether
d) Cycloheptane is an aromatic compound

29. Which of the following reagents are not correctly matched with the reaction?
a) $CH_3CH=CHCHO \longrightarrow CH_3CH=CHCOOH$: Ammoniacal $AgNO_3$
b) $CH_3CH=CHCHO \longrightarrow CH_3CH=CHCH_2OH$: H_2/Pt c) $R\text{-}COOH \longrightarrow R\text{-}CH_2OH$: $NaBH_4$
d) $CH_3CH_2COCl \longrightarrow CH_3CH_2CHO$:$H_2$,Pd/$BaSO_4$

30. The condensation product of benzaldehyde and acetone is
a) C_6H,$CH=C(CH_3)_2$ b) $C_6H_5CH_2-\overset{O}{\overset{||}{C}}-CH=CH_2$ c) $C_6H_5-\overset{O}{\overset{||}{C}}-CH=CH-CH_3$
d) $C_6H_5-CH=CH-\overset{O}{\overset{||}{C}}-CH_3$

31. Formalin is an aqueous solution of _____.
a) fluorescein b) formic acid c) formaldehyde d) furfuraldehyde

32. Of the following, which is the product formed when cyclohexanone undergoes aldol condensation followed by heating?
a) 
b) 
c)
d) 

33. Propionic acid with Br_2|P yields a dibromo product. Its structure would be _____.
a) 
b) $CH_2Br\text{-}CH_2\text{-}COBr$ c) 
d) CH_2Br CHBr-COOH

34. Which of the following does not answer iodoform test?
a) n-Butyl alcohol b) see-Butyl alcohol c) Acetophenone d) Acetaldehyde

35. **Assertion:** The boiling points of given compounds follow the order: $CH_3CH_2CH_2CHO \approx CH_3CH_2CH_2CH_2CH_3 < CH_3CH_2CH_2CH_2OH \approx H_5C_2OC_2H_5$
Reason : Boiling point depends upon molecular mass only
a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false.

36. A carbonyl compound reacts with hydrogen cyanide to form cyanohydrin which on hydrolysis form a racemic mixture of a hydroxy acid. The carbonyl compound is _____.
a) Acetone b) Diethyl ketone c) Formaldehyde d) Acetaldehyde

37. Among the following the strongest acid is _____.
    a) CH_3COOH b) CH_2ClCH_2COOH c) $CH_2ClCOOH$ d) CH_3CH_2COOH

38. Which of the following compounds will undergo Cannizzaro reaction?
    a) CH_3CHO b) CH_3COCH_3 c) C_6H_5CHO d) $C_6H_5CH_2CHO$

39. Carboxylic acids have higher boiling points I than aldehydes, ketones and even alcohols of I comparable molecular mass. It is due to their:
    a) More extensive association of carboxylic acid via van der Waals force of attraction
    b) Formation of carboxylate ion c) Formation of intramolecular H-bonding
    d) Formation of intermolecular H-bonding

40. In a set of the given reactions, acetic acid yielded a product C.

$$CH_3COOH + PCl_5 \longrightarrow A \xrightarrow[anhy.AlCl_3]{C_6H_6} B \xrightarrow[Ether]{C_6H_5MgBr} C$$

    Product C would be :
    a) $CH_3CH(OH)C_6H_5$ b) $CH_3-\overset{C_2H_5|}{C}(OH)C_6H_5$ c) $CH_3CH(OH)C_2H_5$ d) $CH_3COC_6H_5$

41. Aldehydes and ketones will not form crystalline derivatives with _____.
    a) sodium bisulphite b) phenyl hydrazine c) semicarbazide hydrochloride
    d) dihydrogen sodium phosphate

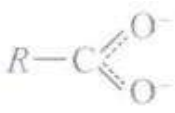
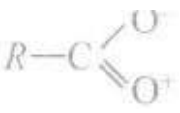
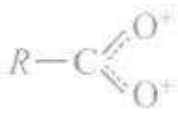
42. Benzoic acid may be converted into ethyl benzoate by reaction with:
    a) sodium ethoxide b) ethyl chloride c) dry HCl, C_2H_5OH d) ethanol

43. Match the compounds given in List-I with List-II and select the suitable option using the code given below:

List I	List II
(A) Benzaldehyde	(i) Phenolphthalein
(B) Phthalic anhydride	(ii) Benzoin condensation
(C) Phenyl benzoate	(iii) Oil of wintergreen
(D) Methyl salicylate	(iv) Fries rearrangement

    a) (iv) (i) (iii) (ii) b) (iv) (ii) (iii) (i) c) (ii) (iii) (iv) (i) d) (ii) (i) (iv) (iii)

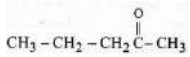
44. Aldol condensation will not take place in _____.
    a) HCHO b) CH_3CHO c) CH_3COCH_3 d) CH_3CH_2CHO

45. The correct structure representation of carboxylate ion is
    a) b)  c)  d) 

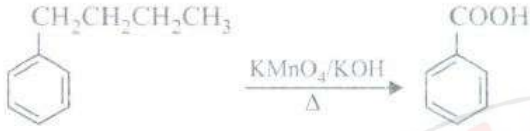
46. The product formed by the reaction of an aldehyde with a primary amine is _____.
    a) Schiff base b) Ketone c) Carboxylic acid d) Aromatic acid

47. Compound $Ph-O-\overset{O||}{C}-Ph$ can be prepared by the reaction of_____
    a) phenol and benzoic acid in the presence of NaOH
    b) phenol and benzoyl chloride in the presence of pyridine
    c) phenol and benzoyl chloride in the presence of $ZnCl_2$
    d) phenol and benzaldehyde in the presence of palladium

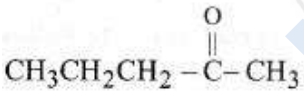
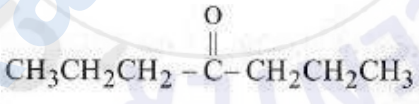
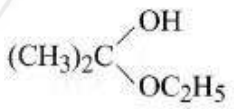
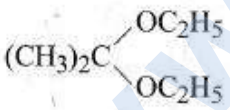
48. Benzoic acid gives benzene on being heated with X and phenol gives benzene on being heated with Y. Therefore, X and Yare respectively.
    a) soda lime and copper b) Zn dust and NaOH c) Zn dust and soda lime
    d) soda lime and zinc dust

49. Nucleophilic addition reaction will be most favoured in _____ .
    a) $(CH_3)_2C=O$ b) CH_3CH_2CHO c) CH_3CHO d) 

50. Formic acidic is obtained when _____.
    a) calcium acetate is heated with conc. H_2SO_4
    b) calcium formate is heated with calcium acetate
    c) glycerol is heated with oxalic acid at 373 K
    d) acetaldehyde is oxidised with $K_2Cr_2O_7$ and H_3SO_4.

51. Which of the following reactions does not occur?
    a) 
    b)
    c)
    d)

52. To differentiate between pentan-2-one and pentan-3-one a test is carried out. Which of the following is the correct answer?
    a) Pentan-2-one will give silver mirror test b) Pentan-2-one will give iodoform test
    c) Pentan-3-one will give iodoform test. d) None of these

53. Acetone is treated with excess of ethanol in the presence of hydrochloric acid. The product obtained is: _____.
    a) 
    b) 
    c) 
    d) 

54. Which of the following will not yield acetic acid on strong oxidation?
    a) Butanone b) Propanone c) Ethyl ethanoate d) Ethanol

55. There is a large difference in the boiling points of butanal and butan -1-ol due to
    a) intermolecular hydrogen bonding in butan-l-ol
    b) intramolecular hydrogen bonding in butanal c) higher molecular mass of butan -1-ol
    d) resonance shown by butanal

56. Polarisation of electrons in acrolein may be written as:
    a) $\overset{\delta+}{C}H_2 = CH - CH = \overset{\delta-}{O}$ b) $\overset{\delta+}{C}H_2 = \overset{\delta+}{C}H - CH = O$ c) $\overset{\delta+}{C}H_2 = CH - CH = \overset{\delta+}{O}$ d) $\overset{\delta+}{C}H_2 = CH - \overset{\delta+}{C}H = O$

57. What are the correct steps to convert acetaldehyde to acetone?
    a) CH_3MgBr, H_2O, Oxidation b) Oxidation, $Ca(OH)_2$, Heat c) Reduction, KCN, Hydrolysis
    d) Oxidation, C_2H_5ONa, Heat

58. Few simple chemical tests are given below to differentiate between the pairs of compounds. Which of the following tests is not correct for differentiation?
a) Prop anal and prop an one - Silver mirror test
b) Acetophenone and benzophenone - Iodoform test
c) Ethanal and propanal- Fehling's test
d) Benzoic acid and ethyl benzoate - Sodium bicarbonate test

59. Match the reagents in column I with products formed by reactions with acetone in column II and mark the appropriate choice.

Column I		Column II	
(A)	Hydrazine	(i)	$(CH_3)_2C$= $NNHCONH_2$
(B)	Semicarbazide	(ii)	$(CH_3)_2C$=NOH
(C)	Phenylhydrazine	(iii)	$(CH_3)C = NNH_2$
(D)	Hydroxylamine	(iv)	$(CH_3)C = NNHC_6H_5$

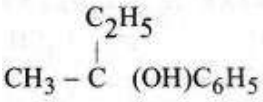
a) (A) → (1), (B) → (ii), (C) → (iii), (D) → (IV)
b) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)
c) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)
d) (A) → (ii), (B) → (iv), (C) → (i), (D) → (iii)

60. Carboxylic acids dimerise due to
a) high molecular weight b) coordinate bonding c) intermolecular hydrogen bonding
d) covalent bonding.

61. In a set of the given reactions, acetic acid yielded a product C.

$$CH_3COOH + PCl_5 \longrightarrow A \xrightarrow[\text{Anh. } AlCl_3]{C_6H_6} B \xrightarrow[\text{Ether}]{C_2H_5MgBr} C$$

Product C would be _____.

a)  b) $CH_3CH(OH)C_2H_5$ c) $CH_3COC_6H_5$ d) $CH_3CH(OH)C_6H_5$

62. **Assertion:** Acetaldehyde is more reactive than acetone in nucleophilic addition reactions.
Reason : Two alkyl groups in acetone reduce the electrophilicity of the carbon.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false

63. When prop anal reacts with 2-methylpropanal in presence of NaOH, four different products are formed. The reaction is known as
a) aldol condensation b) cross aldol condensation c) Cannizzaro reaction
d) HVZ condensation

64. The OH group of an alcohol or the -COOH group of a carboxylic acid can be replaced by -Cl using _____.
a) Phosphorus pentachloride b) Hypochlorus acid c) Chlorine d) Hydrochloric acid

65. 1-phenyl ethanol can he prepared by the reaction of benzaldehyde with _____.

a) methyl bromide b) ethyl iodide and magnesium c) methyl iodide and magnesium
d) methyl bromide and aluminium bromide

66. $\begin{matrix} CHO \\ | \\ CHO \end{matrix} \xrightarrow{NaOH} X$ The product (X) will be

a) $\begin{matrix} CH_2ONa \\ | \\ COONa \end{matrix}$ b) $\begin{matrix} COOH \\ | \\ COOH \end{matrix}$ c) $\begin{matrix} CH_2OH \\ | \\ COONa \end{matrix}$ d) $\begin{matrix} CH_2OH \\ | \\ CH_2OH \end{matrix}$

67. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	$>C=O \xrightarrow{LiAiH_4}$	(i)	-COONa
(B)	$>C=O \xrightarrow[conc.HCl]{Zn/Hg}$	(ii)	-COOH
(C)	$>C=O \xrightarrow{Ag_2O/OH^-}$	(iii)	$>CH_2$
(D)	$>C=O \xrightarrow{NaOX}$	(iv)	-CHzOH

a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)
b) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)
c) (A) → (ii), (B) → (iv), (C) → (iii), (D) → (i)
d) (A) → (iii), (B) → (i), (C) → (ii), (D) → (iv)

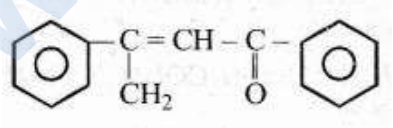
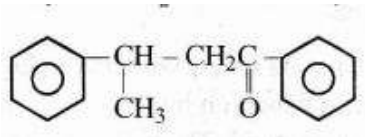
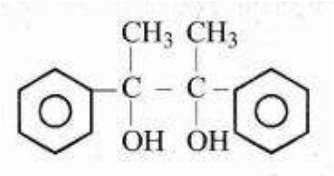
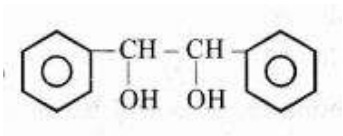
68. A strong base can abstract an α-hydrogen from:
a) alkene b) amine c) ketone d) alkane

69. CH_3CHO and $C_6H_5CH_2CHO$ can be distinguished chemically by _____.
a) Benedict test b) Iodoform test c) Tollen's reagent test d) Fehling solution test

70. An ester is boiled with KOH. The product is cooled and acidified with conc. HCl. A white crystalline acid separates. The ester is _____.
a) methyl acetale b) ethyl acetate c) ethyl formate d) ethyl benzoato

71. The relative reactivities of acyl compounds towards nucleophilic substitution are in the order of _____.
a) Acyl chloride > Acid anhydride > Ester > Amide
b) Ester > Acyl chloride > Amide > Acid anhydride
c) Acid anhybride > Amide > Ester > Acyl chloride
d) Acyl chloride > Ester > Acid anhydride > Amide

72. Acetophenone when reacted with a base, C_2H_5ONa, yields a stable compound which has the structure.

a) 
b) 
c) 
d) 

73. Aldol condensation will not take place in:
a) HCHO b) CH_3CHO c) CH_3COCH d) CH_2CH_2CHO

74. R-CH=CH-CHO + NH_2-$\overset{O}{\overset{||}{C}}$-$NHNH_2$ $\xrightarrow{H^+}$ X (X) in the above reaction is

a) R-CH=CH-CH-NH_2-$\overset{OH}{\overset{||}{C}}$H-$NHNH_2$ b) R-CH=CH-CH=N-NH-$\overset{O}{\overset{||}{C}}$H-$NH_2$

c) R-CH=NH_2CONH_2 d) R-CH=CH-CH-$\overset{|}{C}$HOH-$NH_2COCH=NHNH_2$I

75. Which is the most suitable reagent for the following conversion?

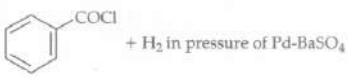
$$CH_3-CH=CH-CH_2-\overset{O}{\overset{||}{C}}-CH_3 \longrightarrow CH_3-CH=CH-CH_2-\overset{O}{\overset{||}{C}}-OH$$

a) Tollens'reagent b) Benzoyl peroxide c) I_2 and NaOH solution

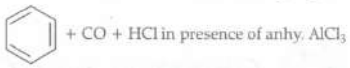
d) Sn and NaOH solution

76. Reaction by which benzaldehyde cannot be prepared?

a)

b) 

c)

d) 

77. Which one of the following on treatment with 50% aqueous sodium hydroxide yields the corresponding alcohol and acid?

a) C_6H_5CHO b) $CH_2CH_2CH_2CHO$ c) $CH_3-\overset{O}{\overset{||}{C}}-CH_3$ d) $C_6H_5CH_2CHO$

78. The best method to purify impure acetone is

a) $CH_3COCH_3 + HCI \rightarrow CH_3-\overset{OH}{\overset{|}{C}}CI-CH_3 \xrightarrow{Heat} CH_3COCH_3$

b) $CH_3COCH_3 + NaHSO_3 \rightarrow CH_3-\overset{OHI}{\overset{|}{C}}CI-CH_3 \xrightarrow{Na_2CO_3} CH_3COCH_3$

c) $CH_3COCH_3 + HCN \rightarrow CH_3-\overset{OH}{\overset{|}{C}}CN-CH_3 \xrightarrow{HOH} CH_3COCH_3$

d) $CH_3COCH_3 + H_2SO_4 \rightarrow CH_3-\overset{OH}{\overset{|}{C}}OSO_3H-CH_3 \xrightarrow{heat} CH_3COCH_3$

79. Match the column I with column II and mark the appropriate choice.

Column I		**Column II**	
(A)	$RCOCH_3 \xrightarrow[HCI]{Zn-Hg} RCH_2CH_3$	(i)	Wolff- Kishner reduction
(B)	$2C_6H_5CHONaOHC_6H_5COONa + C_6 + H_5CH_2OH \rightarrow$	(ii)	Clem mens en reduction
(C)	$C_6H_6 + CH_3COCI \xrightarrow[AICI_3]{Anh.} C_6H_5COCH_3$	(iii)	Friedel-Crafts reaction
(D)	$C_6H_{10}O \xrightarrow[KOH/\,etyleneglycoi\,.\,\triangle]{(i)\,NH_2NH_2} C_6H_{12} + N_2$	(iv)	Cannizzaro reaction

a) (A) → (ii), (B) → (iv), (C) → (iii), (D) → (i)

b) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)

c) (A) → (iii), (B) → (ii), (C) → (i), (D) → (iv)

d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

80. Benzoyl chloride on reduction with H_2/Pd-$BaSO_4$ produces

a) benzoic acid b) benzyl alcohol c) benzoyl sulphate d) benzaldehyde

81. What is the test to differentiate between pentan-2-one and pentan-3-one?
a) Iodoform test b) Benedict's test c) Fehling's test d) Aldol condensation

82. Aldehydes that do not undergo aldol condensation are
(1) prop anal
(2) trichloroethanal
(3) 2-phenylethanal
(4) ethanal
(5) benzaldehyde
a) 3 and 4 only b) 2 and 5 only c) 1, 2 and 3 only d) 2, 3 and 5 only

83. Which of the following compounds will undergo self aldol condensation in the presence of cold dilute alkali?
a) $CH_2 = CH - CHO$ b) $CH = C - CHO$ c) C_6H_5CHO d) $CH_3 - CH_2CHO$

84. Identify (X), (Y) and (Z) in the given reaction

$$X + Y \xrightarrow{Z} CH_3 - \overset{OH|}{C}H - CH_2 - CHO$$

a)

X	Y	Z
HCHO	CH_3CHO	KOH

b)

X	Y	Z
CH_3CHO	CH_3CHO	NaOH

c)

X	Y	Z
CH_3CH_2OH	HCHO	H_2SO_4

d)

X	Y	Z
CH_3CH_2CHO	HCHO	Dry ether

85. Fill in the blanks.
In Hell Volhard Zelinsky reaction, the carboxylic acids are halogenated at __ position by using _____ and _____ .
a) α, NaOH, iodine b) α phosphorus, halogen c) β, phosphorus, H_2O d) β, PCl_5, NaOH

86. Schotten Baumann reaction is a reaction of phenols with:
a) benzoyl chloride and NaOH b) acetyl chloride and NaOH
c) salicylic acid and cone. H_2SO_4 d) acetyl chloride and cone. H_2SO_4

87. Reduction by $LiAlH_4$ of hydrolysed product of an ester gives:
a) two acids b) two aldehydes c) one molecule of alcohol and another of carboxylic acid
d) two alcohols

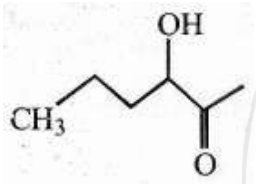
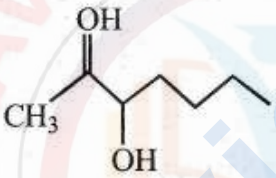
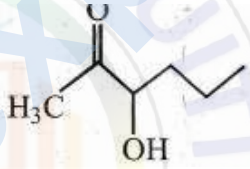
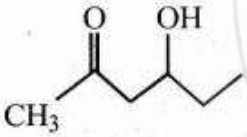
88. The correct order of increasing acidic strength is_____
a) phenol < ethanol < chloroacetic acid < acetic acid
b) ethanol < phenol < chloroacetic acid < acetic aci
c) ethanol < phenol < acetic acid < chloroacetic acid
d) chloroacetic acid < acetic acid < phenol < ethanol

89. During reduction of aldehydes with hydrazine and potassium hydroxide, the first is the formation of:
a) R - CH = NH_2 b) R - C = N c) $R - \overset{||}{C}O - NH_2$ d) R - CH =NH

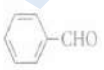
90. Which of the following reactions will give benzophenone?
(i) Benzoyl chloride + Benzene + $AlCl_3$
(ii) Benzoyl chloride + Phenylmagnesium bromide
(iii) Benzoyl chloride + Diphenyl cadmium
a) (i) and (ii) b) (ii) and (iii) c) (i) and (iii) d) (i), (ii) and (iii)

91. **Assertion:** Cross aldol condensation of ethanal and propanal gives a mixture of four products.
Reason: Ethanal and propanal, both contain a-hydrogen atom.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

92. Which of the followinf structures is not correctly matched?
a) αMethodxypropionaldehyde-$H_2C-\overset{H_2CO|}{CH}-\overset{O||}{C}-H$
b) 3- Hydroxybutanal-$CH_3-\overset{OH|}{CH}-CH_2CHO$ c) 4-Oxopentanal-$CH_3CH_2CH_2-\overset{O||}{C}-CHO$
d) Di-sec.-butylketone-$CH_3CH_2-\overset{CH_3|}{CH}-\overset{O||}{C}-\overset{CH_3|}{CH}-CH_2CH_3$

93. Which one of the following compounds will be most readily dehydrated?
a) 
b) 
c) 
d) 

94. In the reaction, $CH_3CHO + HCN \rightarrow CH_3CH(OH)CN \xrightarrow{H.OH} CH_3CH(OH)COOH$
as asymmetric centre is generated. The acid obtained would be _____.
a) 20% D+ 80% L-isomer b) D-isomer c) L-isomer d) 50% D+ 50%-isomers

95. Cannizzaro's reaction is not given by:
a) b)  c) HCHO d) CH_3CHO

96. Sodium formate on heating yields.
a) Oxalic acid and H_2 b) Sodium oxalate and H_2 c) CO_2 and NaOH d) Sodium oxalate

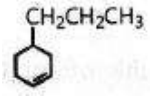
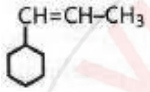
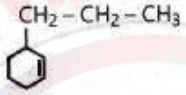
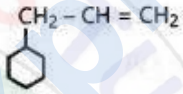
97. Among acetic acid, phenol and *n*-hexanol which one of the following compounds will react with $NaHCO_3$ solution to give sodium salt and CO_2?
a) Acetic acid b) n-hexanol c) Acetic acid and phenol d) Phenol

98. Which of the following is the most reactive isomer?
a) $CH_3CH_2CH_2CH_2-\overset{O||}{C}-H$ b) $CH_3CH_2CH_2-\overset{O||}{C}-CH_3$ c) $CH_3CH_2-\overset{O||}{C}-CH_2CH_3$
d) $CH_3-\overset{O||}{C}-C\overset{|}{C}H_3H-CH_3$

99. **Assertion:** $(CH_3)_3CCOOH$ does not give HVZ reaction.
Reason: $(CH_3)_3CCOOH$ does not have a-hydrogen atom.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

100. I-phenyl ethanol can be prepared by the reaction of benzaldehyde with:
a) methyl bromide b) ethyl iodide and magnesium c) methyl iodide and magnesium
d) methyl bromide and aluminium bromide

101. Identify (X), (Y) and (Z) reagents in the given sequence of reaction
$CH{=}CH \xrightarrow{X} CH_3CHO \xrightarrow{Y} CH_3CH(OH)CH_3 \xrightarrow{Z} CH_3COCH_3$
a) X = H_2SO_4, Y = H_2O/OH^-, Z = PCl_5, heat b) X = HNO_3, Y = Na_2CO_3, Z = H_2SO_4, heat
c) X = H_2SO_4/Hi+' Y= PCls/H_2O, Z = $K_2Cr_2O_7$/OH-
d) X = H_2SO_4/Hg^{2+}, Y = CH_3MgBr/H_20, Z = $K_2Cr_2O_7/H^+$

102. An alkene on ozonolysis gives methanal as one of the product. Its structure is: _____.
a)  b)  c)  d) 

103. Compounds (A) and (C) in the following reactions are
$CH_3CHO \xrightarrow[(ii)\,H_2O]{(i)\,CH_3MgBr} (A) \xrightarrow{H_2SO_4,\,\triangle} (b) \xrightarrow[oxidation]{Hydroboration} (C)$
a) identical b) positional isomers c) functional isomers d) optical isomers

104. Which among the following is most reactive to give nucleophilic addition?
a) FCH_2CHO b) $ClCH_2CHO$ c) $BrCH_2CHO$ d) ICH_2CHO

105. Which of the following carboxylic acids is highly insoluble in water?
a) Propanoic acid b) Butanoic acid c) Pentanoic acid d) Decanoic acid

106. Which of the following represent the correct decreasing order of acidic strength of following?
(i) Methanoic acid (ii) Ethanoic acid
(iii) Propanoic acid (iv) Butanoic acid
a) (i) > (ii) > (iii) > (iv) b) (ii) > (iii) > (iv) > (i) c) (i) > (iv) > (iii) > (ii) d) (ii) > (i) > (iv) > (iii)

107. A diene, buta-I, 3-diene was subjected to ozonolysis to prepare aldehydes. Which of the following aldehydes will be obtained during the reaction?
a) $\begin{matrix} CHO \\ | \\ CHO \end{matrix} + 2HCHO$ b) $CH_3CHO + 2HCHO$ c) $CH_3CH_2CHO + CH_3CHO$ d) $2CH_3CH_2CHO$

108. Ketones $[R - \overset{||}{C}O - R_1]$, where R = R_1 = alkyl group, can be obtained in one step by:
a) hydrolysis of esters b) oxidation of primary alcohol c) oxidation of tertiary alcohol
d) reaction of acid halide with alcohol

109. α-Hydroxypropanoic acid can be prepared from ethanal by following the steps given in the sequence
a) Treat with HCN followed by acidic hydrolysis
b) Treat with $NaHSO_3$ followed by reaction with Na_2CO_3

c) Treat with H_2SO_4 followed by hydrolysis

d) Treatwith $K_2Cr_2P_7$ in presenceof sulphuricacid

110. Which one of the following esters cannot undergo Claisen self-condensation?

a) $CH_3CH_2CH_2CH_2COOC_2H_5$ b) $C_6H_5COOC_2H_5$ c) $C_6H_5CH_2COOC_2H_5$

d) $C_6H_{11}CH_2COOC_2H_s$

111. Which of the following orders is not correct for the decreasing order of acidic character?

a)

(CH)$CH_2CH(Cl)COOH > CH_3CH(Cl)CH_2COOH > CH_2(Cl)CH_2CH_2COOH$ $>CH_3CH_2CH_2COOH$

b) $ICH_2COOH > BrCH_2COOH > ClCH_2COOH > FCH_2COOH$

c) $CCl_3COOH > CHCl_2COOH > CH_2ClCOOH > CH_3COOH$

d) $HCOOH > CH_3COOH > C_2H_5COOH > (CH_3)CHCOOH$

112. Predict the correct intermediate and product in the following reaction.

$$H_3C\text{ - }C \equiv CH \xrightarrow[H_2O,\,H_2SO_4]{HgSO_4}$$

Intermediate ⟶ Product

a) $A = H_3C - \overset{(A)}{C}SO_4 = CH_2,\ B = H_3C - \overset{(B)}{C}O = CH_3$ b) $A = H_3C - COH = CH_2,\ B = H_2C - CSO_4 = CH_2$

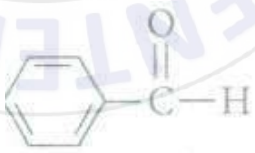
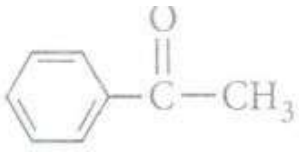
c) $A = H_3C - CO = CH_3$, B = H C - C ≡ CH d) $A = H_3C - COH = CH_3,\ B = H_3C - CO = CH_3$

113. Benzaldehyde can be prepared from benzene by passing vapours of_____and_____ in its solution in presence of catalyst mixture of aluminium chloride and cuprous chloride. The reaction is known as_____

a) HCl, $SnCl_4$, Rosenmund reduction b) CO, HCl, Gattermann-Koch reaction

c) CO2, H_2SO_4, Clemmensen reduction d) O_3, alcohol, Wolff-Kishner reduction

114. Which of the following compounds is most reactive towards nucleophilic addition reactions?

a) $CH_3 - \overset{O}{C} - CH_3$ b) $CH_3 - \overset{O}{C} - H$ c)  d) 

115. $(CH_3)_3C$-CHO does not undergo aldol condensation due to ____.

a) three electron-donating methyl groups b) cleavage taking place between -C-CHO bond

c) absence of alpha hydrogen atom in the molecule d) bulky$(CH_3)_3C$- group

116. Propanone can be prepared from ethyne by

a) passing a mixture of ethyne and steam over a catalyst, magnesium at 420°C

b) passing a mixture of ethyne and ethanol over a catalyst zinc chromite

c) boiling ethyne with water and H_2SO_4 d) treating ethyne with iodine and NaOH

117. Which one of the following order of acidic strength is correct?

a) RCOOH > HOH > HC = CH > ROH b) RCOOH > HC = CH > HOH > ROH

c) RCOOH > ROH > HOH > HC = CH d) RCOOH > HOH > ROH > HC = CH

118. The addition of HCN to carbonyl compounds is an example of

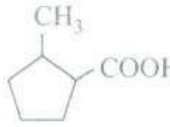
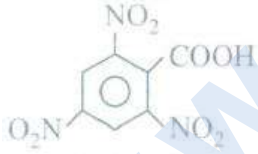
a) nucleophilic addition b) electrophilic addition c) free radical addition
d) elimination addition.

119. A compound (X) with a molecular formula $C_5H_{10}O$ gives a positive 2, 4-DNP test but a negative Tollens' test. On oxidation it gives a carboxylic acid (Y) with a molecular formula $C_3H_6O_2$. Potassium salt of (Y) undergoes Kolbe'sreaction and gives a hydrocarbon (Z). (X), (Y) and (Z) respectively are:
a) pentan-3-one, propanoic acid, butane b) pentanal, pentanoic acid, octane
c) 2-methylbutanone, butanoic acid, hexane
d) 2, 2-dimethylpropanone, propanoic acid, hexane.

120. An aromatic compound (X) (CRH80) gives positive 2,4- DN P test. It gives a yellow precipitate of compound (Y) on reaction with iodine and sodium hydroxide solution. (X) does not give Tollens' test on oxidation under drastic conditions. It gives a carboxylic acid (Z) ($C_7H_6O_2$). (Z) is also formed with (Y) during the reaction. (X), (Y) and (Z) respectively are
a) $C_6H_5COCH_3$, CHI_3, C_6H_5COOH b) CH_3COCH_3, CHI_3,CH_3COOH
c) $C_6H_5COCH_3$, CHI_3,CH_3COOH d) CH_3,CHO, CHI_3, C_6H_5COOH

121. An organic compound (X) with molecular formula $C_9H_{10}O$ gives positive 2, 4-DNP and Tollens' tests It undergoes Cannizzaro reaction and on vigorous oxidation it gives 1, 4-benzenedicarboxylic acid. Compound (X) is:
a) benzaldehyde b) O-methylbenzaldehyde c) P-ethylbenzaldehyde
d) 2, 2-dimethylhexanal.

122. Which of the following aldehydes will show Cannizzaro reaction?
a) HCHO b) C_6H_5CHO c) $(CH_3)CCHO$ d) All of these

123. Which of the following IUPAC names is not correctly matched?
a)  : 3-Cyclopentylpropanoic acid b) $(CH_3)_2C=CHCOOH$: 3-Methylbut-2-enoic acid
c) $PhCH_2CH_2COOH$: 3-Phenylpropanoic acid
d)  : 2, 4, 6-Trinitrobenzoic acid

124. Alkene (X) (C_5H_{10}) on ozonolysis gives a mixture of two compounds (Y) and (Z). Compound (Y) gives positive Fehling's test and iodoform test. Compound (Z) does not give Fehling's test but give iodoform test. Compounds (X), (Y) and (Z) are

a)

X	Y	Z
$C_6H_5COCH_3$	CH_3CHO	CH_3COCH_3

b)

X	Y	Z
$CH_3-CH=C(CH_3)-CH_3$	CH_3CHO	CH_3COCH_3

c)

X	Y	Z
$CH_3CH_2CH=CH_2$	CH_3CH_2CHO	HCHO

d)

X	Y	Z
CH_3-CH=CH-CH_3	CH_3CHO	CH_3CHO

125. Benzaldehyde reacts rvith ethanolic KCN to give _____.
a) $C_6H_5CHOHCN$ b) $C_6H_5CHOHCOC_6H_5$ c) $C_6H_5CHOHCOOH$
d) $C_6H_5CHOHCHOHC_6H_5$

126. Which one of the following can be oxidised to the corresponding carbonyl compound?
a) 2-hydroxypropane b) Ortho-nitrophenol c) Phenol d) 2-methyl-2-hydroxypropane

127. The correct statement regarding a carbonyl compound with a hydrogen atom on its alphacarbon, is:
a)
a carbonyl compound with a hydrogen atom on its alpha carbon rapidly equilibrates with its corresponding enol and this process is known as carbonylation
b)
a carbonyl compound with a hydrogen atom on its alpha carbon rapidly equilibrates with its corresponding enol and this process is known as keto-enol tautomerism
c)
a carbonyl compound with a hydrogen atom on its alpha-carbon never equilibrates with its corresponding enol.
d)
a carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with tis corresponding enol and this process is known as aldehyde-ketone equilibration.

128. Which of the following statements is incorrect?
a) $FeCl_3$ is used in the detection of phenols
b) Fehling solution is used in the detection of glucose
c) Tollens' reagent is used in the detection of unsaturation.
d) $NaHSO_3$ is used in the detection of carbonyl compounds.

129. Pinacolone is _____ .
a) 2, 3 -dimethyl-2, 3 -butanediol b) 3, 3 -dimethyl-2-butanone c) 1 -phenyl-2-propanone
d) 1,1-diphenyl-2-ethanediol

130. The correct order of decreasing acid strength of trichloroacetic acid (A), trifluoroacetic acid (B), acetic acid (C) and formic acid (D) is _____.
a) B>A>D>C b) B>D>C>A c) A>B >C>D d) A>C>B>D

131. In this reaction $CH_3CHO + HCN \longrightarrow CH_3CH(OH)CN \xrightarrow{H.\,OH} CH_3CH(OH)COOH$ An asymmetric centre is generated. The acid obtained would be:
a) 50% D + 50% L-isomer b) 20% D + 80% L-isomer c) D-isomer d) L-isomer

132. Which of the following compound will undergo self ~ aldol condensation in the presence of cold dilute alkali?
a) CH = C - CHO b) CH_2 = CHCHO c) C_6H_5CHO d) CH_3CH_2CHO

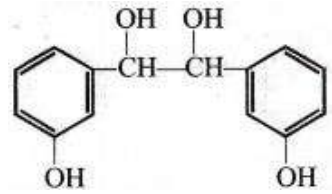
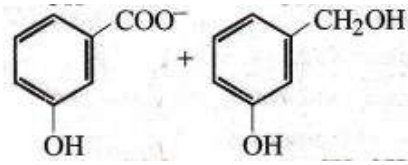
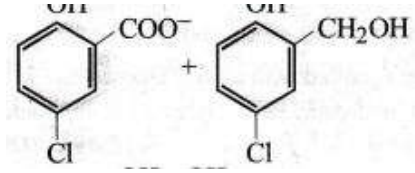
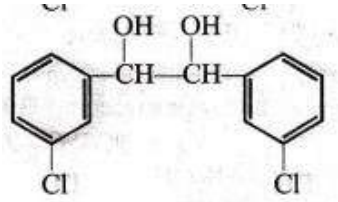
133. Acetaldehyde reacts with _____.
a) only electrophiles b) only nucleophiles c) only free radicals
d) both electrophiles and nucleophiles

134. In Clemmensen reduction carbonyl compound is treated with_____
a) zinc amalgam + HCl b) sodium amalgam + HCl c) zinc amalgam + nitric acid
d) sodium amalgam + HNO_3

135. Reduction of aldehydes and ketones into hydrocarbons using zinc amalgam and conc. HCl is called _____.

a) Cope reduction b) Dow reduction c) Wolff-Kishner reduction
d) Clemmensen reduction.

136. When m-chloro benzaldehyde is treated with 50% KOH solution, the product(s) obtained is (are) _____.

a) 
b) 
c) 
d) 

137. Fill in the blanks by suitable choices.
The carbon atom in carbonyl group is _____hybridised. The carbonyl group in aldehydes and ketones undergoes reactions. Aldehydes which haveαα-H atom undergo _____reaction while aldehydes which have no αα-H atom undergo ____ reaction.
a) sp^3, nucleophilic substitutions, aldol condensation, Cannizzaro
b) sp, electrophilic substitution, Cannizzaro, aldol condensation
c) sp^2, nucleophilic addition, aldol condensation, Cannizzaro
d) sp^3, electrophilic addition, Cannizzaro, aldol condensation

138. Clemmensen reduction of a ketone is carried out in the presence of which of the following?
a) Zn-Hg with HCl b) $LiAlH_6$ c) H_2 and Pt as catalyst d) Glycol With KOH

139. An organic compound 'X' having molecular formula $C_5H_{10}O$ yields phenyl hydrazone and gives negative response to the Iodoform test and Tollen's test. It produces n-pentane on reduction 'X' could be?
a) 2-pentanol b) 3-pentanone c) n-amyl alcohol d) pentanal

140. Which of the following compounds will give a yellow precipitate with iodine and alkali?
a) Acetophenone b) Methyl acetate c) Acetamide d) 2-Hydroxypropane

141. A compound (X) having molecular formula $C_4H_8O_2$ is hydrolysed by water in presence of an acid to give a carboxylicacid (Y) and an alcohol (Z). (Z) on oxidation with chromic acid gives (Y), (X), (Y) and (Z) are:

a)

X	Y	Z
CH_3COOCH_3	CH_3COOH	CH_3OH

b)

X	Y	Z
$CH_3COOC_2H_5$	CH_3COOH	C_2H_5OH

c)

X	Y	Z
$C_2H_5COOCH_3$	C_2H_5COOH	C_2H_5OH

d)

X	Y	Z
$CH_3COOC_2H_5$	C_2H_5COOH	CH_3OH

142. Which of the following structures is not correctly matched?
a) $\alpha - Mwthoxypropionaldehyde - H_3C - \overset{H_3CO|}{CH} - \overset{O||}{C} - H$ b) $3 - Hydroxbutanal - CH_3 - \overset{OH|}{CH} - CH_2CHO$
c) $4 - Ohopentanal - CH_3CH_2CH_2 - \overset{O||}{C} - CHO$

d) $Di-sec.butlyketone-CH_3CH_2-\overset{CH_3|}{CH}-\overset{O||}{C}-\overset{CH_3|}{CH}-CH_2CH_3$

143. Which of the following compounds does not react with $NaHSO_3$?
a) HCHO b) $C_6H_5COCH_3$ c) CH_3COCH_3 d) CH_3CHO

144. Propionic acid with Br_2/P yields a dibromo product. Its structure would be:
a) CH_2Br - CHBr - COOH b) $H-\overset{Br|}{C}Br-CH_2COOH$ c) CH_2Br - CH_2 - COBr
d) $CH_3-\overset{Br|}{C}Br-COOH$

145. Which of the following is incorect?
a) $NaHSO_3$ is used in detection of carbonyl compound
b) $FeCl_3$ is used in detection of phenolic group
c) Tollens reagent is used in detection of unsaturation
d) Fehling solution is used in detection of glucose

146. Which of the following compounds would have the smallest value for pKa?
a) $CHF_2CH_2CH_2COOH$ b) $CH_3CH_2CF_2COOH$ c) $CH_2FCHFCH_2COOH$
d) $CH_3CF_2CH_2COO$

147. Which compound is obtained when acetaldehyde is treated with dilute solution of caustic soda?
a) Sodium acetate b) Resinous mass c) Aldol d) Ethyl acetate

148. Identify (X), (Y) and (Z) in the given reaction
$CH_3COCH_3 \xrightarrow{I_2+NaOH} heat\,X \xrightarrow{Ag} heat\,Y \xrightarrow{H_2SO_4/HgSO_4} heat\ Z$
a) X= CHI_3, Y=CH_3CHO, Z= HCHO b) X= CHI_3, Y= CH_3OH, Z= CH_3CHO
c) X= CHI_3 Y= $CH \equiv CH$, Z= CH_3CHO d) X= CH_3COCl_3, Y= $CH_2=CH_2$, Z= CH_3CHO

149. **Assertion:** In formaldehyde all the four atoms lie in one plane.
Reason : Carbonyl carbon forms a rt-bond with oxygen by overlapping of p-orbitals.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

150. Which of the following reactions will not result in the formation of carbon-carbon bond?
a) Reimer - Tieman reaction b) Cunnizaro reaction c) Wurtz reaction
d) F'riedel-Crafts acylation

151. In a set of reactions propionic acid yielded a compound D.
$CH_3CH_2COOH \xrightarrow{SOCl_2} B \xrightarrow{NH_3} C \xrightarrow{KOH} Br_2D$
The structure of D would be _____.
a) $CH_3CH_2CONH_2$ b) $CH_3CH_2NHCH_3$ c) $CH_3CH_2NH_2$ d) $CH_3CH_2CH_2NH_2$

152. $3CH_3COCH_3 \xrightarrow{HCl} -H_2O \left(CH_3\right)_2C=CH-CO-CH=C\left(CH_3\right)_2(B)$
This polymer (B) is obtained when acetone is saturated with HCl gas, B can be _____.
a) phorone b) formose c) diacetone alcohol d) mesityloxide

153. Choose the correct statement regarding the physical properties of carbonyl compound.

a) All aldehydes are insoluble in benzene b) Higher aldehydes are more fragrant

c) n-Butane has more boiling point than acetone

d) Methanal and propanone are immiscible with water in all proportions

154. Fill in the reagents for the given conversion

$$CH_3COCl \xrightarrow{(X)} CH_3CHO \xrightarrow{(Y)} CH_3-\overset{OH|}{C}H-CH_2CHO \xrightarrow{(Z)} CH_3CH=CHCHO$$

a)

X	Y	Z
$Pd/BaSO_4$	dil. NaOH	heat

b)

X	Y	Z
NaOH	Hydrolysis	heat

c)

X	Y	Z
I_2/NaOH	$LiAlH_4$	H_3O^+

d)

X	Y	Z
CrO_3	Warm	CO_2

155. Acetone reacts with iodine (I_2) to form iodoform in the presence of _____.

a) $CaCO_3$ b) NaOH c) KOH d) $MgCO_3$

156. The reagent which does not react with both, acetone and benzaldehyde is_____

a) sodium hydrogensulphite b) phenyl hydrazine c) Fehling's solution

d) Grignard reagent

157. Addition of water to alkynes occurs in acidic medium and in the presence of Hg^{2+}ions as a catalyst. Which of the following products will be formed on addition of water to but -1- yne under these conditions?

a) $CH_3-CH_2-CH_2-\overset{O||}{C}-H$ b) $CH_3-CH_2-\overset{O||}{C}-CH_3$ c) $CH_3-CH_2-\overset{O||}{C}-OH+CO_2$

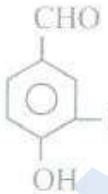
d) $CH_3-\overset{O||}{C}-OH+H-\overset{O||}{C}-H$

158. Reaction of a carbonyl compound with one of the following reagents involves nucleophilic addition followed by elimination of water. The reagent is; _____.

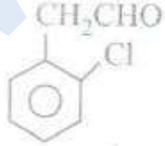
a) a Grignard reagent b) hydrazine in presence offeebly acidic solution

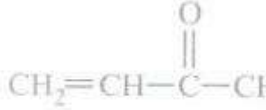
c) hydrocyanic acid d) sodium hydrogen sulphite

159. Which of the following names of the organic compounds is not correctly written?

a)  – 4-Hydroxy-3-methoxybenzaldehyde

b) – 5-Methylcyclohexanecarbaldehyde

c)  – 2-(2-Chlorophenyl)ethanal

d)  – Penta-1, 4-dien-3-one

160. Schotten-Baumann reaction is a reaction of phenols with _____.

a) benzoyl chloride and NaOH b) acetyl chloride and NaOH

c) salicylic acid and conc. H_2SO_4 d) acetyl chloride and conc. H_2SO_4

161. Reaction between benzaldehyde and actophenon in presence of dilute NaOH is known as _____.

a) Cross Aldol condensation b) Aldol condensation c) Cannizzaro's reaction
d) Cross Cannizzaro's reaction

162. A compound 'A' having the molecular formula $C_5H_{12}O$, on oxidation gives a compound 'B' with molecular formula $C_5H_{10}O$. Compound 'B' gave a 2,4-dinitrophenylhydrazine derivative but did not answer halo form test or silver mirror test. The structure of compound 'A' is

a) CH_3-CH_2-CH_2-CH_2-CH_2-OH b) $CH_3-CH_2-CH_2-\underset{|}{C}HOH-CH_3$

c) $CH_3-CH_2-\underset{|}{C}HOH-CH_2-CH_3$ d) $CH_3-CH_2-\underset{|}{C}HCH_3-CH_2-OH$

163. An organic compound of molecular formula C_3H_6O did not give a silver mirror with Tollens' reagent but give an oxime with hydroxylamine. It may be

a) CH_2=CH - CH_2-OH b) CH_3COCH_3 c) CH_3CH_2CHO d) CH_2=CH-OCH_3

164. Which of the following carbonyl compounds is most polar?

a) $C_2H_5-\overset{O}{\overset{||}{C}}-C_2H_5$ b) $CH_3-\overset{O}{\overset{||}{C}}-CH_3$ c) $CH_3-\overset{O}{\overset{||}{C}}-H$ d) $H-\overset{O}{\overset{||}{C}}-H$

165. The order of reactivity of CH_3CHO, $CH_3COC_2H_5$ and CH_3COCH_3 is

a) $CH_3CHO > CH_3COCH_3 > CH_3COC_2H_5$ b) $C_2HsCOCH_3 > CH_3COCH_3 > CH_3CHO$

c) $CH_3COCH_3 > CH_3CHO > C_2HsCOCH_3$ d) $CH_3COCH_3 > C_2H_5COCH_3 > CH_3CHO$

166. **Assertion:** Etard reaction helps to stop the oxidation of toluene at the aldehyde stage.
Reason : Chromyl chloride oxidises methyl group to a chromium complex, which on hydrolysis gives corresponding benzaldehyde

a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

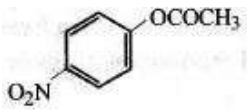
167. **Assertion :** Carboxylic acids do not undergo Friedel- Crafts reaction.
Reason: Carboxyl group is meta-directing group.

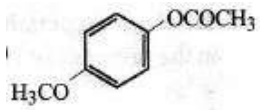
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is fals d) If both assertion and reason are false.

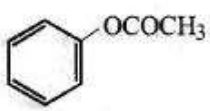
168. Reaction between acetone and methyl magnesium chloride followed by hydrolysis will give _____

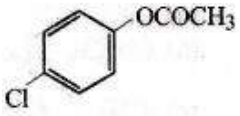
a) Isobutyl alcohol b) Isopropyl alcohol c) Sec. butyl alcohol d) Tert. butyl alcohol

169. Which one of the following esters gets hydrolysed most easily under alkaline conditions?

a) 

b) 

c) 

d) 

170. The product formed in Aldol condensation is _____ .

a) A beta-hydroxy aldehyde or a beta-hydroxy ketone
b) An alpha-hydroxy aldehyde or ketone c) An alpha, beta-unsaturated ester
d) A beta-hydroxy acid

171. Complete the reactions with appropriate products.

(i) $CH_3CHO + NH_2OH \rightarrow X$

(ii) $CH_2 = CH_2 + PdCI_2 + H_2O \xrightarrow{CuCI_2} Y$

(iii) $CH_3CH_2CH_2CH_2OH \xrightarrow{CrO_3 - H_2SO_4} Z$

a) X = CH_3CH = NOH, Y = CH_3CHO, 2 = $CH_3CH_2CH_2COOH$

b) X = $CH_3CH_2NH_2$, Y = CH_3CH_2CHO, Z= $CH_3CH_2CH_2COOH$

c) X = CH_3CONH_2, Y = HCHO, Z= CH_3COCH_3

d) X = CH_3C =N, Y = CH_3CHO, Z = HCOOH

172. Identify reactant (X) in the given reaction sequence.

$$CH_3COCH_3 + X \longrightarrow \left(CH_3\right)_3C - OKg - CI \xrightarrow{H_2O} \left(CH_3\right)_3C - OH + Mg\begin{matrix}OH\\CI\end{matrix}$$

a) CH_3MgCl b) $CH_3COCl + Mg$ c) $MgCl_2$ d) CH_3CH_2MgCl

173. Which is the correct method of synthesising acetamide from acetone?

a) $CH_3COCH_3 \xrightarrow{CrO_3} CH_3COOH \xrightarrow{NH_3} CH_3CONH_2$

b) $CH_3COCH_3 \xrightarrow[NaOH]{I_2} CH_3COOH \xrightarrow{HCI} CH_3COCl \xrightarrow{NH_3} CH_3CONH_2$

c) $CH_3COCH_3 \xrightarrow{Pd/BaSO4} CH_3CHO \xrightarrow{NH_3} CH_3CH_2NH_2 \xrightarrow{H_2O} CH_3CONH_2$

d) $CH_3COCH_3 \xrightarrow[NaOH]{I_2} CH_3COONa \xrightarrow[NH_3]{H^+} CH_3COONH_4 \xrightarrow{\Delta} CH_3CONH_2$

174. An alcohol (A) on dehydration gives (B) which adds bromine molecule to give (C). (C) on heating with sodamide gives (D) which on hydration in the presence of Hg^{++}/H_2SO_4 gives (E). E on reduction by lithium aluminium hydride gives (A). (E) is also obtained on dry distillation of calcium salt of acetic acid. How many enolisable proton present in the product (E)?

a) 2 b) 6 c) 3 d) 0

175. The compound formed when malonic acid is heated with urea, is _____.

a) cinnamic acid b) butyric acid c) barbituric acid d) crotonic acid

176. Which of the following does not undergo Cannizzaro reaction?

a) Benzaldehyde b) 2-Methylpropanal c) p- Methoxybenzaldehyde

d) 2,2-Dimethylpropanal

177. Acetic acid can be halogenated in presence of phosphorus and chlorine. Formic acid cannot be halogenated with same way because of

a) presence of α-H atom in formic acid b) presence of α H atom in acetic acid

c) absence of α-H atom in CH_3COOH

d) higher acidic strength of acetic acid than formic acid.

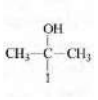
178. The oxidation of toluene to benzaldehyde by chromyl chloride is called

a) Etard reaction b) Riemer-Tiemann reaction c) Wurtz reaction

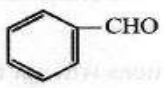
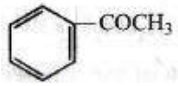
d) Cannizzaro's reaction

179. **Assertion :** Direct attachment of groups such as phenyl or vinyl to the carboxylic acid, increases the acidity of the carboxylic acid.
Reason : Resonance effect always increases the acidity of carboxylic acids
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

180. Consider the following transformations $CH_3COOH \xrightarrow{CaCO_3} A \longrightarrow B \xrightarrow[I_2]{NaOH} C$ The molecular formula of C is _____.

a)  b) $ICH_2\text{-}COCH_3$ c) CHI_3 d) CH_3I

181. Which one is most reactive towards Nucleophillic addition reaction?

a)  b)  c) d)

182. Which of the following will not undergo HVZ reaction?
a) Propanoic acid b) Ethanoic acid c) 2-Methylpropanoic acid
d) 2, 2-Dimethylpropanoic acid

183. The final product (Y) in the following sequence of chemical reaction is
$CH_3OH \xrightarrow[300^0]{Cu} CX \xrightarrow{NaOH} Y + CH_3OH$
a) an alkene b) a carboxylic acid c) an aldehyde d) sodium salt of carboxylic acid

184. Which of the following is the correct order of relative strength of acids?
a) $ClCH_2COOH > BrCH_2COOH > FCH_2COOH$
b) $BrCH_2COOH > ClCH_2COOH > FCH_2COOH$
c) $FCH_2COOH > ClCH_2COOH > BrCH_2COOH$
d) $ClCH_2COOH > FCH_2COOH > BrCH_2COOH$

185. Self condensation of two moles of ethyl acetate in the presence of sodium ethoxide yields:
a) ethyl butyrate b) acetoacetic ester c) methyl acetoacetate d) ethyl propionate

186. The preparation of ethyl acetoacetate involves _____.
a) Wittig reaction b) Cannizaro reaction c) Reformatshy reaction
d) Claisen condensation

187. Iodoform test is not given b _____.
a) 2-pentanone b) ethanol c) ethanal d) 3-pentanone

188. Various products formed on oxidation of 2, 5-dimethylhexan -3-one are
(i)
$CH_3 - \underset{|}{C}CH_3H_3 - COOH$
(ii)
$CH_3 - \underset{|}{C}CH_3H_3 - CH_2 - COOH$

(iii) CH_3COOH
(iv) HCOOH
a) (i) and (iii) b) (i), (ii) and (iii) c) (i), (ii), (iii) and (iv) d) (iii) and (iv)

189. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Clemmensen reduction	(i)	Conc. KOH
(B)	Rosenmund reduction	(ii)	Zn/Hg + cone. HCl
(C)	Iodoform reaction	(iii)	H2/Pd-$BaSO_4$
(D)	Cannizzaro reaction	(iv)	NaOH + 12

a) (A) → (i), (B → (Hi), (C) → (ii), (D) → (iv)
b) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)
c) (A) → (H), (B) → (iii), (C) → (iv), (D) → (i)
d) (A) → (iv), (B) → (i), (C) → (H), (D) → (iii)

190. Study the following reactions and mark the appropriate choice.

(A) $+C_2H_5OH \rightarrow$ (B)+(C)

(C) $+HOH \xrightarrow{H^+}$ (B)+(D)

(D) $\xrightarrow{[0]}$ (B)

(B) $+Ca(OH)_2$ Calcium salt$+H_2O \xrightarrow{dry\ distillation} CH_3COCH_3$

a)

(A)	(B)	(C)	(D)
$(CH_3CO)_2O$	CH_3COOH	$CH_3COOC_2H_5$	C_2H_5OH

b)

(A)	(B)	(C)	(D)
CH_3COCl	HCOOH	CH_3COOCH_3	CH_3OH

c)

(A)	(B)	(C)	(D)
CH_3COOH	CH_3OH	CH_3COOCH_3	CH_3OH

d)

(A)	(B)	(C)	(D)
CH_3NH_2	CH_3COOH	CH_3COOCH_3	C_2H_5OH

191. An organic compound (X) with molecular formula C_3H_6O is not readily oxidised. On reduction it gives C_3H_8O (Y) which reacts with HBr to give a bromide (Z) which is converted to Grignard reagent. Grignard reagent reacts with (X) to give 2, 3-dimethylbutan-2-ol. (X), (Y) and (Z) respectively are
a) CH_3COCH_3, $CH_3CH_2CH_2OH$, $CH_3CH(Br)CH_3$
b) CH_3CH_2CHO, $CH_3CH = CH_2$, $CH_3CH(Br)CH_3$
c) CH_3COCH_3, $CH_3CH(OH)CH_3$, $CH_3CH(Br)CH_3$
d) CH_3CH_2CHO, $CH_3CH_2CH_2OH$, CH_3CH_2CH2Br

192. Consider the reaction:
RCHO + NH2NH, -+ RCH :N-NH2
What sort of reaction is it?
a) Electrophilic addition-elimination reaction b) Free radical addition - elimination reaction
c) Electrophilic substitution - elimination reaction
d) Nucleophilic addition - elimination reaction

193. Hydrocarbons are formed when aldehydes and ketones are reacted with amalgamated zinc and cone. HCl. The reaction is called

a) Cannizzaro reaction b) Clem mens en reduction c) Rosenmund reduction

d) Wolff-Kishner reduction.

194. Compound (X) with molecular formula C_3H_8O is treated with acidified potassium dichromate to form a product (Y) with molecular formula C_3H_6O. (Y) does not form a shining silver mirror on warming with ammoniacal $AgNO_3$ (Y) when treated with an aqueous solution of $NH_2CONHNH_2$. HCl and sodium acetate, gives a product (Z). The structure of (Z) is

a) $CH_3CH_2CH = NNHCONH_2$ b) $(CH_3)_2C=NNHCONH_2$ c) $(CH_3)_2C =NCONHNH_2$

d) $CH_3CH_2CH=NCONHNH_2$

195. Which of the following compounds will give butanone on oxidation with alkaline $KMnO_4$ solution?

a) Butan-1-ol b) Butan-2-ol c) Both of these d) None of these.

196. The reagents which can be used to distinguish acetophenone from benzophenone is (are) _____ .

a) 2, 4-dinitrophenyl hydrazine b) aqueous solution of $NaHSO_3$ c) Benedict reagent

d) I_2 and Na_2CO_3

197. Arrange the following compounds in increasing order of their reactivity in nucleophilic addition reactions.

Ethanal, Propanal, Propanone, Butanone

a) Butanone < Propanone < Propanal < Ethanal

b) Propanone < Butanone < Ethanal > Prop anal

c) Propanal < Ethanal < Propanone < Butanone

d) Ethanal < Prop anal < Propanone < Butanone

198. Which of the following is a correct statement?

a) CCl_3 - CHO gives aldol condensation

b)

When mixture of ethanal and propanal is treated with aqueous NaOH, the product contains four aldols

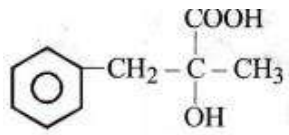
c) Mixture of HCHO and CH_3CHO will not give aldol condensation.

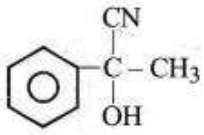
d) HCHO is least reactive towards oxidation.

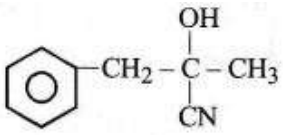
199. In a set of reactions acetic acid yielded a product D.

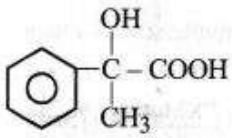
$$CH_3COOH \xrightarrow{SOCl_2} A \xrightarrow[\text{Anhy. } AlCl_3.]{\text{Benzene}} B \xrightarrow{HCN} C \xrightarrow{H.OH} D$$

The structure of D would be: _____.

a) 

b) 

c) 

d) 

200. The carbonyl compound producing an optically active product by reaction with $LiAlH_4$ is

a) propanone b) butanone c) 3-pentanone d) benzophenone

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Time : 1 Mins **BIOMOLECULES' 1** **Marks : 893**

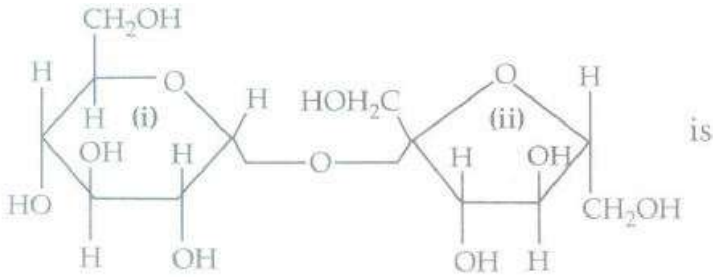
1. In cellulose, D-glucose units are joined by:
   a) α-1, 4 glycosidic linkage b) β-1, 6 glycosidic linkage c) β-1, 4 glycosidic linkage
   d) peptide linkage.
2. The correct statement regarding RNA and DNA respectively is _____.
   a)
   The sugar component in RNA is arabinose and the sugar component in DNA is 2'-deoxyribose.
   b)
   The sugar component in RNA is ribose and the sugar component in DNA is 2'-deoxyribose.
   c) The sugar component in RNA is arabinose.
   d)
   The sugar component in RNA is 2'-deoxyribose and the sugar component in DNA is arabinose.
3. **Assertion:** Maltose and lactose are examples of reducing sugars.
   Reason : Maltose and lactose reduce Fehling's solution and Tollens' reagent.
   a) If both assertion and reason are true and reason is the correct explanation of assertion.
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion.
   c) If assertion is true but reason is false. d) If both assertion and reason are false.
4. Which is the correct statement?
   a) Starch is a polymer of α-glucose
   b) In cyclic structure of fructose, there are four carbons and one oxygen atom
   c) Amylose is a component of cellulose
   d) Proteins are composed of only one type of amino acids
5. During the process of digestion, the proteins present in food materials are hydrolysed to amino acids. The two enzymes involved in the process

   $$\text{Proteins} \xrightarrow{enzyme\ (A)} \text{Polypeptide} \xrightarrow{enzyme\ (B)} \text{Amino acids, are respectively :}$$

   a) invertase and zymase b) amylase and maltase c) diastase and lipase
   d) pepsin and trypsin

6. **Assertion:** Glucose forms hydrogen sulphite addition product with $NaHSO_3$
   Reason: Glucose gives all the reactions of aldehydic group.
   a) If both assertion and reason are true and reason is the correct explanation of assertion.
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion.
   c) If assertion is true but reason is false. d) If both assertion and reason are false.
7. Aspirin is an acetylation product of _____.
   a) o-hydroxy benzole acid b) o-hydroxybenzene c) z-hydroxy benzoic acid
   d) p-dihydroxybenzene
8. α-D-glucose and β-D-glucose are :
   a) epimers b) anomers c) enantiomers d) diastereomers
9. The glycosidic linkage involved in linking the glucose units in amylose part of starch is
   a) C_1 -C_4 β-linkage b) C_1 -C_6 β-linkage c) C_1 -C_6 α-linkage d) C_1 -C_4 α-linkage
10. A sequence of how many nucleotides n messenger RNA makes a codon for a amino acid?
    a) Three b) Four c) One d) Two
11. The letter 'D' in carbohydrates signifies
    a) dextrorotatory b) configuration c) diamagnetic nature d) mode of synthesis.
12. Sucrose in water is dextrorotatory $[\alpha]_D$ = + 66.4° when boiled with dil. HCl, the solution becomes laevorotatory $[\alpha]_D$ = -39.9°. In this process the sucrose breaks into _____.
    a) L-glucose + D-fructose b) L-glucose + L-fructose c) D-glucose + D-fructose
    d) D-glucose + L-fructose
13. Vitamin B_{12} contains _____.
    a) Ca(II) b) Fe(II) c) Co(III) d) Zn(II)
14. What is the basic formula for starch?
    a) $(C_6H_{12}O_6)_n$ b) $(C_6H_{10}O_5)_n$ c) $C_{12}H_{22}O_{11}$ d) $(C_6H_{12}O_4)_n$
15. Mark the incorrect example
    a) Keratin and myosin - Fibrous proteins b) Insulin and albumins - Globular proteins
    c) Glycylalanine - Dipeptide d) Enzymes and haemoglobin - Derived proteins
16. Which is a fat soluble vitamin?
    a) Vitamin A b) Vitamin B_6 c) Vitamin C d) Vitamin B_2
17. Fructose reduces Tollen's reagent due to _____.
    a) enolisation of fructose followed by conversion to aldehyde by base
    b) asymmetric carbons c) primary alcoholic group d) secondary alcoholic group
18. Chemically considering digestion is basically :
    a) anabolism b) hydrogenation c) hydrolysis d) dehydrogenation

19. The correct statement about the following disaccharide



is

a) ring (i) is pyranose with α-glycosidic link b) ring (i) is furanose with α-glycosidic link
c) ring (ii) is pyranose with α-glycosidic link d) ring (ii) is pyranose with β-glycosidic link.

20. **Assertion:** All naturally occurring a- amino acids are optically active.
Reason: Most naturally occuring amino acids have D-configuration.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

21. Which of the following protein destroy the antigen when it enters in body cell?
a) Antibodies b) Insulin c) Chromoprotein d) phosphoprotein

22. Which of the following is responsible for preparing the uterus for implantation of fertilised egg?
a) Testosterone b) Glucocorticoids c) Progesterone d) Estradiol

23. In a protein molecule, various amino acids are linked together by _____.
a) α-glycosidic bond b) β-glycosidic bond c) peptide bond d) dative bond

24. Bases common to RNA and DNA are
a) adenine, guanine, cytosine b) adenine, uracil, cytosine c) adenine, guanine, thymine
d) guanine, uracil, thymine.

25. Maximum amount of RNA is found in
a) nucleolus b) chloroplast c) ribosomes d) cytoplasm

26. How many C-atoms are there in a pyranose ring?
a) 3 b) 5 c) 6 d) 7

27. Which of the following statements about enzymes are true?
a) Enzymes catalyse chemical reactions by increasing the activation energy
b)
Enzymes are highly specific both in binding chiral substrates and in catalyzing their reactions
c) Enzymes lack in nucleophilic groups d) Pepsin is proteolytic enzyme

28. Hereditary characteristic are passed on from parents to children through:
a) gametes b) genes c) mutants d) enzymes

29. Enzymes take part in a reaction and :
a) decrease the rate of a chemical reaction b) increase the rate of a chemical reaction
c) both (a) and (b) d) none of these

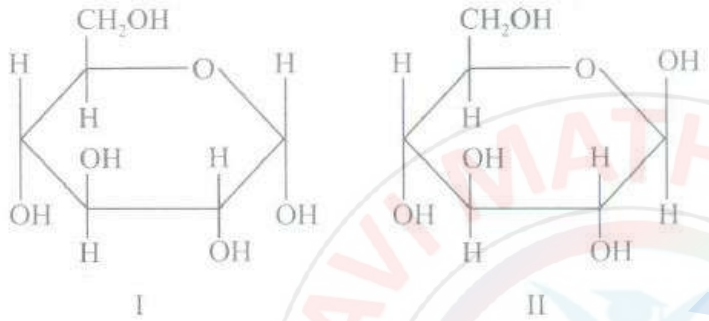
30. Which of the following reactions of glucose can be explained only by its cyclic structure?
a) Glucose forms pentaacetate. b) Glucose reacts with hydroxylamine to form an oxime.
c) Pentaacetate of glucose does not react with hydroxylamine.

d) Glucose is oxidised by nitric acid to gluconic acid

31. Which of the following B-group vitamins can be stored in our body?
a) Vitamin B_1 b) Vitamin B_2 c) Vitamin B_6 d) Vitamin B_{12}

32. Which of the following statements is not correct?
a) Only α-amino acids are obtained on hydrolysis of proteins.
b)
The amino acids which are synthesised in the body are known as non-essential amino acids.
c) There are 20 essential amino acids.
d) L-amino acids are represented by writing the NH_2 group on the left side.

33. Study the structures of α-D-(+) glucopyranose and β-D-(+) glucopyranose and mark the correct statement.



a) Structures I and II are enantiomers. b) Structures I and II are anomers.
c) The two structures I and II differ in the configuration of C, and C4.
d) Both the structures I and II give 2, 4-DNP test.

34. Chargaffs rule states that in an organism _____.
a) Amounts of all bases are equal
b)
Amount of adenine (A) is equal to that of thymine (T) and the amount of guanine (G) is equal to that of cytosine (C)
c)
Amount of adenine (A) is equal to that of guanine (G) and the amount of thymine (T) is equal to that of cytosine (C)
d)
Amount of adenine (A) is equal to that of cytosine (C) and the amount of thymine (T) is equal to that of guanine (G)

35. Which of the following acids is a vitamin?
a) Aspartic acid b) Ascorbic acid c) Adipic acid d) Saccharic acid

36. Starch is composed of two polysaccharides which are
a) amylopectin and glycogen b) amylose and glycogen c) amylose and amylopectin
d) cellulose and glycogen.

37. The secondary structure of a protein refers to :

a) regular folding patterns of continuous portions of the polypeptide chain

b)

three-dimensional structure, specially the bond between amino acid residues that are distant from each other in the polypeptide drain

c) mainly denatured proteins and structures of prosthetic groups.

d) linear sequence of amino acid residues in the polypeptide chain.

38. **Assertion:** Glucose gets oxidised to gluconic acid on reaction with mild oxidising agent like bromine water.

Reason: Glucose contains a keto group.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

39. Genetic code determines

a) sequence of amino acids in a peptide chain

b) sequence of variable amino acids in a protein chain c) structure of human cells

d) morphology of traits.

40. Amino acids are classified as acidic, basic or neutral depending upon the relative number of amino and carboxyl groups in their molecule. Which of the following are acidic?

(i) $\left(CH_3\right)_2CH-CH-\underset{|}{COOH}\underset{|}{NH_2}$

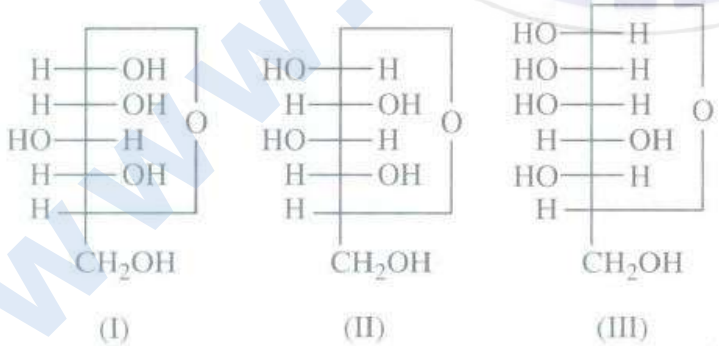
(ii) $HOOC-CH_2-CH_2-\underset{|}{CH}\underset{|}{NH_2}-COOH$

(iii) $H_2N-CH_2-CH_2-\underset{|}{CH_2}-COOH$

(iv) $HOOC-CH_2-\underset{|}{CH}\underset{|}{NH_2}-COOH$

a) (ii) and (iv) b) (iii) and (iv) c) (i) and (ii) d) (ii) and (iii)

41. Three cyclic structures of monosaccharides are given below. Which of these are anomers?



a) I and II b) II and III c) I and III d) III is anomer of I and II

42. Glucocorticoids

a) control the carbohydrate metabolism b) modulate inflammatory reactions

c) are involved in the reactions to stress d) all of these

43. Haemoglobin is _____.

a) an enzyme b) a globular protein c) a vitamin d) a carbohydrate

44. Which of the following is the correct statement?

a) Starch is a polymer of α -glucose b) Amylose is not a component of starch.

c) Proteins are composed of only one type of amino acid.

d) In cyclic structure of fructose, there are five carbon and one oxygen atoms.

45. DNA and RNA contain four bases each. Which of the following bases is not present in RNA?
a) Adenine b) Uracil c) Thymine d) Cytosine

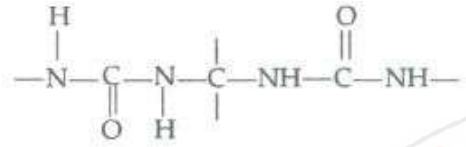
46. The melting points of amino acids are higher than the corresponding halo-acids because:
a) amino acids exist as zwitter ions resulting in strong dipole - dipole attraction

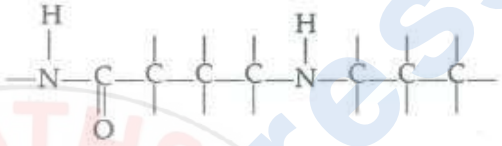
b) amino acids are optically active

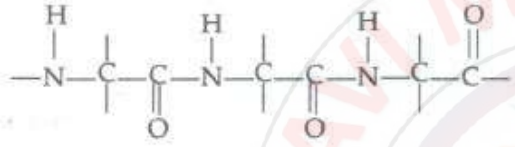
c) due to higher molecular mass of $-NH_2$ group molecular mass of amino acids is higher

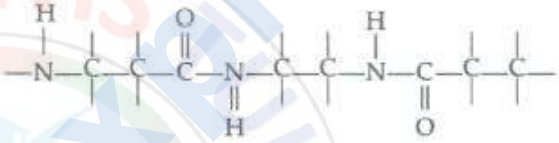
d) they interact with water more than halo-acids and have salt like structure.

47. Which of the following structures represents the peptide chain?

a) 

b) 

c) 

d) 

48. On hydrolysis of starch, we finally get _____.
a) glucose b) fructose c) both (a) and (b) d) sucrose

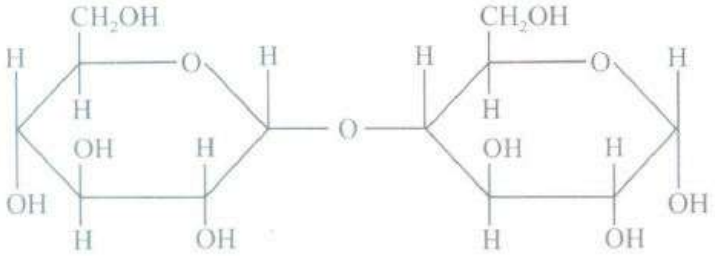
49. When adenine is attached to ribose sugar, it is called adenosine. To make a nucleotide from it, would require
a) oxygenation b) addition of a base c) addition of phosphate d) hydrogenation

50. Within the list shown below, the correct pair of structures of alanine in pH ranges 2-4 and 9-11 is
I. $H_3N^+CH(CH_3)CO_2H$
II. $H_2NCH(CH_3)CO^-_2$
III. $H_3N^+CH(CH_3)CO^-_2$
IV $H_2NCH(CH_3)CO_2H$
a) I, II b) I, III c) II, III d) III, IV

51. Which of the following is a basic amino acid?
a) Lysine b) Serine c) Alanine d) Tyrosine

52. The couplings between base units of DNA is through :
a) hydrogen bonding b) electrostatic bonding c) covalent bonding
d) vander Waal's forces.

53. Study the structure of maltose and mark the incorrect statement.



a) Maltose is composed of two a-D-glucose units.
b) C-1 of one glucose is linked to C-4 of other unit. c) It is a non-reducing sugar.
d) It is a disaccharide.

54. Which of the following is correct about H-bonding in nucleotide?
a) A - T, G - C b) A - G, T - C c) G - T, A - C d) A - A, T - T

55. A compound which contains both..... and ..... is called amino acid. The amino acids in polypeptide chain are joined by..... bonds.
a) amino, carboxylic group, ester b) amino, carboxylic group, peptide
c) nitrogen, carbon, glycosidic d) hydroxy, carboxylic group, peptide

56. Keratin, a structural protein is present in
a) hair b) wool c) silk d) all of these.

57. Which of the following is an acidic amino acid?
a) Glycine b) Valine c) Leucine d) Glutamic acid

58. which of the following is an example of an aldopentose?
a) D-Ribose b) Glyceraldehyde c) Fructose d) Erythrose

59. RNA is a
a) single helix strand b) double helix strand c) right hand twisted double helix strand
d) triple helix strand.

60. Pick up the incorrect statement from the following
a) Glucose exists in two different crystalline forms, α-D-glucose and β-D-glucose.
b) Cyclic structure of α-D-glucose and β-D-glucose is called pyranose structure
c) α - glucose an β - D-glucoseare enantiomers.
d) Cellulose is a straight chain polysaccharide made up of only β-glucose units

61. Each polypeptide in a protein has amino acids linked with each other in a specific sequence. This sequence of amino acids is said to be_____.
a) primary structure of proteins b) secondary structure of proteins
c) tertiary structure of proteins d) quaternary structure of proteins

62. A diabetic person carries a packet of glucose with him always, because
a) glucose increases the blood sugar level slowly b) glucose reduces the blood sugar level
c) glucose increases the blood sugar level almost instantaneously
d) glucose reduces the blood sugar level slowly.

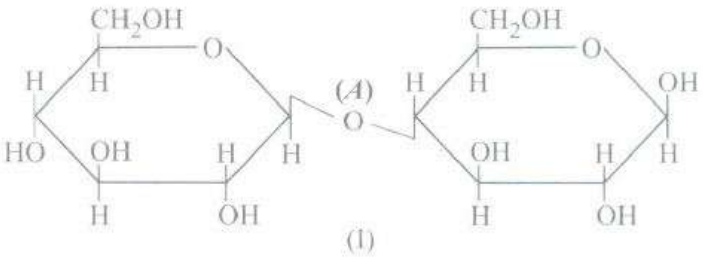
63. **Assertion:** Polysaccharides are called non-sugars.
Reason: Carbohydrates which yield a large number of monosaccharide units on hydrolysis are called polysaccharides.

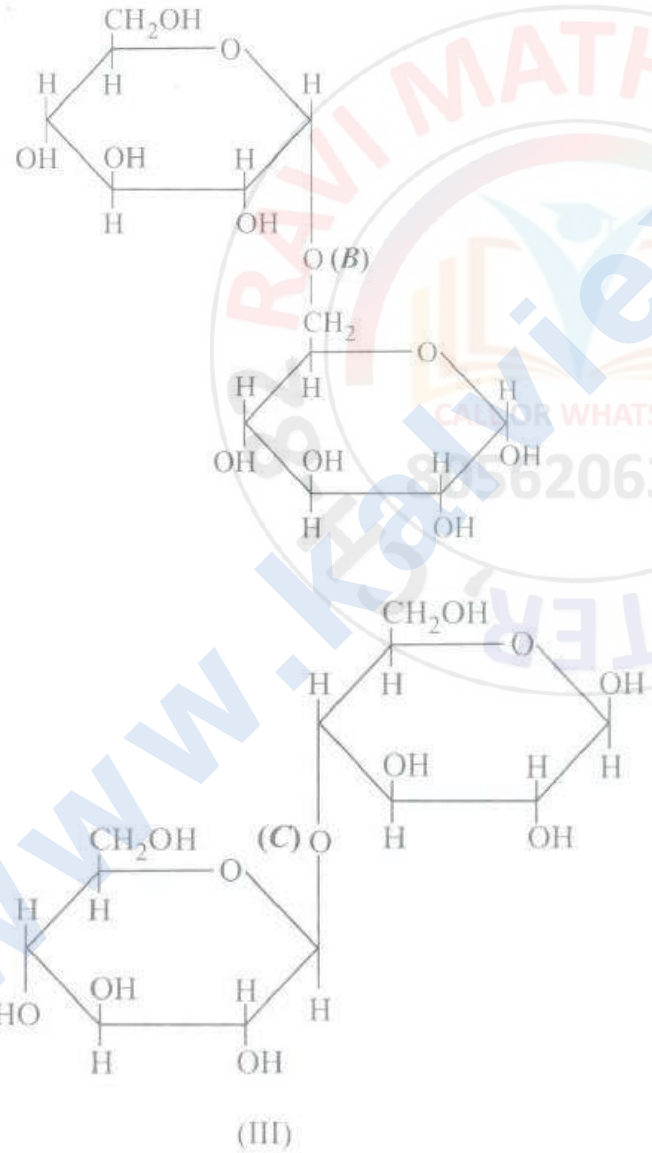
a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

64. Three structures are given below in which two glucose units are linked. Which of these linkages between glucose units are between C-I and C-4 and which linkages are between C-I and C-6?





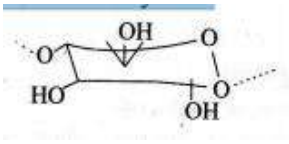
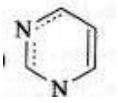
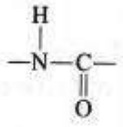
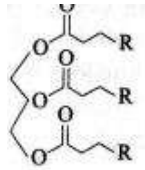
a) (A) is between C-I and C-4, (B) and (C) are between C-I and C-6.

b) (A) and (B) are between C-I and C-4, (C) is between C-I and C-6.

c) (A) and (C) are between C-I and C-4, (B) is between C-I and C-6.

d) (A) and (C) are between C-I and C-6, (B) is between C-I and C-4.

65. Secondary structure of protein refers to
a) sequence of amino acids in polypeptide chain
b) bonds between alternate polypeptide chains c) folding patterns of polypeptide chain
d) bonding between NH^+_3 and COO^- of two peptides.

66. Which one of the following chemical units is certainly to be found in enzyme?
a) 
b) 
c) 
d) 

67. The correct statement in respect of protein haemoglobin is that it _____.
a) acts as an oxygen carrier in the blood
b) forms antibodies and offers resistance to diseases
c) functions as a catalyst for biological reactions d) maintains blood sugar level

68. Guanine is an example of
a) a nitrogenous base b) a nucleoside c) a nucleotide d) phosphate.

69. Glucose $\xrightarrow{HCN} X \xrightarrow{\text{Hydrolysis}} Y \xrightarrow[\text{Heat}]{HI} Z$ Identify Z.
a) 2-Iodoheptane b) Heptane-2-ol c) 2-Iodohexane d) Heptanoic acid

70. **Assertion :** Vitamin D cannot be stored in our body.
Reason : Vitamin D is fat soluble vitamin and is excreted out of the body with urine.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

71. Which of the following statements is not correct?
a) Proteins are polyamides formed from amino acids.
b) Except glycine, all other amino acids show optical activity.
c) Natural proteins are commonly made up of L-isomer of amino acids.
d) In α-amino acids, $-NH_2$ and - COOH groups are attached to different carbon atoms.

72. In aqueous solutions, amino acids mostly exist as
a) NH_2 - CHR - COOH b) NH_2 - CHR - COO^- c) $\overset{+}{N}H_3CHRCOOH$ d) $\overset{+}{N}H_3CHRCOO^-$

73. Match the column I with column II and mark the appropriate choice.

	Column - I		Column -II
(A)	Pentose sugar in DNA	(i)	Ascorbic acid
(B)	Nucleic acid	(ii)	Uracil
(C)	RNA	(iii)	Genetic material
(D)	Vitamin	(iv)	Furanose structure

a) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)
b) (A) → (iii), (B) → (ii), (C) → (iv), (D) → (i)
c) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)
d) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)

74. RNA and DNA are chiral molecules, their chirality is due to :

a) chiral bases b) chiral phosphate ester units c) D-sugar component
d) L-sugar component

75. The α-amino acid which contains the aromatic side chain is
a) proline b) tyrosine c) valine d) serine

76. Which of the following is correct about H-bonding in nucleotide?
a) A--A and T--T b) G---T and A---C c) A--G and T--C d) A--T and G--C

77. Which of the following vitamins is water-soluble?
a) Vitamin E b) Vitamin K c) Vitamin A d) Vitamin B

78. Match the column I with column II and mark the appropriate choice.

Column - I		**Column - II**	
(A)	Nucleoside	(i)	Sugar +base + phosphoric acid group
(B)	Nucleotide	(ii)	Cytosine + uracil
(C)	DNA	(iii)	Sugar + base
(D)	RNA	(iv)	Cytosine + thymine

a) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)
b) (A) → (i), (B) → (iv), (C) → (iii), (D) → (ii)
c) (A) → (ii), (B) → (iii), (C) → (i), (D) → (iv)
d) (A) → (iv), (B) → (ii), (C) → (i), (D) → (iii)

79. Which one of the following is not correct?
a) D(-) Fructose exists in furanose structure. b) D(+) Glucose exists in pyranose structure.
c) In sucrose the two monosaccharides are held together by peptide linkage.
d) Maltose is a reducing sugar.

80. The hormone that helps in the conversion of glucose to glycogen is _____.
a) Cortisone b) Bileacids c) Adrenaline d) Insulin

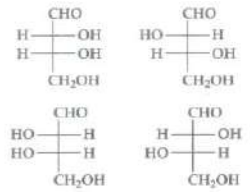
81. RNA molecules are of three types which are based on their different functions. These are
a) messenger RNA, translational RNA, structural RNA
b) cytosine RNA, nucleoside RNA, nucleotide RNA
c) messenger RNA, ribosomal RNA, transfer RNA
d) primary RNA, secondary RNA, tertiary RNA.

82. Vegetable oils like wheat germ oil, sunflower oil, etc. are the good source of
a) vitamin K b) vitamin E c) vitamin D d) vitamin A.

83. The segment of DNA which acts as the instrumental manual for the synthesis of the protein is: _____.
a) ribose b) gene c) nucleoside d) nucleotide

84. Primary structure of a protein is
a) sequence in which a-amino acids are linked to one another
b) sequence in which amino acids of one polypeptide chain are joined to other chain
c) the folding patterns of polypeptide chains
d) the pattern in which the polypeptide chains are arranged.

85. The correct corresponding order of four aldoses with configuration given below :



Respectively, is :

a) L-erythrose, L-threose, L-erythrose, D-threose

b) D-threose, D-erythrose, L-threose, L-erythrose

c) L-erythrose, L-threose, D-erythrose, D-threose

d) D-erythrose, D-threose, L-erythrose, L-threose.

86. Which of the following represents a peptide chain?

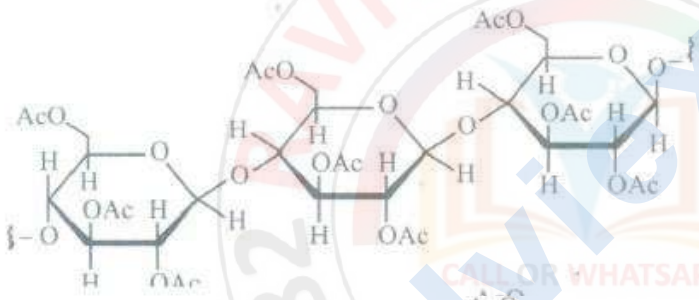
a) $-NH-\overset{\overset{||}{O}}{C}-NH-\overset{|}{C}-NH-\overset{\overset{||}{O}}{C}-NH-$ b) $-NH-\overset{\overset{||}{O}}{C}-CH_2-CH_2CH_2-NH-CH_2CH_2-C-\overset{||}{O}$

c) $-NH-CH_2-C-\overset{\overset{||}{O}}{O}NH-CH_2-C-\overset{\overset{||}{O}}{O}NH-CH_2$

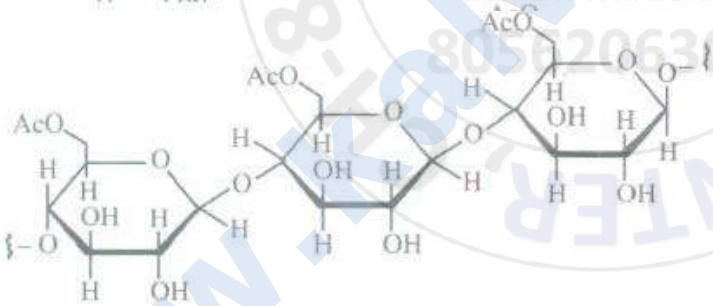
d) $-NH-CH_2CH_2-C-\overset{\overset{||}{O}}{O}NH-NH-CH_2-C-\overset{\overset{||}{O}}{O}CH_2$

87. Cellulose upon acetylation with excess acetic anhydride/H_2SO_4 (catalytic) gives cellulose triacetate whose structure is

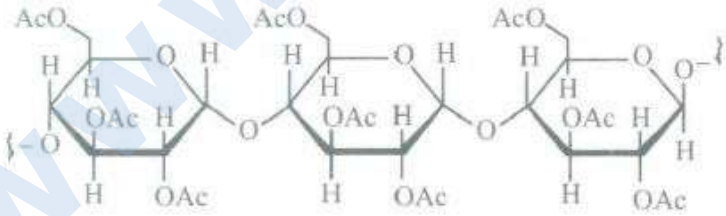
a)



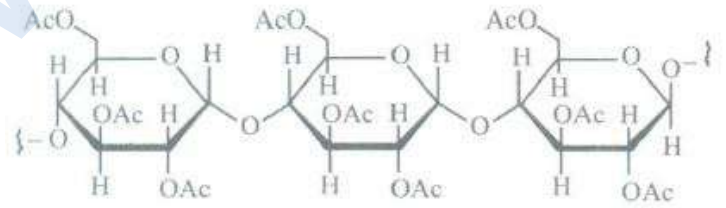
b)



c)



d)



88. Nucleic acids are

a) small molecules b) dipeptides c) long chain polymers of nucleotides d) polypeptides

89. Match the name of vitamins in column I with their sources in column II and mark the appropriate choice.

Column -I		Column - II	
(A)	Vitamin B_1	(i)	Milk, yeast, cereals
(B)	Vitamin B_{12}	(ii)	Meat, fish, egg
(C)	Vitamin A	(iii)	Carrots, butter, papaya
(D)	Vitamin C	(iv)	Citrus fruits, amla, green leafy vegetables

a) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)
b) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)
c) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)
d) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)

90. Which of the following compounds is found abundantly in nature?
a) Fructose b) Starch c) Glucose d) Cellulose

91. Which one of the following sets of monosaccharides forms sucrose?
a) α-D-galactopyranose and α-D glucopyranose
b) α-D-glucopyranose and β-D-fructofuranose
c) β-D-galactopyranose and α-D glucopyranose
d) α-D-galactopyranose and β-D glucopyranose

92. Which one of the following is an amine hormone?
a) Thyroxine b) Oxypurin c) Insulin d) Progesterone

93. The general formula of carbohydrates is
a) $C_nH_{2n+1}O$ b) $CnH_{2n}O$ c) $C_n(H_2O)_n$ d) $C_n(H_2O)_{2n}$

94. Proteins are found to have two different types of secondary structures viz. α-helix and β-pleated sheet structure. α-helix structure of protein is stabilised by
a) peptide bonds b) van der Waals forces c) hydrogen bonds
d) dipole-dipole interactions

95. Which of the following hormones contains iodine?
a) Testosterone b) Adrenaline c) Thyroxine d) Insulin

96. The double strand helix structure of DNA was proposed by
a) Har Gobind Khorana b) Watson and Crick c) A.R. Todd d) G.w. Kenner.

97. Which one of the following does not exhibit the phenomenon of mutarotation?
a) (+) Sucrose b) (+) Lactose c) (+) Maltose d) (-) Fructose

98. Sucrose (cane sugar) is a disaccharide. One molecule of sucrose on hydrolysis gives _____.
a) 2 molecules of glucose b) 2 molecules of glucose + 1 molecule of fructose
c) 1 molecule of glucose + 1 molecule of fructose d) 2 molecules of fructose

99. Glucose molecule reacts with 'X' number of molecules of phenylhydrazine to yield osazone. The value of 'X' is _____.
a) four b) one c) two d) three

100. Which of the following gives positive Fehling solution test?
a) Protein b) Sucrose c) Glucose d) Fats

101. Which one is responsible for production of energy in bin-reaction?

a) Thyroxine b) Adrenaline c) Oestrogen d) Progesterone

102. Which of the following is correct?
a) Cycloheptane is an aromatic compound b) Diastase is an enzyme
c) Acetophenone is an ether d) All of these

103. Chemically considering digestion is _____.
a) anabolism b) hydrogenation c) hydrolysis d) dehydrogenation

104. Deficiency of vitamin E causes
a) rickets b) scurvy c) muscular weakness d) beri beri

105. **Assertion :** The two strands of DNA are complementary to each other.
Reason: Adenine specifically forms hydrogen bonds with guanine whereas cytosine forms hydrogen bonds with thymine.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

106. An example of biopolymer is _____.
a) Teflon b) neoprene c) nylon-66 d) DNA

107. Which of the statements about "Denaturation", given below are correct?
(1) Denaturation of protein causes loss of secondary and tertiary structures of the protein.
(2) Denaturation affects primary structure which gets distorted.
a) (2) and (3) b) (1) and (3) c) (1) and (2) d) (1), (2) and (3)

108. Among the following, the narrow-spectrum antibiotic is _____.
a) Ampicillin b) Amoxycillin c) Chloramphenicol d) Penicillin G

109. Which one given below is a non-reducing sugar?
a) Maltose b) Lactose c) Glucose d) Sucrose

110. Which of the following is water-soluble?
a) Vitamin E b) Vitamin K c) Vitamin A d) Vitamin B

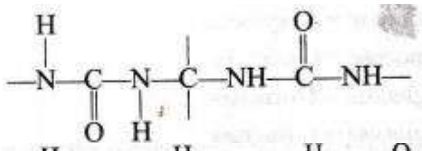
111. Which compound can exist in a dipolar (zwitter ion) structure?
a) $C_6H_5CH_2CH(N=CH_2)COOH$ b) $(CH_3)_2CHCH(NH_2)COOH$ c) $C_6H_5CONHCH_2COOH$
d) $HOOCCH_2CH_2COCOOH$

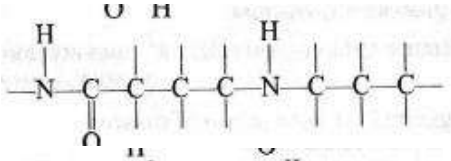
112. Which one of the following bases is not present in DNA?
a) Adenine b) Thymine c) Cytosine d) Uracil

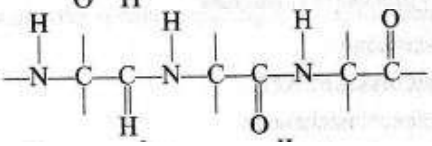
113. Which one given below is a non-reducing sugar?
a) Glucose b) Sucrose c) Maltose d) Lactose

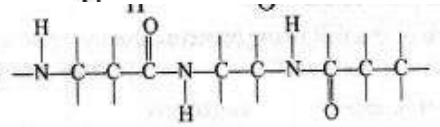
114. Dinucleotide is obtained by joining two nucleotides together by phospho diester linkage. Between which carbon atoms of pentose sugars of nucleotides are these linkages present?
a) 5' and 3' b) 1' and 5' c) 5' and 5' d) 3' and 3'

115. Which one of the following structures represents the peptide chain?

a) 

b) 

c) 

d) 

116. Which one of the following statements is not true regarding (+) lactose?

a) On hydrolysis (+) lactose gives equal amount of D(+) glucose and D(+) galactose.

b)

(+) Lactose is a β-glucoside formed by the union of a molecule of D(+) glucose and a molecule of D(+) galactose

c) (+) Lactose is a reducing sugar and does not exhibit mutarotation.

d) (+) Lactose, $C_{12}H_{22}O_{11}$ contains 8-OH groups

117. Which is not true statement?

a) a-carbon of a-amino acid is asymmetric b) All proteins are found in L-form.

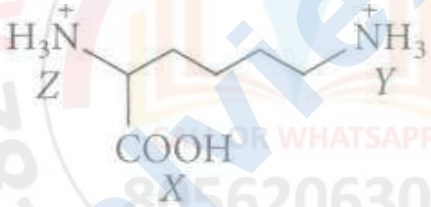
c) Human body can synthesize all proteins they need.

d) At pH=7 both amino and carboxylic groups exist in ionized form.

118. The two main differences between RNA and DNA are

a) ribose sugar and thymine in RNA b) deoxyribose sugar and uracil in DNA

c) ribose sugar and uracil in RNA d) deoxyribose sugar and guanine in DNA.

119. Consider the compound 

and arrange X, Y, Z in order of increasing acid strengths.

a) X > Z > Y b) Z < X < Y c) X > Y > Z d) Z > X > Y

120. The function of enzymes in the living system is to _____.

a) transport oxygen b) provide immunity c) catalyse biochemical reactions

d) provide energy

121. The α- and β-forms of glucose are:

a) isomers of D(+) glucose and L(-) glucose respectively b) diastereomers of glucose

c) anomers of glucose d) isomers which differ in the configuration of C-2.

122. Thymine is

a) 5-methyluracil b) 4-methyluracil c) 3-methyluracil d) 1-methyluracil

123. Proteins are condensation polymers of

a) α- amino acids b) β - amino acids c) α - hydroxy acids d) β - amino acids

124. Which of the following diseases is not correctly matched with the vitamins mentioned with it?

a) Vitamin B_2 - Cracking of lips b) Vitamin C -Bone deformities

c) Vitamin D -Osteomalacia d) Vitamin A -Night blindness

125. —C—NH—(peptide bond).

Which statement is incorrect about peptide bond?

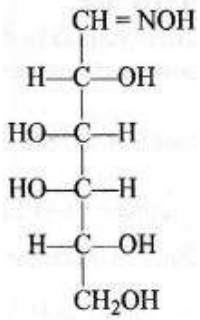
a) C—N bond length in proteins is longer than usual bond length of N—C bond structure
b) Spectroscopic analysis shows planar of
c) C—N bond length in proteins is smaller than usual bond length of C—N bond.
d) None of the above.

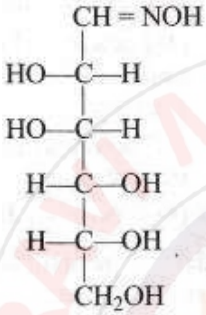
126. Which one of the following is a peptide hormone?
a) Adrenaline b) Glucagon c) Testosterone d) Thyroxine

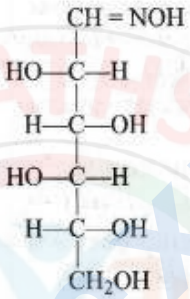
127. Number of chiral carbons in β-(D)-(+) glucose is :
a) five b) six c) three d) four

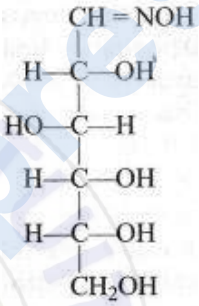
128. Which of the following statements is true for proteins?
a) They act as antibodies. b) They act as hormones.
c) They catalyse the biochemical reactions. d) All of these.

129. D(+) glucose reacts with hydroxylamine and yields an oxime. The structure of the oxime would be _____.

a) 

b) 

c) 

d) 

130. Which of the following compounds can form a zwitter ion?
a) Benzoic acid b) Acetanilide c) Aniline d) Glycine

131. On boiling the egg, what structural changes are taking place in the egg white?
a) The colour of the egg changes from colourless to white.
b) 2° and 3° structures are destroyed but 1° structure remains intact.
c) 1°, 2° and 3° structures of egg are destroyed
d) A reversible change takes place which can be reversed by decreasing the temperature.

132. During the process of digestion, the proteins present in food materials are hydrolysed to amino acids. The two enzymes involved in the process

$$\text{Proteins} \xrightarrow{\text{Enzyme (A)}} \text{Polypeptides} \xrightarrow{\text{Enzyme (o)}} \text{Amino acids}$$ are respectively.

a) Diastase and Lipasa b) Pepsin and Trypsin c) Invertase and Zymase
d) Amylase and Maltase

133. Match the vitamins given in column I with the deficiency diseases caused by it given in column II and mark the appropriate choice.

Column - I		**Column - II**	
(A)	Vitamin B_1	(i)	Convulsions
(B)	Vitamin B_2	(ii)	Pernicious anemia
(C)	Vitamin B_{12}	(iii)	Beri beri
(D)	Vitamin B_6	(iv)	Cheilosis

a) (A) → (iv), (B) → (iii), (C) → (i), (D) → (ii)
b) (A) → (i), (B) → (iv), (C) → (iii), (D) → (ii)

c) (A) → (ii), (B) → (i), (C) → (iv), (D) → (iii)
d) (A) → (iii), (B) → (iv), (C) → (ii), (D) → (i)

134. The couplings between base units of DNA is through _____.
a) hydrogen bonding b) electrostatic bonding c) covalent bonding
d) van der Waals, forces

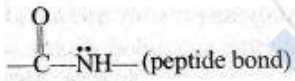
135. Invert sugar is
a) a type of cane sugar b) optically inactive form of sugar
c) mixture of glucose and galactose
d) mixture of glucose and fructose in equimolar quantities

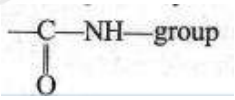
136. Vitamin A is present in
a) fish liver oil b) milk c) butter d) all of these.

137. Which of the statement about "Denaturation" given below are correct?
(i) Denaturation of proteins causes loss of secondary and tertiary structures of the protein
(ii) Denaturation leads to the conversion of double strand of DNA into single strand
(iii) Denaturation affects primary structure which gets distorted
a) (ii) and (iii) b) (i) and (iii) c) (i) and (ii) d) (i), (ii) and (iii)

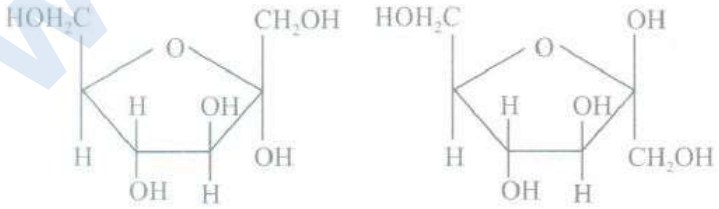
138. Which of the following is not produced by human body?
a) Enzymes b) Vitamins c) Proteins d) Nucleic acid

139. Cellulose present in plants and as a food for cattle but not for human beings because
a) human body does not contain cellulase hence cellulose cannot be broken into D-glucose
b) human saliva cannot break down plant cellulose in small pieces
c) bile juice present in cattle helps them to digest cellulose
d) human beings have a smaller stomach than cattle.

140. For 

Which statement is incorrect about peptide bond?
a) C-N bond length in proteins is longer than usual bond length of the C-N bond
b) Spectroscopic analysis shows planar structure of the 

c) C-N bond length in proteins is smaller than usual bond length of the C-N bond.
d) None of the above

141. Five-membered ring structures of fructose are given below. Mark the incorrect statement.


a) The five-membered ring structures are named as furanose structures.
b) The cyclic structures represent two anomers of fructose.
c) Five-membered ring structures are named as pyranose structures.
d) These are also called Haworth structures.

142. **Assertion:** Purine bases present in DNA are adenine and guanine.
Reason: The base thymine is present in RNA while base uracil is present in DNA.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

143. The enzymes which hydrolysis triglycerides to fatty acids and glycerol is called _____.
a) Maltase b) Lipase c) Zymase d) Pepsin

144. The number of amino acids found in proteins that a human body can synthesise is
a) 20 b) 25 c) 10 d) 100

145. A sequence of how many nucleotides in messenger RNA makes a codon for an amnion acid?
a) Three b) Four c) One d) Two

146. The number of molecules of ATP produced in the lipid metabolism of a molecule of palmitic acid is _____.
a) 130 b) 36 c) 56 d) 86

147. Which of the following is not true about amino acids?
a) They are constituents of all proteins.
b) Alanine having one amino and one carboxylic group.
c) Most naturally occurring amino acids have D- configuration.
d) Glycine is the only naturally occurring amino acid which is optically inactive.

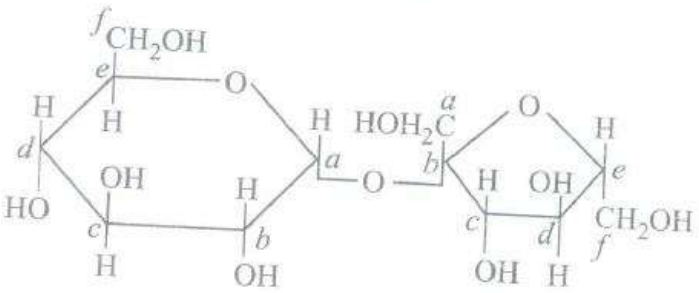
148. Deficiency of vitamin B, causes the disease?
a) Convulsions b) Beri-Beri c) Cheilosis d) Sterility

149. **Assertion:** D-glucose is dextrorotatory whereas l-glucose is laevorotatory.
Reason : D-compounds are always dextro andl-compounds are always laevorotatory.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

150. In DNA, the complimentary bases are _____
a) Adenine and thymine; guanine and cytosine b) Adenine and thymine; guanine and uracil
c) Adenine and guanine; thymine and cytosine
d) Uracil and adenine; cytosine and guanine

151. Which of the following hormones is produced under the conditions of stress which stimulate glycogenolysis in the liver of human beings?
a) Thyroxin b) Insulin c) Adrenaline d) Estradiol

152. Stucture of a disaccharide formed by glucose and fructose is given below. Identify anomeric carbon atoms in monosaccharide units.



a) 'a' carbon of glucose and 'a' carbon of fructose
b) 'a' carbon of glucose and 'e' carbon of fructose
c) 'a' carbon of glucose and 'b' carbon of fructose
d) 'f' carbon of glucose and 'f' carbon of fructose

153. Artificial sweetener which is stable under cold conditions only is _____.
a) Saccharine b) Sucralose c) Aspartame d) Alitame

154. Which of the following in an amine hormone?
a) Insulin b) Progesterone c) Thyroxine d) Oxypurin

155. Denaturation of protein leads to loss of its biological activity by
a) formation of amino acids b) loss of primary structure
c) loss of both primary and secondary structure
d) loss of both secondary and tertiary structures.

156. Which of the following statements is not true about glucose?
a) It is an aldohexose. b) On heating with HI it forms n-hexane.
c) It is present in furanose form. d) It does not give 2, 4-DNP test.

157. Among the naturally occurring carbohydrates, furanose ring is found in the
a) glucose unit of cane sugar b) glucose unit of cellulose c) fructose unit of cane sugar
d) galactose unit of lactose

158. **Assertion:** Sucrose is a non reducing sugar.
Reason: Sucrose is a disaccharide formed by glycosidic linkage between C-1 of α-glucose and C-2 of β-fructose.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

159. The human body does not produce _____.
a) Vitamins b) Hormones c) Enzymes d) DNA

160. During acetylation of glucose it needs x moles of acetic anhydride. The value of x would be
a) 3 b) 5 c) 4 d) 1

161. A unit in nucleic acid which contains 'base-sugar phosphate' unit is called
a) nucleotide b) nucleoside c) phosphotide d) polypeptide.

162. Which one of the following statements is not true regarding (+) lactose?

a) On hydrolysis (+) Lactose gives equal amount of D(+) glucose and D(+) galactose.

b)

(+) Lactose is a B-glycoside formed by the union of a molecule of D(+) glucose and a molecule of D(+) galactose.

c) (+) Lactose is a reducing sugar and does not exhibit mutarotation.

d) (+) Lactose, $C_{12}H_{22}O_{11}$ contains 8-OH groups.

163. Which one of the amino acids can be synthesised in the body?

a) Alanine b) Lysine c) Valine d) Histidine

164. Glycogen is a branched chain polymer of a-D-glucose units in which chain is formed by C-1 - C-4 glycosidic linkage whereas branching occurs by the formation of C-1- C-6 glycosidic linkage. Structure of glycogen is similar to_____.

a) amylose b) amylopectin c) cellulose d) glucose

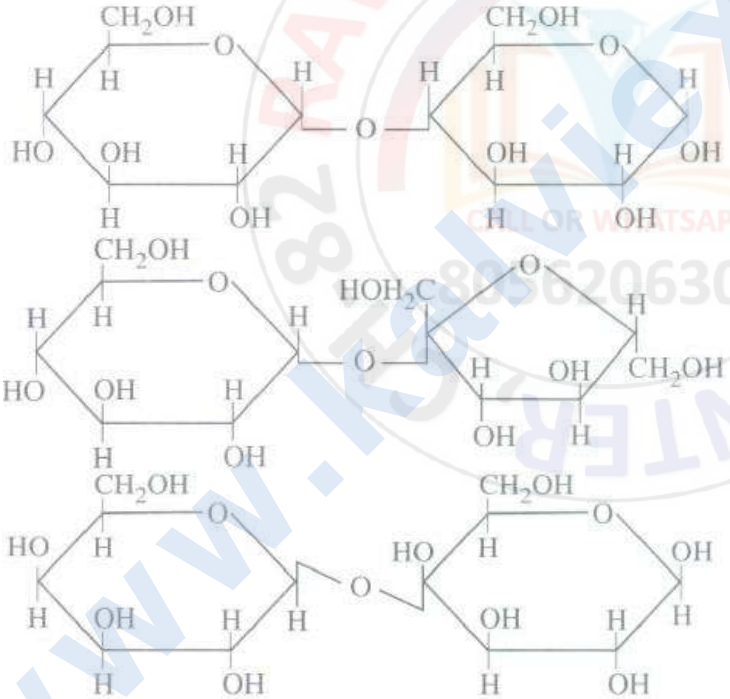
165. Enzymes are made up of _____.

a) Edible proteins b) Proteins with specific structure

c) Nitrogen-containing carbohydrates d) Carbohydrates

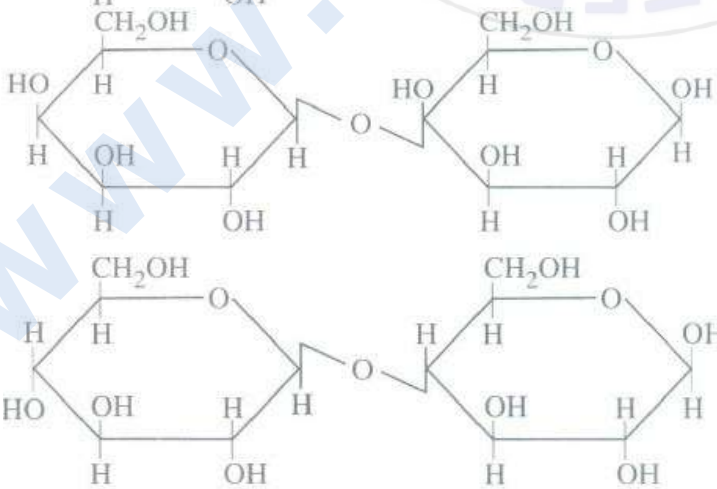
166. In disaccharides, if the reducing groups of monosaccharides i.e. aldehydic or ketonic groups are bonded, these are non-reducing sugars. Which of the following disaccharide is a non-reducing sugar?

a)



b)

c)



d)

167. The hydrogen bonding for the bases pairs of DNA are between

a) amide carbonyl and $-NH_2$ only b) amide N - H and cyclic amine nitrogen only

c) alcohols and carbonyls only d) both (a) and (b).

168. In fibrous proteins, polypeptide chains are held together by

a) van der Waals forces b) electrostatic forces of attraction c) hydrogen bonds

d) covalent bonds.

169. Which is the correct statement?

a) Starch is a polymer of α-glucose b) Amylose is a component of cellulose

c) Proteins are composed of only one type of amino acid.

d) In cyclic structure of fructose, there are four carbons and one oxygen atom.

170. Which is not a true statement?

a) α -Carbon of α-amino acid is asymmetric b) All proteins are found in L-form

c) Human body can synthesize all proteins they need

d) At PH =7 both amino and carboxylic groups exist in ionised form

171. Which of the following statements is not true?

a) Glucose and fructose both are monosaccharides

b) The natural glucose and fructose are D-forms.

c)

The solution having equal molecules of D-glucose and D-fructose is termed as invert sugar

d) Aldohexoses exist in 2^6 optical forms

172. Which of the following is the sweetest sugar?

a) Fructose b) Glucose c) Sucrose d) Maltose

173. Which of the following can possibly be used as analgesic without causing addiction and mood modification?

a) Morphine b) Diazepam c) Tetrahydrocational d) N-acetyl-para-aminophenol

174. Which functional group participates in disulphide bond formation in proteins?

a) Thioester b) Thioether c) Thiol d) Thiolactone

175. Most common types of secondary structures of proteins are

a) α- helix and β- helix structures b) α helix and β - pleated sheet structures

c) right and left hand twisted structures d) globular and fibrous structures.

176. Which of the following statements is not correct?

a) Ovalbumin is a simple food reserve in egg-white.

b) Blood proteins thrombin and fibrinogen are involved in blood clotting.

c) Denaturation makes the proteins more active.

d) Insulin maintains sugar level in the blood of a human body.

177. Which type of interactions are responsible for making the a-helix structure stable?

a) Peptide bonds between - NH_2 and CO groups of adjacent carbon chains.

b)

Hydrogen bonds between - NH of amino acid in one turn with - CO of amino acid to adjacent turn.

c) -OH group of one amino acid with -CO group of other amino acid on the turn.

d) Hydrogen bonds between adjacent amino acids.

178. The conversion of maltose into glucose is possible by the enzyme

a) zymase b) lactase c) maltase d) diastase

179. Mark the wrong statement about denaturation of proteins.
a) The primary structure of the protein does not change.
b) Globular proteins are converted into fibrous proteins.
c) Fibrous proteins are converted into globular proteins.
d) The biological activity of the protein is destroyed.

180. Glycolysis is _____.
a) conversion of glucose to haem b) oxidation of glucose of glutamate
c) conversion of pyruvate to citrate d) oxidation of glucose to pyruvate

181. Amino acids generally exist in the form of Zwitter ions. This means they contain
a) basic $-NH_2$ group and acidic -COOH group
b) the basic $-NH_3$ group and acidic $-COO^-$ group c) basic $-NH_2$ and acidic $-H^+$ group
d) basic $-COO^-$ group and acidic $-NH_3$ group.

182. Nucleic acids are the polymers of_____.
a) nucleosides b) nucleotides c) bases d) sugars

183. The cell membranes are mainly composed of _____.
a) fats b) proteins c) phospholipids d) carbohydrates

184. Which of the following is not a function of proteins?
a) Formation of hair, wool, skin and nails.
b) As a biological catalysts in the form of enzymes. c) As food in the form of meat, eggs.
d) As energy provider for metabolism.

185. Match the column I with column II and mark the appropriate choice.

Column -I		**Column - II**	
(A)	Peptide linkage	(i)	Inversion
(B)	Nucleic acid	(ii)	Polysaccharide
(C)	Hydrolysis of cane sugar	(iii)	Proteins
(D)	Starch	(iv)	Nucleotides

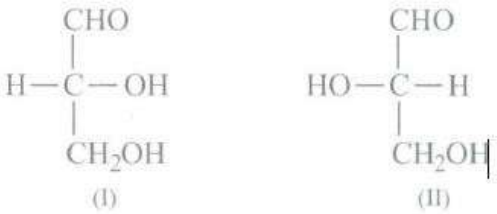
a) (A) → (ii), (B) → (i), (C) → (iii), (D) → (iv)
b) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)
c) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)
d) (A) → (i), (B) → (iii), (C) → (iv), (D) → (ii)

186. The difference between amylose and amylopectin is:
a) Amylopectin have 1 ⟶ 4 α-linkage and 1 ⟶ 6 β-linkage
b) Amylose have 1 ⟶ 4 α-linkage and 1 ⟶ 6 β-linkage
c) Amylopectin have 1 ⟶ 4 α-linkage and 1 ⟶ 6 α-linkage
d) Amylose is made up of glucose and galactose

187. Cellulose is a
a) hexapolysaccharide b) pentapolysaccharide c) tripolysaccharide d) none of these.

188. Deficiency of vitamin B_1 causes the disease :
a) convulsions b) beri-beri c) cheilosis d) sterility

189. The given structures (I) and (II) represent configuration of the simplest sugar glyceraldehyde. Which of the following statements is not correct for the structures?



a) (I) represents D-form while (II) represents L- form of glyceraldehyde.
b) The sugars having same configuration as D-glyceraldehyde are designated as D-sugars.
c) Natural glucose and fructose are D-forms.
d) D is dextrorotatory while L is laevorotatory enantiomer.

190. Glycosidic linkage is an
a) amide linkage b) ester linkage c) ether linkage d) acetyl linkage.

191. The hormone thyroxine
a) is secreted by pancreas b) is secreted by thyroid c) decreases blood sugar
d) does not stimulate metabolism

192. If one strand of DNA has the sequence ATGCTTGA, the sequence in the complimentary strand would be
a) TCCGAACT b) TACGTAGT c) TACGAATC d) TACGAACT

193. What are the hydrolysis products of sucrose?
a) Fructose + Fructose b) Glucose + Glucose c) Glucose + Galactose
d) Glucose + Fructose

194. In reference to biological role, Ca^{2+} ions are important in _____.
a) triggering the contraction of muscles
b) generating the right electrode potential across cell membrane c) hydrolysis of ATP
d) defence mechanism

195. **Assertion :** Glucose is correctly named as D-(+)-glucose.
Reason: 'D' before the name of glucose represents its dextrorotatory nature.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

196. **Assertion:** All enzymes found in cells are invariably proteins which catalyse biological reactions.
Reason : Enzymes act efficiently at a moderate temperature and pH.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

197. Carbohydrates are stored in human body as the polysaccharide
a) starch b) glycogen c) cellulose d) amylose.

198. The peptide linkage formed between glycine (NH_2CH_2COOH) and alanine

$\left(NH_2 - CH - \overset{|}{C}H_3COOH \right)$ to give glycylalanine can be shown as:

a) $NH_2 - CH_2 - NH - CH\overset{|}{C}H_3 - COOH$ b) $NH_2 - CH_2 - CONH - CH\overset{|}{C}H_3 - COOH$

c) $H_2NCOCH_2 - CH\overset{|}{C}H_3 - CONH_2$ d) $HOOC - CH_2 - NH - NH - CH\overset{|}{C}H_3 - COOH$

199. The oxidation of glucose is one of the most important reaction in a living cell. What is the number of ATP molecules generated in cells from one molecule of glucose :

a) 28 b) 38 c) 12 d) 18

200. **Assertion:** Hydrolysis of sucrose brings about a change in sign of rotation from dextro to laevo.

Reason : Hydrolysis always changes the optical rotation of a compound.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

201. Which of the following is a non-reducing sugar?

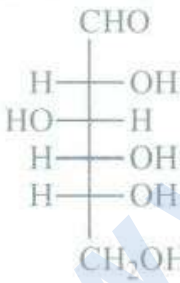
a) Glucose b) Sucrose c) Maltose d) Lactose

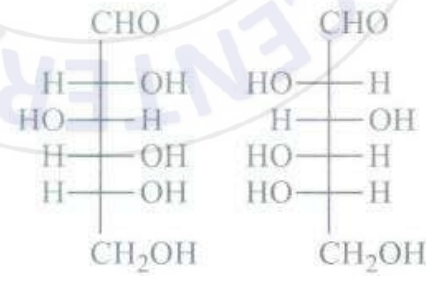
202. Sucrose on hydrolysis gives _____.

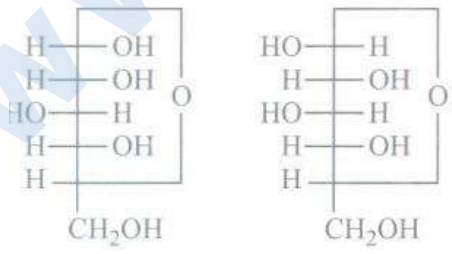
a) α - Fructose + β-Fructose b) β-Glucose + α-Fructose c) α -Glucose + β-Glucose

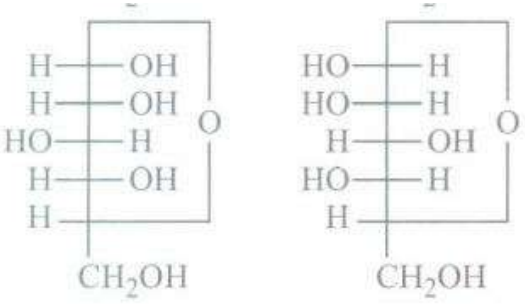
d) α-Glucose + β-Fructose

203. Which of the following pairs represents anomers?

a) 

b) 

c) 

d) 

204. A nucleoside on hydrolysis gives

a) an aldopentose and a nitrogenous base b) an aldopentose and phosphoric acid

c) an aldopentose, a nitrogenous base and phosphoric acid

d) a nitrogenous base and phosphoric acid.

205. Mg is present in :

a) chlorophyll b) haemoglobin c) vitamin-D d) vitamin-B

206. Match the sugars in column I with their types given in column IIand mark the appropriate choice.

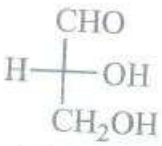
Column - I		Column -II	
(A)	Glucose	(i)	Ketohexose
(B)	Fructose	(ii)	Aldohexose
(C)	Ribose	(iii)	Aldotetrose
(D)	Erythrose	(iv)	Aldopentose

a) (A) → (iv), (B) → (i), (C) → (iii), (D) → (ii)
b) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)
c) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)
d) (A) → (ii), (B) → (i), (C) → (iv), (D) → (iii)

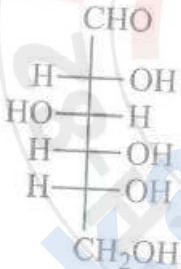
207. Phospholipids are esters of glycerol with _____.
a) Three phosphate groups b) Three carboxylic acid residues
c) Two carboxylic acid residues and one phosphate group
d) One carboxylic acid residue and two phosphate groups

208. The anomeric carbon in D(+) glucose is:
a) C-1 carbon b) C-2 carbon c) C-5 carbon d) C-6 carbon

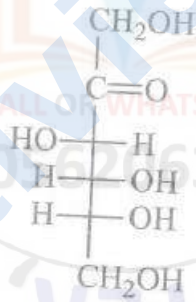
209. Optical rotations of some compounds along with their structures are given below. Which of them have D-configuration?



(+) rotation
(I)



(+) rotation
(II)



(–) rotation
(III)

a) I,II,III b) II,III c) I,II d) III

210. Which one of the following, statements is incorrect about enzymes catalysis
a) Enzymes are mostly proteinous in nature. b) Enzyme action is specific.
c) Enzymes are denatured by ultraviolet rays and at high temperature.
d) Enzymes are least reactive at optimum temperature.

211. The helical structure of protein is stabilized by _____.
a) dipeptide bonds b) hydrogen bonds c) ether bonds d) Peptide bonds

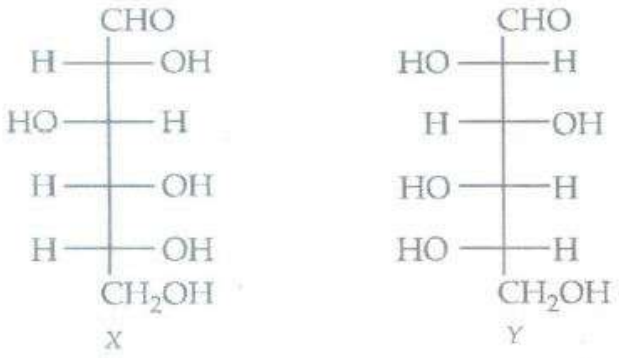
212. Vitamin C must be supplied regularly in diet because
a) it is water soluble hence excreted in urine and can't be stored in the body
b) it is fat soluble hence stored in the body and cannot be used on regular basis
c) it is required in a large amount by the body hence supplied regularly
d) it is water soluble hence used by the body on daily basis and is to be supplied regularly.

213. The central dogma of molecular genetics states that the genetic information flows from :

a) Amino acids ⟶ Proteins ⟶ DNA b) DNA ⟶ Carbohydrates ⟶ Proteins
c) DNA ⟶ RNA ⟶ Proteins d) DNA ⟶ RNA ⟶ Carbohydrates

214. The α-D-glucose and β-D-glucose differ from each other due to difference in carbon atom with respect to its :
a) number of OH groups b) size of hemiacetal ring c) conformation d) configuration

215. Among the following statements about the molecules X and Y, which is incorrect?



a) X and Y are diastereomers. b) X and Y are enantiomers.
c) X and Y are both aldohexoses d) X is a D-sugar and Y is an L-sugar

216. Hyperglycemia implies
a) high blood-sugar level b) low blood -sugar level c) high concentration of salt in blood
d) low concentration of salt in blood

217. Which of the following treatment will convert starch directly into glucose?
a) Heating with dilute H_2SO_4 b) Fermentation by diastase c) Fermentation by zymase
d) Heating with dilute NaOH

218. Maltose is made up of:
a) two α-D-glucose b) normal β-D-glucose c) α- and β-D-glucose d) fructose

219. Which of the following polymers is stored in the liver of animals?
a) Amylose b) Amylose c) Amylopectin d) Glycogen

220. The α-D-glucose and β-D-glucose differ from other due to difference in carbon atom with respect to its _____.
a) conformation b) configuration c) number of OH-groups d) size of hemiacetal ring

221. Amino acids are least soluble
a) at pH around 7 b) at pH 7 c) at their isoelectric points d) none of these.

222. RNA and DNA are chiral molecules, their chirality due to _____.
a) chiral bases b) chiral phosphate ester units c) D-sugar component
d) L-sugar component

223. **Assertion:** The two cyclic hemiacetal forms of glucose, α- form and β-form are called anomers.
Reason : Anomers differ only in the configurationof the hydroxyl group at C-1.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

224. Globular proteins are present in
a) blood b) eggs c) milk d) all of these.

225. Cellulose is a polymer of _____.
a) Glucose b) Fructose c) Ribose d) Sucrose

226. In DNA the linkages between different nitrogenous bases are _____.
a) peptide linkage b) phosphate linkage c) H-bonding d) glycosidic linkage

227. **Assertion :** In presence of enzyme, substrate molecule can be attacked by the reagent effectively.
Reason: Active sites of enzymes hold the substrate molecule in a suitable position.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

228. On oxidation with a mild oxidising agent like Br_2/H_2O, the glucose is oxidised to
a) saccharic acid b) glucaric acid c) gluconic acid d) valeric acid.

229. Vitamin B_2, a water soluble vitamin is also known as
a) ascorbic acid b) riboflavin c) thiamine d) pyridoxine

230. Which of the following is not a fat soluble vitamin?
a) Vitamin B complex b) Vitamin D c) Vitamin E d) Vitamin A

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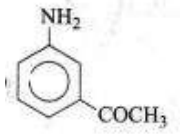
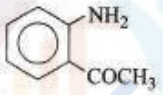
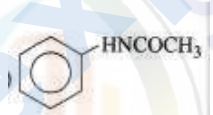
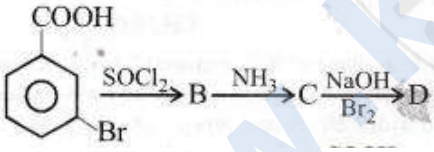
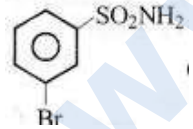
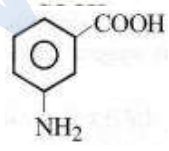
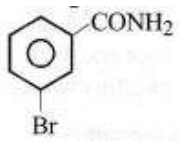
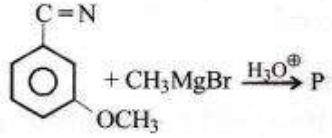
Time : 1 Mins **ORGANIC COMPOUNDS CONTAING NITROGEN AND POLYMERS 1** **Marks : 746**

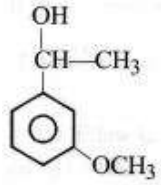
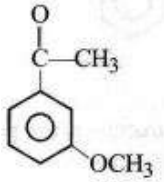
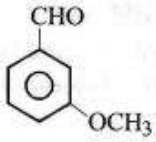
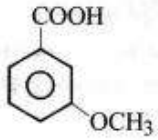
1. Nitrobenzene on reaction with conc. HNO_3/H_2SO_4 at 80-100°C forms which one of the following produces?
   a) 1, 3 - Dinitrobenzene b) 1, 4-Dinitrobenzene c) 1, 2, 4 - Trinitrobenzene
   d) 1, 2-Dinitrobenzene
2. The compound obtained by heating a mixture of primary amine and chloroform with ethanolic potassium hydroxide (KOH) is _____.
   a) an alkyl isocyanide b) an alkyl halide c) an amide d) an amide and nitro compound
3. Aniline is an activated system for electrophilic substitution. The compound formed on healing aniline with acetic anhydride is _____.

   a)  b) c)  d) 
4. The decomposition of organic compounds, sin the presence of oxygen and without the development of odoriferous substances is called _____.
   a) decay b) N_2 - fixation c) nitrification d) dentrification
5. In a set of rection m-bromoben zoic acid gave a product D. Identify the product D.

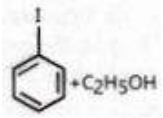
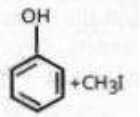
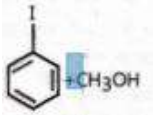
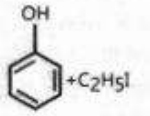
   

   a)  b)  c) d) 
6. Anline is reacted with bromine water and the resulting product is treated with an aqueous solution of sodium nitrite in presence of dilute hydrochloric acid. The compound so formed is converted into a tetrafluoroborate which is subsequently heated. The final product is:
   a) 1, 3, 5 - trbromobenzene b) p - bromofluorobenzene c) p - bromoaniline
   d) 2, 4, 6 - tribromofluorobenzene
7. 

   Product 'P' in the above reaction is _____.

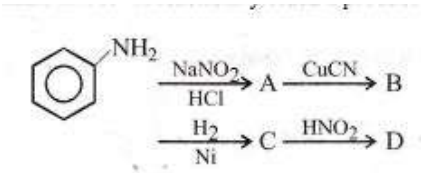
a)  b)  c)  d) 

8. Anisole on cleavage with HI gives:

a)  b)  c)  d) 

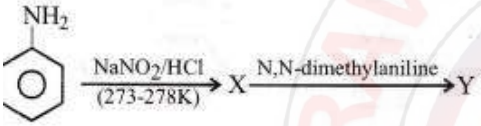
9. Indicate which nitrogen compound amongst the following would undergo Hofmann reaction?
   a) $RCONHCH_3$ b) $RCOONH_4$ c) $RCONH_2$ d) RCONHOH

10. Aniline in a set of reactions yielded a product D.

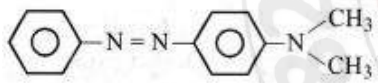
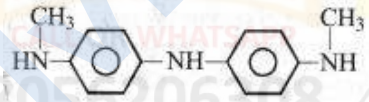


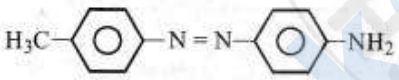
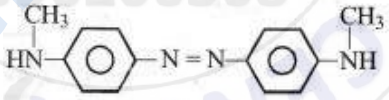
The structure of the product D would be _____.
a) C_6H_5NHOH b) $C_6H_5NHCH_2CH_3$ c) $C_6H_5CH_2NH_2$ d) $C_6H_5CH_2OH$

11. Aniline in a set of the following reactions yielded a coloured product 'Y'



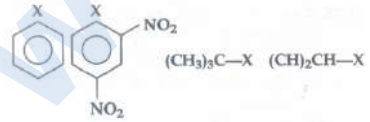
The structure of Y could be: _____.

a)  b) 

c)  d) 

12. When aniline reacts with oil of almonds (C_6H_5CHO) condensation takesplace and benzal derivative is formed. This is known as _____.
   a) Millon's base b) Schitr's reagent c) Schiff's base d) Benedict's reagent

13. The correct order of increasing reactivity of C - X bond towards nucleophile in the following compounds is:



I II III IV

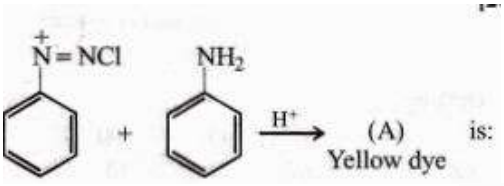
a) I < II < IV < III b) II < III < I < IV c) IV < III < I < II d) III < II < I < IV

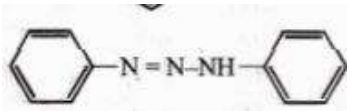
14. For carbylamine reaction, we need hot alc. KOH and _____.
   a) any primary amine and chloroform b) chloroform and silver powder
   c) a primary amine arrd an alkyl halide d) a mono alkyl amine and trichlorom ethane

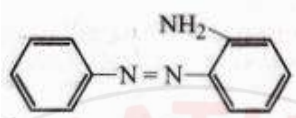
15. On hydrolysis of a "compound", two compounds are obtained. One of which on treatment with sodium nitrite and hydrochloric acid gives a product which does not respond to iodoform test. The second one reduces Tollen's reagent and Fehling's solution. The "compound" is _____.
    a) $CH_3CH_2CH_2CON(CH_3)_2$ b) $CH_3CH_2CH_2NC$ c) $CH_3CH_2CH_2CN$
    d) $CH_3CH_2CH_2ON{=}O$

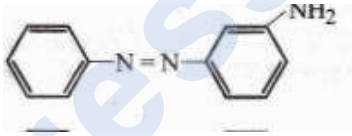
16. Acetamide is treated with the following reagents separately. Which one of these would yield methyl amine?
    a) $NaOH/Br_2$ b) Sodalime c) Hot conc. H_2SO_4 d) PCl_4

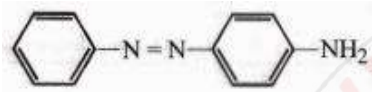
17. In the following reaction, the production (A).



a) 

b) 

c) 

d) 

18. The product formed by the reaction of an aldehyde with a primary amine is:
    a) carboxylic acid b) aromatic acid c) Schiff's base d) ketone

19. Phenyl isocyanides are prepared from which of the following reaction?
    a) Rosenmund's reaction b) Carbylamine reaction c) Reimer-Tiemann reaction
    d) Wurtz reaction

20. Consider the following sequence of reactions
    $\text{Compound [A]} \xrightarrow{\text{Reduction}} [B] \xrightarrow{HNO_2} CH_3CH_2OH$. The compound [A] is _____.
    a) CH_3CH_2CN b) CH_3NO_2 c) CH_3NC d) CH_3CN

21. Mark the correct statement:
    a) Methyl amine is slightly acidic b) Methyl amine is less basic than ammonia
    c) Methyl amine is a stronger base than NH_3 d) Methyl amine forms salts with alkalies

22. Acetamide and ethyl amine can be distinguished by reacting with _____.
    a) aq.HCl and heat b) aq. NaOH and heat c) acidified $KMnO_4$ d) bromine water

23. Nitrobenzene can be prepared from benzene by using a mixture of conc. HNO_3 and conc. H_2SO_4 in the mixture, nitric acid acts as a/an _____.
    a) acid b) base c) catalyst d) reducing agent

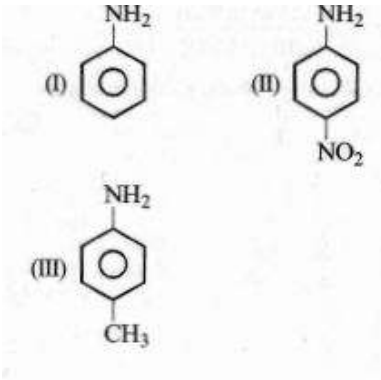
24. Which of the following is more basic than aniline?
    a) Diphenylamine b) Triphenylamine c) *p*-nitroaniline d) Benzylamine

25. In the reaction, $CH_3CN + 2H \xrightarrow{HCl} SnCl_2 \longrightarrow X \xrightarrow{\text{Boiling } H_2O} Y$, then the Y is _____.
    a) acetone b) ethanamine c) acetaldehyde d) dimethylamine

26. A reagent suitable for the determination of N-terminal residue of a peptide is _____.

a) p-toluene sulphonyl chloride b) 2,4-dinitrophenyl hydrazine c) carboxypeptidase
d) 2,4-dinitrofl uorobenzene

27. The correct increasing order of basic strength for the following compounds is _____.

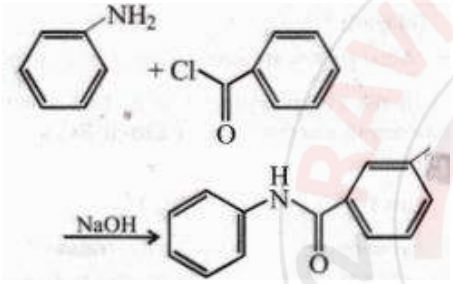


a) III<I<II b) III<II<I c) II<I<III d) II<III<I

28. Intermediates formed during reaction of with Br_2 and KOH are _____.

a) RNHBr and RCONHBr b) RNHCOBT and RNCO c) RCONHB and RCNO
d) $RCONBr_2$

29. The following reaction



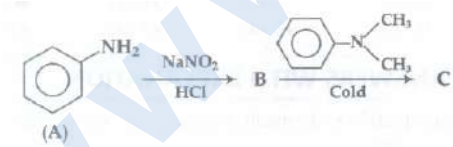
is known by the name: _____.

a) Friedel-Craft's reaction b) Perkin's reaction c) Acetylation reaction
d) Shotten-Banmen reaction

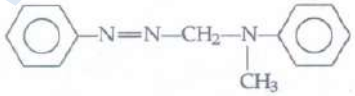
30. What is the decreasing order of basicity of 1^0, 2^0, and 3^0 ethyl amines and ammonia?

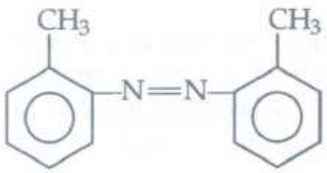
a) $NH_3 > C_2H_5NH_2 > (C_2H_5)_2 NH > (C_2H_5)_3N$ b) $(C_2H_5)_3N > (C_2H_5)_2NH > C_2H_5NH_2 > NH_3$
c) $(C_2H_5)_3NH > C_2H_5NH_2 > (C_2H_5)_3N > NH_3$ d) $(C_2H_5)_2NH > (C_2H_5)_3N > C_2H_5NH_2 > NH_3$

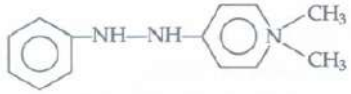
31. In a reaction of aniline a coloured product C was obtained.

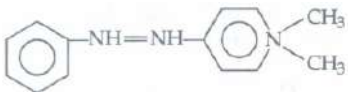


The structure of C would be:

a) 

b) 

c) 

d) 

32. The correct order of the basic strength of methyl-substituted amines in aqueous solution is: _____.

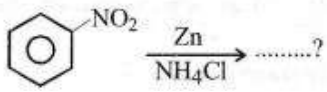
a) $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH$ b) $(CH_3)_3N > (CH_3)_2NH_2 > CH_3NH_2$

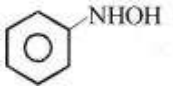
c) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N^2$ d) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$

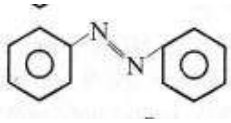
33. Which one of the following on reduction with $LiAlH_4$ yields a secondary amine?

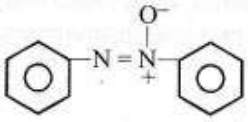
a) Methyl isocyanide b) Acetamide c) Methyl cyanide d) Nitroethane

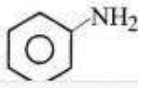
34. What is the product obtained in the following reaction:



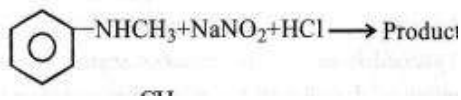
a) 

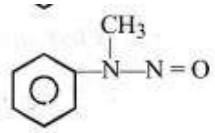
b) 

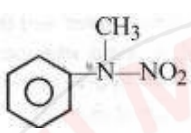
c) 

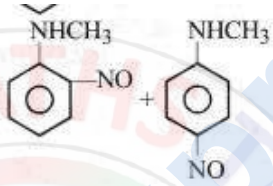
d) 

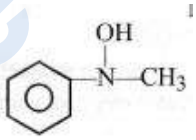
35. Predict the product:



a) 

b) 

c) 

d) 

36. The correct statement regarding the basicity of arylamines is _____.

a)

Arylamines are generally less basic than alkylamines because the nitrogen lone-pair electrons are delocalized by interaction with the aromatic ring πelectron system.

b)

Arylamines are generally more basic than alkylamines because the nitrogen lone-pair electrons are not delocalized by interaction with the aromatic ring π-electron system.

c) Arylamines are generally more basic than alkylamines because of aryl group.

d)

Arylamines are generally more basic than alkylamines, because the nitrogen atom in arylamines because the nitrogen atom in arylamines is sp-hybridized.

37. Electrolytic reduction of nitrobenzene in weakly acidic medium gives _____.

a) N-Phenylhydroxylamine b) Nitrosobenzene c) Aniline d) P- Hydroxyamline

38. Amides can be converted into amines by a reaction named after _____.

a) Pertin b) Claisen c) Hofmann d) Kekule

39. Consider the following sequence of reactions compound [A] $\xrightarrow{Reduction}$ [B]

$\xrightarrow{HNO_2}$ CH_3CH_2OH The compound [A] is:

a) CH_3CH_2CN b) CH_3NO_2 c) CH_3NC d) CH_3CN

40. Aniline is reacted with bromine water and the resulting product is heated with an aqueous solution of sodium nitrite in presence of dilute hydrochloric acid. The compound so formed is converted into a tetrafluoroborate which is subsequently heated. The final product is _____.

a) 1, 3, 5-tribromo benzene b) p-bromofluoro benzenea c) p-bromoaniline

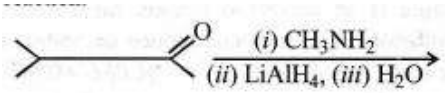
d) 2, 4, 6-tribromofluoro benzene

41. In the reaction,

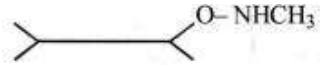
$$CH_3CN + 2H \xrightarrow[SnCl_2]{HCl} X \xrightarrow{Boiling} H_2OY,$$ the term Y is:

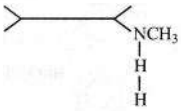
a) acetone b) ethanamine c) acetaldehyde d) dimethyl amine

42. The major organic product formed from the following reaction:



is _____.

a) 

b) 

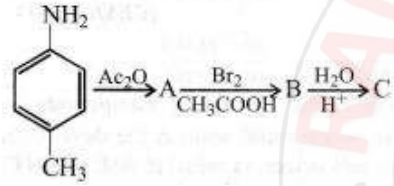
c)

d)

43. Nitration of aniline in strong acidic medium also gives m-nitroaniline because:
    a) In absence of substituents nitro group always goes to m-position.
    b) In electrophilic substitution reactions amino group is meta directive.
    c) Inspite of substituents nitro group always goes to only m-position.
    d) In acidic (strong) medium aniline is present as anilinium ion.

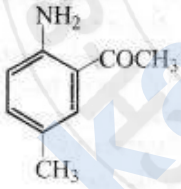
44. The electrolytic reduction of nitrobenzene in strongly acidic medium produces _____.
    a) Azoxybenzene b) Azobenzene c) Aniline d) P-Aminophenol

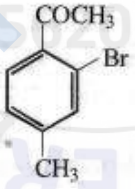
45. The final product C, obtained in this reaction

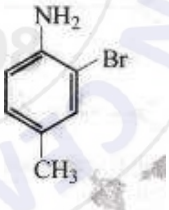


would be _____.

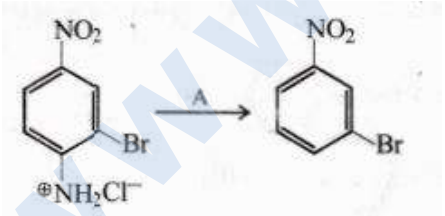
a)

b) 

c) 

d) 

46. In the reaction A is _____.



A is _____.

a) Cu_2Cl_2 b) H_3PO_2 and H_2O c) H+/H_2O d) $HgSO_4/H_2SO_4$

47. Calgon used as a water softner, is
    a) $Na_2\,[Na_4(PO_3)_5]$ b) $Na_4[Na_3(P)_3)_6]$ c) $Na_4\,[Na_4(PO_4)_5]$
    d) $Na_4\,[Na_2(PO_4)_6]$

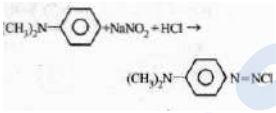
48. Match the compounds given in List-I with their characteristic reactions given in List-II. Select the correct option.

List - I	List - II
Compounds	**Reactions**
(1)$CH_3CH_2CH_2CH_2NH_2$	(i) alkaline hydrolysis

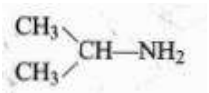
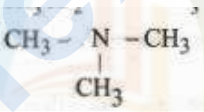
(2) $CH_3C{\equiv}CH$	(ii) with KOH (alcohol) and $CHCl_3$ produce bad smell.
(3) $CH_3CH_2COOCH_3$	(iii) gives white ppt. with ammoniacal $AgNO_3$
(4) $CH_3CH(OH)CH_3$	(iy) With Lucas, reagent cloudiness appears after 5 minutes.

a) (iv) (ii) (iii) (i) b) (ii) (i) (iv) (iii) c) (iii) (ii) (i) (iv) d) (ii) (iii) (i) (iv)

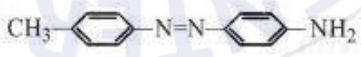
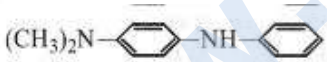
49. Which is formed when acetonitrile is hydrolysed partially with cold cone. HCl?
a) Acetic acid b) Acetamide c) Methyl cyanide d) Acetic anhydride

50. Some reactions of amines are given. Which one is not correct?
a) $(CH_3)_2NH + NaNO_2 + HCl \rightarrow (CH_3)_2\ N - N = O$ b) 
c) $CH_3CH_2NH_2 + HNO_2 \rightarrow CH_3CH_2OH + N_2$
d) $CH_3NH_2 + C_6H_5SO_2Cl \rightarrow CH_3NHSO_2C_6H_5$

51. Which of the following reactions is appropriate for converting acetamide to methanamine?
a) Carbylarnine reaction b) Hofmann bromarnide reaction c) Stephens reaction
d) Gabriel phthalirnide synthesis

52. An organic compound (C_3H_9N) (A), when treated with nitrous acid, gave an alcohol and N_2 gas was evolved. (A) on warming with $CHCl_3$ and caustic potash gave (C) which on reduction gave isopropyl methylamine. Predict the structure of (A).
a)  b) CH_3CH_2-NH-CH_3 c)  d) $CH_3CH_2CH_2$-NH_2

53. The number of structural isomers possible from the molecular formula C_3H_9N is _____.
a) 4 b) 5 c) 2 d) 3

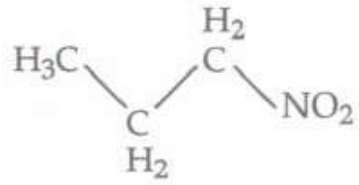
54. Aniline when diazotized in cold and when treated with dimethylaniline gives a coloured product. its structure would be _____.
a) b)  c)
d) 

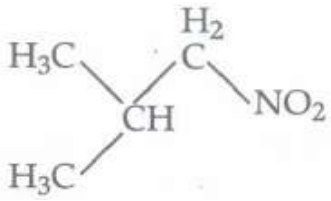
55. Which of the following amine will give the carbylamine test _____.
a) b) c) d)

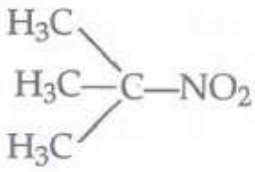
56. Which of the following statements about primary amines is 'False'?
a) Alkylamines are stronger bases than aryl amines
b) Alkylamines react with nitrous acid to produce alcohols
c) Aryl amines react with nitrous acid to produce phenols
d) Alkylamines are stronger bases than ammonia

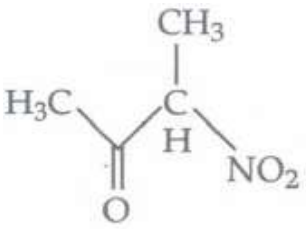
57. Which of the following will be most stable diazonium salt $RN_2{+}X^-$?
a) $CH_3N_2{}^+X$ b) $C_6H_5N_2{}^+X^-$ c) $CH_3CH_2N_2{}^+X^-$ d) $C_6H_5CH_2N_2{}^+X^-$

58. Which of the following nitro compounds does not react with nitrous acid?

a) 

b) 

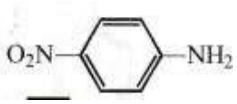
c) 

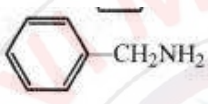
d) 

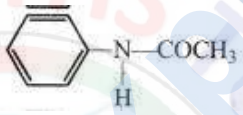
59. For carbylamine reaction, we need hot ale, KOH and:
    a) any primary amine and chloroform b) chloroform and silver powder
    c) a primary amine and an alkyl halide d) a mono alkyl amine and trichloromethane

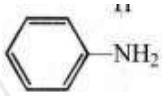
60. Which one of the following on reduction with lithium aluminiurn hydride yields a secondary amine?
    a) Methyl isocyanide b) Acetamide c) Methyl cyanide d) Nitroethane

61. Which of the following compounds is most basic?

a) 

b) 

c) 

d) 

62. The non-essential amino acid among the following is: _____.
    a) Leucine b) Alarrine c) Lysine d) Vatine

63. Method by which Aniline cannot be prepared is: _____.
    a) hydrolysis of phenyl isocyanide with acidic solution
    b) degradation of benzamide with bromine in alkaline solution
    c) reduction of nitrobenzene with H_2/pd in ethanol
    d)
    potassium salt of phthalimide treated with chlorobenzene followed by hydrolysis with aqueous NaOH solution.

64. Mark the correct statement.
    a) Methyl amine is slightly acidic b) Methyl amine is less basic than ammonia
    c) Methyl amine is a stronger base than NH_3 d) Methyl amine forms salts with alkalies

65. Which one of the followng statements is not true?
    a)
    In vulcanization the formation of sulphur bridges between different chains make rubber harder and stronger.
    b) Natural rubber has trans-configuration at every double bond
    c) Buna-S is a copolymer of butadiene and styrene
    d) Natural rubber is a 1, 4-polymer of isoprene

66. Which of the following is not true about polymers?
    a) Polymers are high molecular mass macromolecules
    b) Polymers may be of natural or synthetic origin
    c) Condensation polymers are made up of one type of monomers only
    d) They have high viscosity and do not carry any charge

67. Which of the following are thermoplastic polymers?
a) Polythene, urea-formaldehyde, polyvinyls b) Bakelite, polythene, polystyrene
c) Polythene, polystyrene, polyvinyls d) Urea-formaldehyde, polystyrene, bakelite

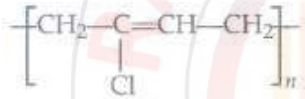
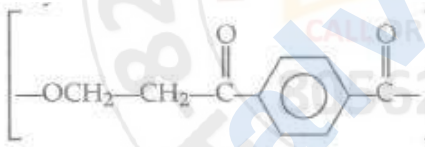
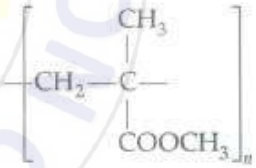
68. On complete hydrogenation, natural rubber produces
a) ethylene-propylene copolymer b) vulcanised rubber c) polypropylene
d) polybutylene.

69. Which of the following polymers are used as fibre?
a) Nylon b) Polytetra fluoroethane c) Terylene d) Buna-S

70. The biodegradable polymer is _____.
a) Nylon-2-Nylon 6 b) Nylon-6 c) Buna-S d) Nylon-6,6

71. Arrange the following polymers in an increasing order of intermolecular forces; fibre, plastic, elastomer.
a) Elastomer < Fibre < Plastic b) Elastomer < Plastic < Fibre
c) Plastic < Elastomer < Fibre d) Fibre < Elastomer < Plastic

72. Which one of the following statements is wrong?
a) PVC stands for poly vinyl chloride b) PTFE stands for teflon
c) PMMA stands for polymethyl methyl acrylate d) Buna-S stands for natural rubber

73. Which of the following is not correctly matched?
a) Neoprene : 
b) Nylon-6,6 :
c) Terylene : 
d) PMMA : 

74. $[NH(CH_2)_6NHCO(CH_2)_4CO]_n$ is a _____.
a) addition polymer b) thermosetting polymer c) homopolymer d) copolymer

75. ~~$[NH(CH_2)_6NHCO(CH_2)_4CO]_n$~~ is a :
a) homopolymer b) copolymer c) addition polymer d) thermosetting polymer

76. Which of the following sets contain only addition homopolymers?
a) Polythene, natural rubber, cellulose b) Nylon, polyester, melamine resin
c) Teflon, bakelite, orlon d) Neoprene, PVC, polythene

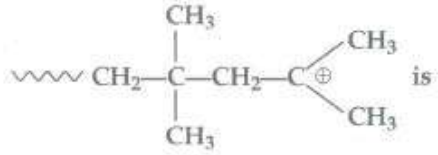
77. Which of the following polymers does not involve cross-linkages?
a) Vulcanised rubber b) Bakelite c) Melamine d) Teflon

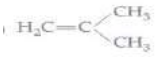
78. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	PVC	(i)	Rubber
(B)	Condensation polymer	(ii)	Thermoplastic
(C)	Polysaccharide	(iii)	Dacron
(D)	Elastomer	(iv)	Natural polymer

a) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i) b) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (iii)
c) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii) d) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii)

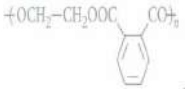
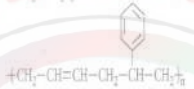
79. The monomer of the polymer :



a)  b) $CH_3CH{=}{=}CHCH_3$ c) $CH_3CH{=}{=}CH_2$ d) $(CH_3)_2C{=}{=}C(CH_3)_2$

80. Which of the following represents chloroprene, the monomer of neoprene?
a) $CH_2{=}CH{-}CH{=}CH_2Cl$ b) $CH_2 = \underset{Ch_3}{C} - CH = CHCI$
c) $CH_2 = \underset{CI}{C} - CH = CH_2$ d) $CH_2 = \underset{CH_3}{C} - \underset{CI}{C} = CH_2$

81. Which of the following is not an example of rubber?
a) Polychloroprene b) Buna-N c) Butadiene-styrene copolymer d) Polyacrylonitrile

82. In which of the following polymers ethylene glycol is one of the monomer units?
a)  b) c)  d)

83. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Natural polymer	(i)	Rayon
(B)	Addition polymer	(ii)	Bakelite
(C)	Copolymer	(iii)	Silk
(D)	Semi-synthetic polymer	(iv)	Neoprene

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (iii) b) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (i)
c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶ (iv) d) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii)

84. Assertion: Network polymers are thermosetting.
Reason: Network polymers have high molecular mass.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

85. Assertion: Rayon is a semi-synthetic polymer and is taken as a better choice than cotton fabric.
Reason: Mechanical and aesthetic properties of cellulose can be improved by acetylation.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

86. Bakelite is prepared by the reaction between _____.
a) urea and formaldehyde b) ethylene glycol c) phenol and fonnaldehyde
d) tetramethylene glycol

87. Which of the following polymer is biodegradable?

a) $\left(-CH_2 - \underset{CI}{\underset{|}{C}} = CH - CH_2 - \right) n$

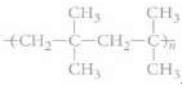
b) $\left(-CH_2 - CH = CH - CH_2 - CH_2 - \overset{CN}{\overset{|}{C}}H - \right) n$

c) $\left(-O - \underset{CH_3}{\underset{|}{C}}H - CH_2 - \underset{O}{\underset{||}{C}} - O - \underset{CH_2CH_3}{\underset{|}{C}}H - CH_2 - \underset{O}{\underset{||}{C}} - \right) N$

d) $\left(-\overset{H}{\overset{|}{N}} - (CH_2)_6 - \overset{H}{\overset{||}{N}} - \overset{O}{\overset{||}{C}} - (CH_2)_4 - \overset{O}{\overset{||}{C}} - \right) N$

88. Nylon is an example of?
a) Polysaccharide b) Polyamide c) Polythene d) Polyester

89. The Bakelite is prepared by the reaction between :
a) phenol and formaldehyde b) tetramethylene glycol c) urea and formaldehyde
d) ethylene glycol

90.  is a polymer having monomer units _____ .

a) b) c) d)

91. Which of the following statements is false?
a) Artificial silk is derived from cellulose. b) Nylon-6, 6 is an example of elastomer.
c) The repeat unit in natural rubber is isoprene.
d) Both starch and cellulose are polymers of glucose.

92. Cellulose is polymer of :
a) glucose b) fructose c) ribose d) sucrose

93. Assertion: The physical properties of natural rubber can be improved by vulcanisation.
Reason: Neoprene is the monomer of natural rubber.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

94. Fill up the blanks with suitable reagents to show synthesis of polyvinyl chloride.

$$CH \equiv CH \xrightarrow{X} CH_2 = CHCI \xrightarrow{Y} \left(CH_2 - CHCI - \overset{CI}{\overset{|}{C}}H \right) n$$

a) X = HCl, $HgCl_2$; Y = Polymerisation, peroxide
b) X = Cl_2, $FeCl_3$; Y = Polymerisation, heat c) X = HCl, CuCl; Y= H_2O, H^+
d) X = HCl, $HgCl_2$; Y = Pt, high pressure

95. The difference in the densities of low density (LDP) and high density polymers (HDP) is due to the fact that

a)
LDP are highly branched structures while HDP consists of closely packed linear molecules

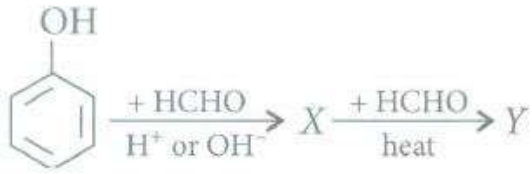
b) LDP are linear chains while HDP are branched chains of polythene

c) both LDP and HDP are unbranched linear chains with different lengths

d) at high temperature, the density of polymer is reduced

96. The commercial name of polyacrylonitrile is
a) dacron b) orlon (acrilan) c) PVC d) bakelite.

97. Identify X and Y in the given polymerisation reactions.



a) X = Bakelite, Y = Novolac b) X = Novolac, Y = Melamine
c) X = Bakelite, Y = Melamine d) X = Novolac, Y = Bakelite

98. Lowdensity polythene (LDP) is used in the insulation of electricity carrying wires and manufacture of flexible pipes and squeeze bottles because
a) it is tough, hard and rigid

b) it is chemically inert, tough, flexible and poor conductor of electricity

c) it is very tough, good conductor of electricity and flexible

d) it is chemically inert, very soft, water absorbent and poor conductor of heat

99. Assertion: The monomer of neoprene is 1, 3-butadiene.
Reason: Neoprene is highly inflammable.
a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

100. Formation of nylons and polyesters are called step growth polymerisation because
a) the polymers are formed by adding a monomer step by step

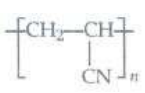
b)
the polymers are formed by condensation and monomers are joined by loss of simple molecules like water

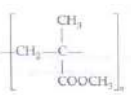
c) the monomers used for condensation are unsaturated molecules

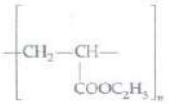
d)
the polymers are formed by addition of a large number of free radicals formed by monomers

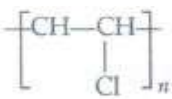
101. Which of the following is a homopolymer?
a) Bakelite b) Nylon 6, 6 c) Neoprene d) Buna-S

102. Acrilan is a hard, horny and a high melting. material. Which one of the following represents its structure?

a) 

b) 

c) 

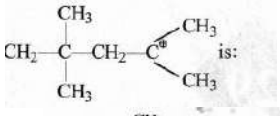
d) 

103. Heating rubber with sulphur is known as

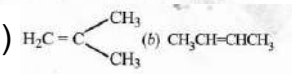
a) galvanisation b) bessemerisation c) vulcanisation d) sulphonation

104. cis-Polyisoprene possesses elastic property because
a) it is soft and soluble in non-polar solvent b) it is unsaturated and porous
c) it has a coiled structure and chains held together by weak van der Waals forces
d) it has a fibrous structure and reactive sites at various double bonds

105. The monomer of the polymer;



is:

a)  b) $CH_3CH=CHCH_3$ c) $CH_3CH=CH_2$ d) $(CH_3)_2C=C(CH_3)_2$

106. Of the following which one is classified as polyester polymer?
a) Terylene b) Bakelite c) Melamine d) Nylone-6, 6

107. Which of the following statements is false?
a) Artificialsilk is derived from cellulose. b) Nylon-6, 6 is an example of elastomer.
c) The repeat unit in natural rubber is isoprene
d) Both starch and celluloseare polymer of glucose.

108. High density polythene is obtained by
a)
polymerisation of ethene in a hydrocarbon solvent in the presence of Ziegler-Natta catalyst
b) polymerisation of ethene under high pressure and temperature
c) free radical polymerisation of ethene at low temperature in presence of peroxide
d) polymerisation of ethene in presence of carbon tetrachloride

109. Which one of the following is used to make 'non-stick' cookware?
a) Poly-ethylene terephthalate b) Polytetrafluoroethylene c) PVC d) Polystyrene

110. Natural rubber or raw rubber consists of basic material latex which is a dispersion of isoprene. During the treatment this isoprene forms a high molecular weight polymer of isoprene. Natural rubber can be obtained from five hundred different species of plants.
In the isoprene polymer all the isoprene have
a) trans-1, 4 configuration b) cis-1, 4 configuration
c) both cis- and trans-1, 4 configuration d) none of these

111. Glyptal polymer is obtained by the following monomers,
a) malonic acid + ethylene glycol b) phthalic acid + ethylene glycol
c) maleic acid + formaldehyde d) acetic acid + phenol.

112. Which one of the following is a chain growth polymer?
a) Starch b) Nucleic acid c) Polystyrene d) Protein

113. Which of the following sets contains only addition polymers?
a) Polyethylene, polypropylene, terylene b) Polyethylene, PVC, acrilan
c) Buna-S, nylon, polybutadiene d) Bakelite, PVC, polyethylene

114. Which of the following polymers, need atleast one diene monomer for their preparation?
a) Dacron b) Novolac c) Neoprene d) Teflon

115. Which among the following is a cross-linked polymer?
a) Polyesters b) Glycogens c) Melamine- formaldehyde d) Polyvinyl chloride

116. Which of the following is not an example of addition polymer?
a) Polythene b) Polystyrene c) Neoprene d) Nylon 6,6

117. The S in buna-S refers to
a) sulphur b) styrene c) sodium d) salicylate

118. Which of the following polymers of glucose is stored by animals?
a) Cellulose b) Amylose c) Amylopectin d) Glycogen

119. Among cellulose, poly(vinylchloride), nylon and natural rubber, the polymer in which the intermolecular force of attraction is weakest is
a) nylon b) poly(vinyl chloride) c) cellulose d) natural rubber

120. Which one of the following polymers is prepared by condensation polymerisation?
a) Teflon b) Natural rubber c) Styrene d) Nylon-6, 6

121. Assertion: PHBV is a biodegradable polymer.
Reason: PHBV is an aliphatic polyester.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

122. Which factor imparts the crystalline nature to a polymer like nylon?
a) Strong intermolecular forces like hydrogen bonding between chains
b) van der Waals forces between the polymeric chains
c) Close packing of the chains due to ionic bonding between the chains
d) Three-dimensional network of chains

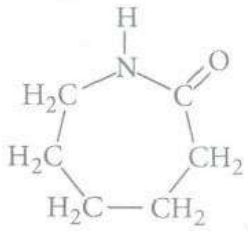
123. Biodegradable polymer which can be produced from glycine and aminocaproic acid is: _____.
a) PHBV b) Buma-N c) Nylon 6,6 d) Nylon-2-nylon 6

124. Natural rubber has :
a) alternate cis-and trans-configuration b) random cis- and trans-configuration
c) all cis-configuration d) all trans-configuration

125. Which of the following alkenes is least reactive towards anionic polymerisation?
a) $CH_2 = CHCH_3$ b) $CH_2 = CF_2$ c) CH_2 = Proverbs d) $CH_2 = CHC_6H_5$

126. During addition polymerisation of ethene molecules, the initiator like benzoyl peroxide, acetyl peroxide, tert-butyl peroxide, etc. are added. Their function is to
a) ensure anti-Markownikoff's addition of molecules to form polymer
b) give cations during the reaction which join together to form bigger molecules
c) decrease the temperature of the reaction mixture
d) generate free radical which adds to the monomer to give bigger free radical.

127. Which of the following polymers can be formed by using the following monomer unit?

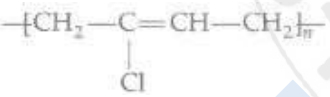
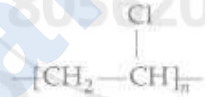
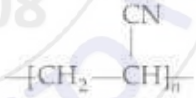
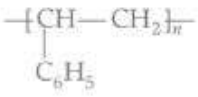


a) Nylon-6, 6 b) Nylon-2-nylon-6 c) Melamine polymer d) Nylon-6

128. Natural rubber or raw rubber consists of basic material latex which is a dispersion of isoprene. During the treatment this isoprene forms a high molecular weight polymer of isoprene. Natural rubber can be obtained from five hundred different species of plants.
Consider the following properties of rubber,
(i) Tensile strength of vulcanised rubber is almost ten times more than raw rubber.
(ii) Elasticity of raw rubber is very high.
Choose the correct option.
a) (i) is true (ii) is false b) (i) is false (ii) is true c) Both (i) and (ii) are true
d) Both (i) and (ii) are false

129. Buna-N is used in making oil seals and tank linings, etc. because
a) it is resistant to the action of lubricating oil and organic solvents
b) it is more elastic than natural rubber c) it can be stretched twice its length
d) it does not melt at high temperatures

130. Which compound form linear polymer due to H-bond?
a) H_2O b) NH_3 c) HF d) HCl

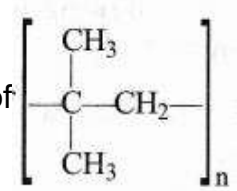
131. Which of the following structures represents neoprene polymer?
a)  b)  c)  d) 

132. Teflon and neoprene are the examples of
a) copolymers b) monomers c) homopolymers d) condensation polymers

133. Match the column I with column II and mark the appropriate choice:

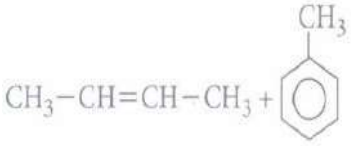
Column I		Column II	
(A)	Buna-S	(i)	Thermosetting
(B)	Polyamides	(ii)	Fibres
(C)	Polyvinyls	(iii)	Elastomer
(D)	Urea-formaldehyde	(iv)	Thermoplastics

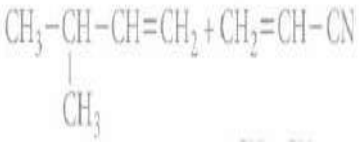
a) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶ (ii) b) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (iv)
c) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (i) d) (A) ⟶ (i), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (iii)

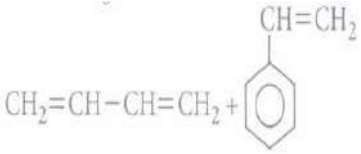
134. Monomer of  is _____.

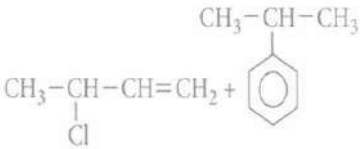
a) 2-methylpropene b) Styrene c) Propylene d) Ethene

135. The correct structure of monomers of buna-S is:

a) 

b) 

c) 

d) 

136. Which of the following alkenes is most reactive towards cationic polymerisation?
a) $CH_2 = CHCH_3$ b) $CH_2 = CHCl$ c) $CH_2 = CHC6H_5$ d) $CH_2 = CHCOOCH_3$

137. Which one of the following is not a condensation polymer?
a) Melamine b) Glyptal c) Dacron d) Neoprene

138. Regarding cross-linked or network polymers, which of the following statement is incorrect?
a) Examples are bakelite and melamine
b) They are formed from bi- and tri-functional monomers
c) They contain covalent bonds between various linear polymer chains
d) They contain strong covalent bonds in their polymer chains.

139. Which of the following polymers is not correctly matched?
a) Formation of dacron - Step growth polymerisation
b) Formation of polytetratluoroethene - Step growth polymerisation
c) Formation of polythene - Chain growth polymerisation in presence of benzoyl peroxide
d) Formation of polyacrylonitrile - Chain growth polymerisation in presence of peroxide

140. Which of the following is a condensation polymer?
a) Teflon b) PVC c) Polyester d) Neoprene

141. Which of the following is not a semi-synthetic polymer?
a) cis-Polyisoprene b) Cellulose nitrate c) Cellulose acetate d) Vulcanised rubber

142. Few polymers are matched with their uses. Point out the wrong match.
a) Polyesters - Fabric, tyre cords, safety belts b) Nylon 6 - Ropes, tyre cords, fabrics
c) Bakelite - Packaging industry, lubricant d) Teflon - Oil seals, gaskets, non-stick utensils

143. Assertion: In vulcanisation of rubber, sulphur cross- links are introduced.
Reason: Vulcanisation is a free radical initiated chain reaction.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

144. Which of the following is not a characteristic of thermosetting polymers?
a) Linear or slightly branched long chain polymers
b) Heavily branched and cross-linked polymers c) Become infusible on moulding
d) Cannot be remoulded or reused on heating

145. Assertion: Teflon is used for making oil seals, gaskets and non-stick surface coating.
Reason: Teflon is chemically inert and resistant to attack by corrosive reagents.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

146. In vulcanization of rubber

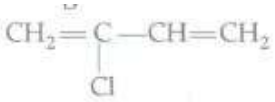
a) sulphur reacts to form a new compound b) sulphur cross-links are introduced

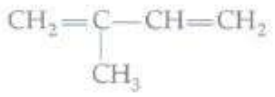
c) sulphur forms a very thin protective layer over rubber d) all statements are correct

147. Which of the following statements is not true about low density polythene?

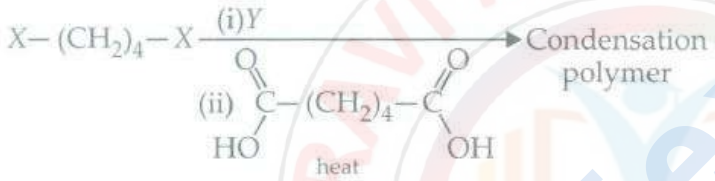
a) Tough b) Hard c) Poor conductor of electricity d) Highly branched structure

148. Which is the monomer of neoprene in the following?

a)  b) CH_2 == CH—C ≡ CH c) CH_2 == CH—CH ≡ CH_2

d) 

149. The correct functional group X and the reagent/reaction conditions Y in the following scheme are



(i) X= $COOCH_3$, Y= H_2Ni/heat

(ii) X = $CONH_2$, Y = H_2/Ni/heat

(iii) X = $CONH_2$, Y = Br_2/NaOH

(iv) X = CN, Y = H_2/Ni/heat.

a) (i) and (ii) b) (i), (ii) and (iii) c) (i) and (iii) d) All of these.

150. Structures of some common polymers are given. Which one is not correctly presented?

a) Neoprene: b) Terylene:

c) Nylon 6,6: d) Teflon:

151. Assertion: Most of the synthetic polymers are nonbiodegradable.

Reason: During polymerisation, the polymers become toxic and non-biodegradable.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

152. Composition of Ziegler- Natta catalyst is

a) $(Et_3)_3Al.TiCl_2$ b) $(Me)_3Al.TiCl_2$ c) $(Et)_3Al.TiCl_4$ d) $(Et)_3Al.PtCl_4$

153. Novolac on heating with formaldehyde undergoes _____ to form an infusible solid mass called _____.

a) polymerisation, melamine b) vulcanisation, resin c) cross-linking, bakelite

d) condensation, polystyrene

154. Which one of the following statements is not true?

a) Buna-S is a copolymer of butadiene and styrene

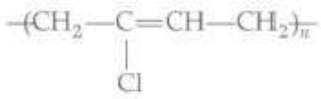
b) Natural rubber is a 1, 4-polymer of isoprene

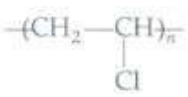
c)

In vulcanization, the formation of sulphur bridges between different chains make rubber harder and stronger.

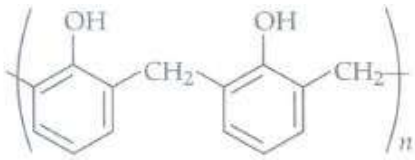
d) Natural rubber has the trans-configuration at every double bond.

155. Which one of the following is an example of thermosetting polymer?

a) 

b) 

c)

d) 

156. The monomers used in addition polymerisation through free radical should be very pure because

a) the traces of impurities act like inhibitors resulting in short chain polymers

b) the impurities result in formation of different products c) the polymer formed is impure

d) catalyst does not function in presence of impurities

157. Dacron is an example of

a) polyamides b) polypropenes c) polyacrylonitrile d) polyesters

158. Nylon-6, 6 is a polyamide obtained by the reaction of _____ .

a) $COOH(CH_2)_4COOH + H_2NC_6H_4NH_2$ - (p) b) $COOH(CH_2)_4COOH + NH_2(CH_2)6NH_2$

c) $COOH(CH_2)_6COOH + NH_2(CH_2)_4NH_2$ d) $COOHC_6H_4COOH$- (p)+$NH_2(CH_2)_6NH_2$

159. Assertion: Low density polythene is used to make buckets, dustbins, bottles etc.

Reason: Low density polythene consists of linear molecules and has close packing.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

160. Assertion: The correct order of increasing molecular forces in the given polymers is: Buna-S, Polythene, Nylon-6, 6.

Reason: The properties of polymers depend upon the molecular forces.

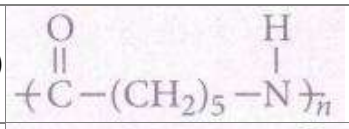
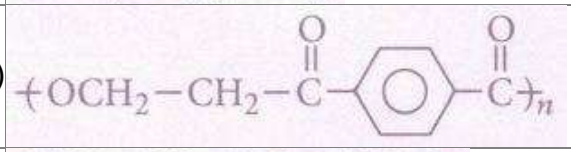
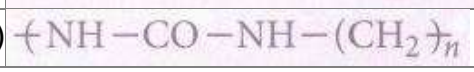
a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

161. Match the polymers given in column I with the monomers in column II and mark the appropriate choice:

Column I		Column II	
(A)		(i)	Ethylene glycol + terephthalic acid

(B)		(ii)	Urea + formaldehyde
(C)		(iii)	Hexamethylenediamine + adipic acid
(D)		(iv)	Caprolactam

a) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (iv) b) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii)

c) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (iv) d) (A) ⟶ (iv), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (i)

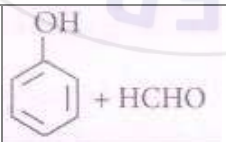
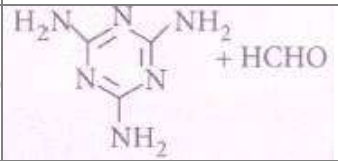
162. Assertion: Thermoplastics become hard on heating and soft on cooling.
Reason: Thermoplastics are cross-linked polymers which are soluble in many organic solvents.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

163. Synthetic biopolymer, PHBV is made up of the following monomers,
a) 3-hydroxybutanoic acid + 3-hydroxypentanoic acid
b) 2-hydroxybutanoic acid + 2- hydroxypropanoic acid
c) 3-chlorobutanoic acid + 3-chloropentanoic acid
d) 2-chlorobutanoic acid + 3-methylpentanoic acid.

164. $CF_2=CF_2$ is monomer of :
a) teflon b) orlon c) polythene d) nylon-6

165. Synthetic polymer prepared by using caprolactam is known as
a) terylene b) teflon c) nylon 6 d) neoprene.

166. Match the polymers given in column I with monomers in column II and mark the appropriate choice.

Column I		Column II	
(A)	Melamine-formaldehyde polymer	(i)	
(B)	Bakelite	(ii)	$CH_2 = \overset{Cl}{\overset{\vert}{C}} - CH = CH_2$
(C)	Neoprene	(iii)	$CH_2 = \overset{CH_3}{\overset{\vert}{C}} - CH = CH_2$
(D)	Natural rubber	(iv)	

a) (A) ⟶ (iv), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iii) b) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (ii)

c) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii) d) (A) ⟶ (ii), (B) ⟶ (iv), (C) ⟶ (iii), (D) ⟶ (i)

167. Polyethylene is obtained from calcium carbide.
$CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2$
$C_2H_2 + H_2 \longrightarrow C_2H_4$

$nC_2H_4 \longrightarrow (CH_2 - CH_2.)n$

Therefore, the amount of polyethylene obtained for 64 kg CaC_2 is

a) 7 kg b) 14 kg c) 21 kg d) 28 kg

168. The monomers of biodegradable polymer, nylon 2-nylon 6 are

a) glycine + adipic acid b) glycol + phthalic acid c) phenol + urea

d) glycine + amino caproic acid

169. Polymer which has amide linkage is:

a) nylon-6, 6 b) terylene c) teflon d) bakelite

170. Identify the type of polymer.

(i) - A - A - A - A - A - A -

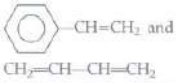
(ii) - A - B - B - A - A - A - B - A -

a) (i) Homopolymer, (ii) Copolymer b) (i) Natural polymer, (ii) Synthetic polymer

c) (i) Linear polymer, (ii) Branched polymer d) (i) Fibre, (ii) Elastomer

171. Which one of the following sets forms the biodegradable polymer?

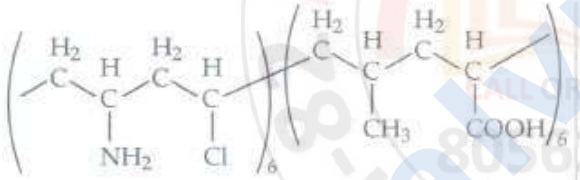
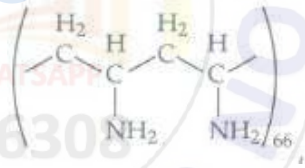
a) CH_2 == CH—CN and CH_2 == CN-CH == H_2N-CH_2-COOH and H_2N-(CH_2h-COOHCH_2

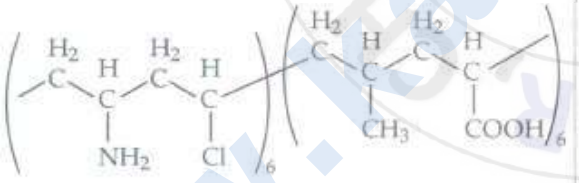
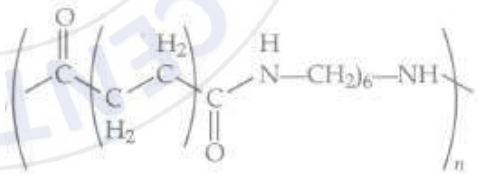
b) $H_2N—CH_2—COOH$ and $H_2N—(CH_2)_5—COOH$ c) d) 

172. Caprolactam is used for the manufacture of :

a) teflon b) terylene c) nylon 6, 6 d) nylon 6

173. Which one of the following structures represents nylon 6, 6 polymer?

a)  b) 

c)  d) 

174. Which of the following is not true for thermoplastic polymers?

a) Thermoplastics are linear polymers b) They soften and melt on heating

c) Molten polymer can be remoulded into any shape

d) They have cross-linkages which break on heating

175. Which of the following is not true about high density polythene?

a) Tough b) Hard c) Inert d) Highly branched

176. Nylon 6, 6 is obtained by condensation polymerisation of

a) adipic acid and ethylene glycol b) adipic acid and hexamethylenediamine

c) terephthalic acid and ethylene glycol d) adipic acid and phenol

177. In elastomer, the intermolecular forces are _____.

a) Strong b) Weak c) nil d) none of the above

178. Assertion: Bakelite is a thermosetting polymer.
Reason: Bakelite is formed by cross-linking of novo lac and formaldehyde.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

179. Terylene is a condensation polymer of ethylene glycol and _____.
a) benzoic acid b) Phthalic acid c) salicylic acid d) terephthalic acid

180. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Raincoats, hand bags	(i)	PHBV
(B)	Laminated sheets	(ii)	PVC
(C)	Television cabinets	(iii)	Urea-formaldehyde
(D)	Orthopaedic devices	(iv)	Polystyrene

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv) b) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii)
c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i) d) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii)

181. Glycogen, a naturally occurring polymer stored in animals is a:
a) monosaccharide b) disaccharide c) trisaccharide d) polysaccharide

182. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Buna-N	(i)	Phthalic acid and ethylene glycol
(B)	Nylon-6,6	(ii)	Terephthalic acid and ethylene glycol
(C)	Dacron	(iii)	Hexamethylene diamine and adipic acid
(D)	Glyptal plastic	(iv)	Acrylonitrile and butadiene

a) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i) b) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (iii)
c) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii) d) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)

183. Natural rubber is a polymer of _____.
a) butadiene b) ethyne c) styrene d) isoprene

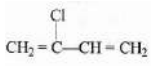
184. Assertion: Buna-S is a copolymer.
Reason: Buna-S is formed by condensation reaction between two different monomers.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

185. Which of the following is a natural polymer?
a) Poly (Butadiense-acrylonitrile) b) cis-1, 4-polyisoprene c) poly (Butadiense-stysene)
d) polybutadiene

186. Assertion: Dacron is formed by step growth polymerisation of monomer units.
Reason: Dacron fibre is crease resistant.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

187. Mark the incorrect use of the polymer.
a) High density polythene - Buckets, pipes b) Nylon 6, 6 - Ropes, bristles for brushes
c) Orlon - Synthetic wool, carpets d) Glyptal - Electrical switches, combs

188. Which of the following organic compounds polymerized to form the polyester Dacron?
a) Propylene and para HO—(C_6H_4)—OH b) Benzoicacid and ethanol
c) Terephthalic acid and ethylene glycol d) Benzoic acid and para HO—(C_6H_4)—OH

189. Which one of the following monomers gives the polymer neoprene on polymerization?
a) $CF_2=CF_2$ b) $CH_2=CHCl$ c) $CCl_2=CCl_2$ d) 

190. Which of the following is a biodegradable synthetic polymer?
a) Aliphatic polyesters b) PHBV c) Nylon-2-nylon-6 d) All of these

191. Choose the correct statements from the following
a) Nylon 2-nylon 6 is a polyamide copolymer of alanine
b) 3-Hydroxy pentanoic acid is a monomer of Nylon 2-nylon 6
c) PHBV can never be used in the manufacture of orthopaedic devices d) None of these

192. Out of the following which one is classified as polyester polymer?
a) Terylene b) Bakelit c) Melamine d) Nylon-6,6

193. Bakelite is an example of
a) elastomer b) fibre c) thermoplastic d) thermosetting

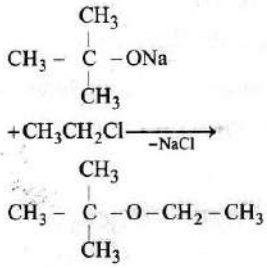
194. Assertion: Strong interparticle forces exist in thermosetting polymers.
Reason: Thermosetting polymers are heavily cross linked.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

RAVI MATHS TUITION CENTRE , WHATSAPP - 8056206308

Time : 1 Mins **ALCOHOL PHENOLS ETHERS 1** **Marks : 628**

1. 2-bromopentane is heated with potassium ethoxide in ethanol. The major product obtained is _____ .
   a) 2-ethoxypentane b) pentene-1 c) trans-pentene-2 d) cis-pentene-2
2. Among the following sets of reactants which one produces anisole?
   a) CH_3CHO, RMgX b) C_6H_5OH, NaOH, CH_3I c) C_6H_5OH, neutral $FeCl_3$
   d) $C_6H_5CH_3$,CH_3COCl, $AlCl_3$
3. Which of the following is not true in case of reaction with heated copper at 300°C?
   a) Phenol $\rightarrow$ Benzyl alcohol b) Secondary alcohol $\rightarrow$ Ketone
   c) Primary alcohol $\rightarrow$ Aldehyde d) Tertiary alcohol $\rightarrow$ Olefin
4. Which one of the following compounds will be most readily attacked by an electrophile?
   a) Chlorobenzene b) Benzene c) Phenol d) Toluene
5. Picric acid is a yellow coloured compound. Its chemical name is
   a) m-nitrobenzoic acid b) 2, 4, 6-trinitrophenol c) 2, 4, 6-tribromophenol
   d) p-nitrophenol.
6. Vapours of an alcohol X when passed over hot reduced copper, produce an alkene, the alcohol is
   a) primary alcohol b) secondary alcohol c) tertiary alcohol d) dihydric alcohol.
7. Ethyl chloride is converted into diethyl ether by _____ .
   a) Williamson's synthesis b) Wurtz synthesis c) Grignard reaction
   d) Perkin's reaction
8. Acid catalysed dehydration of t-butanol is faster than that of n-butanol because
   a) tertiary carbocation is more stable than primary carbocation
   b) primary carbocation is more stable than tertiary carbocation
   c) t-butanol has a higher boiling point
   d) rearrangement takes place during dehydration of t-butanol.
9. Conversion of ethyl alcohol into acetaldehyde is an example of
   a) hydrolysis b) oxidation c) reduction d) molecular rearrangement
10. In the reaction:
    $CH_3 - \overset{CH_3}{\underset{|}{CH}} - CH_2 - O - CH_2 - CH_3 + HI \xrightarrow{heated}$ Which of the following compounds will be formed?
    a) $CH_3 - \underset{CH_3}{\underset{|}{CH}} - CH_3 + CH_3CH_2OH$ b) $CH_3 - \underset{CH_3}{\underset{|}{CH}} - CH_2OH + OCH_3CH_3$
    c) $CH_3 - \underset{CH_3}{\underset{|}{CH}} - CH_2OH - CH_3CH_2I$ d) $CH_3 - \underset{CH_3}{\underset{|}{CH}} - CH_2 - I + CH_3CH_2OH$
11. Assertion: Boiling point of ethanol is higher than that of propane.
    Reason: Molecular mass of ethanol is higher than propane.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) if both assertion and reason are false.

12. Number of isomeric alcohols of molecular formula $C_6H_{14}O$ which give positive iodoform test is _____ .
    a) Two b) Three c) Four d) Five
13. How many isomers of $C_5H_{11}OH$ will be primary alcohols?
    a) 5 b) 4 c) 2 d) 3
14. The reaction



    is called:
    a) Williamson continuous etherification process b) Etard reaction
    c) Gatterman-Koch reaction d) Williamson Synthesis
15. In the following reaction sequence, $CH_3-\underset{\underset{(X)}{OH}}{CH}\xrightarrow{[O]}Y\xrightarrow[H^+/H_2O]{CH_3MgBr}Z$ Z is
    a) butan-l-ol b) butan-Z-ol c) 2-methylpropan-2-ol d) 1, l-dimethylethanol.
16. Assertion: When the vapours of a primary, secondary or tertiary alcohol are passed over heated copper at 573 K, an aldehyde or ketone is formed.
    Reason: Reduction of alcohols takes place.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.
17. In the following reactions:
    (i) $CH_3-\underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{CH}}-CH_3\xrightarrow{H^+/heat}$
    (ii) $\left[\overset{A}{Major\ product}\right]^+\downarrow\left[\overset{B}{Minor\ product}\right]$

    $$A\xrightarrow[in\ absence\ of\ peroxide]{HBr,\ dark}\left[\overset{C}{Major\ product}\right]^+\downarrow\left[\overset{D}{Minor\ product}\right]$$

    The major products (A) and (C) are respectively:
    a) $CH_2=\overset{\overset{CH_3}{|}}{C}-CH_2-CH_3$ and $\underset{\underset{Br}{|}}{CH_2}-\overset{\overset{CH_3}{|}}{CH}-CH_2-CH_3$
    b) $CH_3-\overset{\overset{CH_3}{|}}{C}-CH-CH_3$ and $CH_3-\underset{\underset{Br}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_2-CH_3$
    c) $CH_2=\overset{\overset{CH_3}{|}}{C}-CH_2-CH_3$ and $CH_3-\overset{\overset{CH_3}{|}}{CH}-\underset{\underset{Br}{|}}{CH}-CH_3$
    d) $CH_3-\overset{\overset{CH_3}{|}}{CH}=CH-CH_3$ and $CH_3-\underset{\underset{BR}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_2-CH_3$

18. Consider the following reaction,

$$\text{ethanol} \xrightarrow{PBr_3} X \xrightarrow{\text{alc. KOH}} Y \xrightarrow[(ii)\ H_2O,\ \text{heat}]{(i)\ H_2SO_4,\ \text{room temperature}} Z;$$

the product Z is:

a) $CH_3CH_2 - O - CH_2 - CH_3$ b) $CH_3 - CH_2 - O - SO_3H$

c) CH_3CH_2OH d) $CH_2 = CH_2$

19. Which of the following alcohols gives the best yield of dialkyl ether on being heated with a trace of sulphuric acid?

a) 2-Pentanol b) 2-Methyl-2-butanol c) 1-Pentanol d) 2-Propanol

20. What is formed when a primary alcohol undergoes catalytic dehydrogenation?

a) Aldehyde b) Ketone c) Alkene d) Acid

21. The general molecular formula, which represents the homologous series of alkanols is:

a) $C_nH_{2n+2}O$ b) $C_nH_{2n}O_2$ c) $C_nH_{2n}O$ d) $C_nH_{2n+1}O$

22. Anisole on reaction with chloromethane in presence of anhydrous $AlCl_3$ gives

a) o-methyl anisole and p-methoxy anisole

b) p- methyl anisole and p- methoxy anisole c) a-methyl anisole and p-methyl anisole

d) o-methoxy acetophenone and p-methoxy acetophenone.

23. Which of the following is most acidic?

a) Benzyl alcohol b) Cyclohexanol c) Phenol d) m-Chlorophenol

24. For the reaction $C_2H_5OH + HX \rightarrow C_2H^5X + H_2O$; the order of reactivity is

a) HCl > HBr > HI b) HI > HBr > HCl c) HBr > HCl > HI d) HI > HCl > HBr

25. Which of the following compounds does not react with NaOH?

a) CH_3COOH b) CH_3CONH_2 c) C_6H_5OH d) CH_3CH_2OH

26. An organic compound with molecular formula $C_4H_{10}O$ does not react with sodium. With excess of HI it gives only one type of alkyl halide. The compound is

a) $C_2H_5OC_2H_5$ b) $CH_3\underset{\underset{OCH_3}{|}}{C}HCH_3$ c) $CH_3CH_2CH_2OCH_3$ d) $CH_3CH_2CH_2CH_2OH$

27. Which one of the following will not form a yellow precipitate on heating with an alkaline solution of iodine?

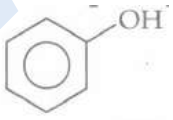
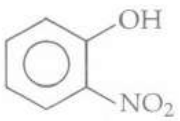
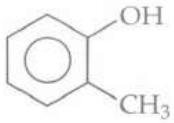
a) $CH_3CH(OH)CH_3$ b) $CH_3CH_2CH(OH)CH_3$ c) CH_3OH d) CH_3CH_2OH

28. What is the correct order of reactivity of alcohols in the following reaction?

R- OH + HCl $\xrightarrow{ZnCl_2}$ R- Cl + H_2O

a) 1° > 2° > 3° b) 1° < 2° > 3° c) 3° > 2° > 1° d) 3° > 1° > 2°

29. Which of the following compounds is most acidic?

a) Cl-CH_2-CH_2-OH b)  c)  d) 

30. Which of the following statements is correct?

a)

The reaction of methyl magnesium iodide with acetone followed by hydrolysis gives secondary butanol.

b) Primary alcohols are dehydrated easily than secondary and tertiary alcohols.

c) Tertiary alcohol is more acidic than primary alcohol.

d) Tertiary butyl alcohol gives turbidity fastest with Lucas reagent

31. A compound $C_6H_{14}O_2$ has two tertiary alcoholic groups. The IUPAC name of this compound is

a) 2, 3-dimethyl - 1, 2-butanediol b) 3, 3-dimethyl - 1, 2-butanediol

c) 2, 3-dimethyl - 2, 3-butanediol d) 2-methyl - 2, 3-pentanediol.

32. CH_3CH_2OH can be converted into CH_3CHO by

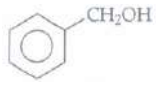
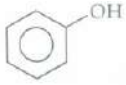
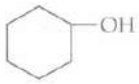
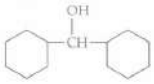
a) catalytic hydrogenation b) treatment with $LiAlH_4$
c) treatment with pyridinium chlorochromate d) treatment with $KMnO_4$.

33. 2.2 g of an alcohol (A) when treated with CH_3 - MgI liberates 560 mL of CH_4 at STP. Alcohol (A) on dehydration followed by ozonolysis gives ketone (B) along with (C). Oxime of ketone (B) contains 19.17% N. (A) on oxidation gives ketone (D) having same number of carbon atom Structure of ketone (D) is

a) $CH_3-\overset{O}{\overset{\|}{C}}-CH_2-CH_2-CH_3$ b) $CH_3-CH_2-\overset{O}{\overset{\|}{C}}-\underset{CH_3}{\underset{|}{CH}}-CH_3$

c) $CH_3-\underset{CH_3}{\underset{|}{CH}}-\overset{O}{\overset{\|}{C}}-CH_3$ d) none of these

34. Which of the following compounds has the most acidic nature?

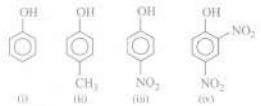
a)  b)  c)  d) 

35. Compound C_2H_6O has two isomers X and Y. On reaction with HI, X gives alkyl iodide and water while Y gives alkyl iodide and alcohol. Compounds X and Yare respectively
a) $C_2H_5OC_2H_5$ and $CH_3OC_2H_5$ b) CH_3OCH_3 and $C_2H_5OCH_3$
c) C_2H_5OH and CH_3OCH_3 d) CH_3OH and CH_3OCH_3

36. The best method to prepare 3-methylbutan-2-ol from 3-methylbut -1-ene is
a) addition of water in presence of dil. H_2SO_4
b) addition of HCl followed by reaction with dil.NaOH
c) hydroboration - oxidation reaction d) Reimer-Tiemann reaction.

37. Phenol is less acidic than
a) ethanol b) o-nitrophenol c) o-methylphenol d) o-methoxyphenol.

38. The correct order of strength of acidity of the following compounds is



a) (ii) > (i) > (iii) > (iv) b) (i) > (ii) > (iii) > (iv) c) (iv) > (iii) > (ii) > (i)
d) (iv) > (iii) > (i) > (ii)

39. The compound A on treatment with Na gives B, and with PCl_5 gives C. B and C react together to give diethyl ether. A, B and C are in the order:
a) C_2H_5Cl, C_2H_6, C_2H_5OH b) C_2H_5OH, C_2H_5Cl, C_2H_5ONa c) C_2H_5OH, C_2H_6, C_2H_5Cl
d) C_2H_5OH, C_2H_5ONa, C_2H_5Cl

40. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Methanol	(i)	Conversion of phenol to o-hydroxysalicylic acid
(B)	Kolbe's reaction	(ii)	Ethyl alcohol
(C)	Williamson's synthesis	(iii)	Conversion of phenol to salicylaldehyde
(D)	Conversion of 1° alcohol to aldehyde	(iv)	Wood spirit
(E)	Reimer- Tiemann reaction	(V)	Heated copper at 573 K
(F)	Fermentation	(VI)	Reaction of alkyl halide with sodium alkoxide

a) (A) → (ii), (B) → (iv), (C) → (i), (D) → (iii), (E) → (v), (F) → (vi)
b) (A) → (vi), (B) → (v), (C) → (ii), (D) → (iv), (E) → (i), (F) → (iii)
c) (A) → (iv), (B) → (i), (C) → (vi), (D) → (v), (E) → (iii), (F) → (ii)
d) (A) → (v), (B) → (ii), (C) → (iv), (D) → (vi), (E) → (iii), (F) → (i)

41. The major organic product in the reaction,
$CH_3-O-CH(CH_3)_2+HI\rightarrow$ Product is _____ .
a) $ICH_2OCH(CH_3)_2$ b) $\underset{I}{CH_3OC(CH_3)_2}$ c) $CH_3I+(CH_3)_2CHOH$
d) $CH_3OH+(CH_3)_2CHI$

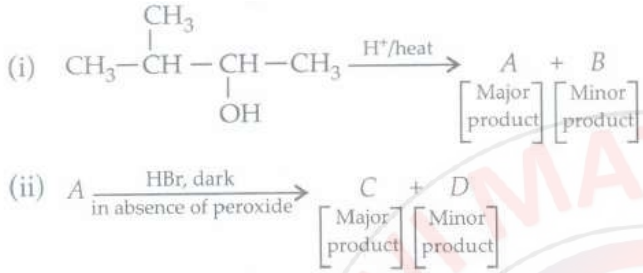
42. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	Hydrolysis of benzene diazonium chloride	(i)	p-Cresol
(B)	Phenol + methyl chloride in presence of anh. $AlCl_3$	(ii)	Salicylic acid
(C)	Reaction of sodium phenoxide with CO_2	(iii)	Picric acid
(D)	Phenol + Conc. HNO_3	(iv)	Phenol

a) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)
b) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)
c) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)
d) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

43. An alcohol (A) gives Lucas test within 5 min. 7.4 g of alcohol when treated with sodium metal liberates 1120 mL of H_2 at STP. What will be alcohol (A)?
a) $CH_3(CH_2)_3OH$ b) $CH_3CH(OH)CH_2CH_3$ c) $(CH_3)_3COH$
d) $CH_3CH(OH)CH_2CH_2CH_3$

44. In the following reactions,



The major products A and C are respectively

a) $CH_2 = \overset{CH_3}{\underset{|}{C}} - CH_2 - CH_3$ and $CH_2 - \underset{Br}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}} - CH_2 - CH_3$

b) $CH_3 - \overset{CH_3}{\underset{|}{C}} = CH - CH_3$ and $CH_3 - \underset{Br}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}} - CH_2 - CH_3$

c) $CH_3 - \overset{CH_3}{\underset{|}{C}} = CH - CH_3$ and $CH_3 - \underset{Br}{\overset{CH_3}{\underset{|}{CH}}} - CH - CH_3$

d) $CH_2 = \overset{CH_3}{\underset{|}{C}} - CH_2 - CH_3$ and $CH_3 - \underset{Br}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}} - CH_2 - CH_3$

45. Which of the following alcohols is dehydrated most easily with conc. H_2SO_4?
a) p-$O_2NC_6H_4CH(OH)CH_3$ b) p-$ClC_6H_4CH(OH)CH_3$ c) p-$CH_3OC_6H_4CH(OH)CH_3$
d) $C_6H_5CH(OH)CH_3$

46. Which of the following compounds will react with sodium hydroxide solution in water?
a) C_6H_5OH b) $C_6H_5CH_2OH$ c) $(CH_3)_3COH$ d) C_2H_5OH

47. When phenol is treated with excess bromine water. It gives:
a) m-bromophenol b) o-and p-bromophenols c) 2, 4-dibromophenol
d) 2, 4, 6-tribromophenol

48. The reaction between phenol and chloroform in the presence of aqueous NaOH is
a) nucleophilic substitution reaction b) electrophilic addition reaction
c) electrophilic substitution reaction d) nucleophilic addition reaction

49. The enzyme which can catalyse the conversion of glucose to ethanol is
a) invertase b) zymase c) maltase d) diastase

50. An alcohol X when treated with hot conc. H_2SO_4 gave an alkene Y with formula C4Hs. This alkene on ozonolysis gives single product with molecular formula C2H40. The alcohol is:
a) butan-1-ol b) butan-2-ol c) 2-methylpropan-1-ol d) 2, 2-dimethylbutan -1-o1

51. Reaction of phenol with chloroform in presence of dilute sodium hydroxide finally introduces which one of the following functional group?
a) -COOH b) $-HCl_2$ c) -CHO d) $-H_2Cl$

52. Arrange the following alcohols in order of increasing reactivity towards sodium metal.
(i) $(CH_3)_3C$ - OH
(ii) $(CH_3)_3CH$ - OH
(iii) CH_3CH_2OH
a) (iii) < (ii) < (i) b) (ii) < (i) < (iii) c) (i) < (ii) < (iii) d) (iii) < (i) < (ii)

53. Given are cyclohexanol (I), acetic acid (II), 2, 4, 6-trinitrophenol (III) and phenol (IV). In these the order of decreasing acidic character will be :
a) III > II > IV > I b) II > III > I > IV c) II > III > IV > I d) III > IV > II > I

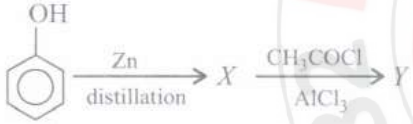
54. Match the column-I with column-II and mark the appropriate choice.

Column I		Column II	
(A)	Methanol	(i)	Ethyl alcohol
(B)	Fermentation	(ii)	Heated copper at 573 K
(C)	Conversion of 2° alcohol to ketone	(iii)	Reaction of alkyl halide with sodium alkoxide
(D)	Williamson's synthesis	(iv)	Wood spirit

a) (A) $\rightarrow$ (i), (B) $\rightarrow$ (iii), (C) $\rightarrow$ (ii), (D) $\rightarrow$ (iv)
b) (A) $\rightarrow$ (ii), (B) $\rightarrow$ (iii), (C) $\rightarrow$ (iv), (D) $\rightarrow$ (i)
c) (A) $\rightarrow$ (iv), (B) $\rightarrow$ (i), (C) $\rightarrow$ (ii), (D) $\rightarrow$ (iii)
d) (A) $\rightarrow$ (iv), (B) $\rightarrow$ (ii), (C) $\rightarrow$ (iii), (D) $\rightarrow$ (i)

55. When phenol is heated with $CHCl_3$ and alcoholic KOH, salicylaldehyde is produced. This reaction is known as _____ .
a) Rosenmund's reaction b) Reimer-Tiemann reaction c) Friedel-Craft's reaction
d) Sommelet reaction

56. Identify the final product of the reaction sequence.



a) Benzophenone b) Acetophenone c) Diphenyl d) Methyl salicylate

57. The heating of phenyl-methyl ethers with HI produces:
a) ethyl chlorides b) iodobenzene c) phenol d) benzene

58. Match the compounds given in List I with their characteristic reactions given in List II. Select the correct option.

List I (Compounds)	List II (Reactions)
(a) $CH_3(CH_2)_2NH_2$	(i) Alkaline hydrolysis
(b) $CH_3C \equiv CH$	(ii) With KOH (alcohol) and $CHCl_3$ produces bad smell
(c) $CH_3CH_2COOCH_3$	(iii) Gives white ppt. with ammoniacal $AgNO_3$
(d) $CH_3CH(OH)CH_3$	(iv) With Lucas reagent cloudiness appears after 5 minutes

a) a-(ii), b-(i), c-(iv), d-(iii) b) a-(iii), b-(ii), c-(i), d-(iv) c) a-(ii), b-(iii), c-(i), d-(iv)
d) a-(iv), b-(ii), c-(iii), d-(i)

59. What happens when tertiary butyl alcohol is passed over heated copper at 300°C?
a) Secondary butyl alcohol is formed. b) 2-Methylpropene is formed.
c) 1-Butene is formed. d) Butanal is formed.

60. Consider the following reaction:

$$Ethanol \xrightarrow{} \underset{}{PBr_3} X \xrightarrow{alc.\ KOH} Y \xrightarrow[(i)H_2SO_4]{(ii)H_2O,heat} Z$$

a) CH_3CH_2 O - CH_z - CH_3 b) CH_3 - CH_2 - SO_3H c) CH_3CH_2OH d) $CH_2 = CH_2$

61. Iodoform test is not given by:

a) ethanal b) ethanol c) 2-pentanone d) 3-pentanone

62. In the following sequence of reactions

CH_3 - Br $\xrightarrow{KCN}$ A $\xrightarrow{H_3O^+}$ B $\xrightarrow{LiAlH_4}$ C the end product (C) is:

a) acetone b) methane c) acetaldehyde d) ethyl alcohol

63. Assertion: Addition reaction of water to but-l-ene in acidic medium yields butan-1-ol.
Reason: Addition of water in acidic medium proceeds through the formation of primary carbocation.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

64. Phenol is distilled with Zn dust followed by Friedel-Crafts alkylation with propyl chloride in the presence of $AlCl_3$ to give a compound (B). (B) is oxidised in the presence of air to form the compound (C). The structural formula of (C) is _____ .

a) b) c) d)

65. Which of the following are the products shown by the reaction of methoxyethane with HI?

a) $C_2H_5I + CH_3OH$ b) $CH_3I + H_2O$ c) $C_2H_5OH + H_2O$ d) $C_2H_5OH + CH_3I$

66. The process of converting alkyl halides into alcohols involves

a) addition reaction b) substitution reaction c) dehydrohalogenation reaction

d) rearrangement reaction.

67. $(CH_3)_3$ C - CH_2 OH $\xrightarrow[170^oC]{Conc.H_2SO_4}$ X In the reaction, X is

a) $(CH_3)_2C{=}CHCH_3$ b) $CH_3C \equiv CH$ c) $(CH_3)_2CHCH_2CH_3$

d) $CH_3 - \underset{CH_3}{\underset{|}{CH_2}} - C = CH_2$

68. Increasing order of acid strength among p-methoxyphenol, p-methylphenol and p-nitrophenol is:

a) p-nitrophenol, p-methoxyphenol, p-methylphenol

b) p-methylphenol, p-methoxyphenol, p-nitrophenol

c) p-nitrophenol, p-methylphenol, p-methoxyphenol

d) p-methoxyphenol, p-methylphenol, p-nitrophenol

69. The compound which does not react with sodium is:

a) CH_3COOH b) $CH_3CHOHCH_3$ c) C_2H_5OH d) CH_3OCH_3

70. A primary alcohol, C_3H_8O (A) on heating with sulphuric acid undergo dehydration to give an alkene, B. B when reacted with HCl gave C, which on treatment with aqueous KOH gives compound D(C_3H_8O). A and D are:

a) functional isomers b) position isomers c) chain isomers d) stereoisomers.

71. Among the following ethers, which one will produce methyl alcohol on treatment with hot concentrated HI?

a) $CH_3 - \underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}} - O + CH_3$ b) $CH_3 - \underset{CH_3}{\underset{|}{CH}} - CH_2 - O - CH_3$

c) CH_3 - CH_2 - CH_2 - O - CH_3 d) $CH_3 - CH_2 - \underset{CH_3}{\underset{|}{CH}} - O - CH_3$

72. Assertion: Alcohols react both as nudeophiles and electrophiles.
Reason: Alcohols react with active metals such as sodium, potassium and aluminium to yield corresponding alkoxides and hydrogen.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

73. Assertion: Ortho and para-nitrophenol can be separated by steam distillation.
Reason: Para-nitrophenol is steam volatile due to intramolecular hydrogen bonding.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

74. Which of the following alcohols will give the most stable carbocation during dehydration?
a) 2-Methyl-1-propanol b) 2-Methyl-2-propanol c) 1-Butanol d) 2-Butanol

75. When glycerol is treated with excess of HI, it produces:
a) 2-iodopropane b) allyl iodide c) propene d) glycerol triiodide

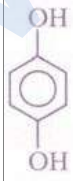
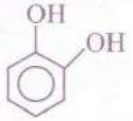
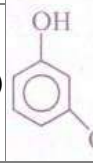
76. Which of the following reagents can not be used to oxidise primary alcohols to aldehydes?
a) CrO_3 in anhydrous medium b) $KMnO_4$ in acidic medium
c) Pyridinium chlorochromate d) Heat in the presence of Cu at 573 K.

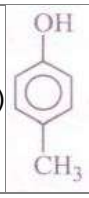
77. Among the following four compounds (i) Phenol (ii) Methyl phenol (iii)Meta nitrophenol (iv) Para-nitrophenol The acidity order is
a) (iv) > (iii) > (i) > (ii) b) (iii) > (iv) > (i) > (ii) c) (i) > (iv) > (iii) > (ii)
d) (ii) > (i) > (iii) > (iv)

78. The decreasing order of boiling points of the following alcohols is
a) 3-methylbutan-2-ol > 2-methylbutan-2-ol > pentan -1-ol
b) pentan-Lol > 3-methylbutan-2-ol > 2-methylbutan-2-ol
c) 2-methylbutan-2-ol > 3-methylbutan-2-ol > pentan-1-ol
d) 2-methylbutan-2-ol > pentan-t-ol > 3-methylbutan-2-ol

79. The major organic product in the reaction is $CH_3 - O - CH(CH_3)_2 + HI \longrightarrow$ products:
a) $CH_3I + (CH_3)_2CHOH$ b) $CH_3OH + (CH_3)_2CHI$ c) $ICH_zOCH(CH_3)_2$
d) $CH_3OC(CH_3)_2$ (I)

80. Match the column I with column II and mark the appropriate choice

	Column I		Column II
(A)	Catechol	(i)	
(B)	Resorcinol	(ii)	
(C)	p-Cresol	(iii)	

(D)	Quinol	(iv)	

a) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i)
b) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv)
c) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)
d) (A) ⟶ (ii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (iii)

81. The ether that undergoes electrophilic substitution reaction is
a) $CH_3OC_2H_5$ b) $C_6H_5OCH_3$ c) CH_3OCH_3 d) $C_2H_5OC_2H_5$

82. Which of the following compounds can be used as antifreeze in automobile readiators?
a) Methyl alcohols b) Glycol c) Nitrophenol d) Ethyl alcohols

83. Which of the following statements is not correct about methanol?
a) It is used for drinking purposes b) It is highly poisonous compound.
c) It can be prepared by reduction of formaldehyde with $LiAlH_4$.
d) It is miscible with water in all proportions.

84. The most suitable reagent for the conversion of $RCH_2OH \longrightarrow$ RCHO is
a) $K_2Cr_2O_7$ b) CrO_3 c) $KMnO_4$ d) PCC

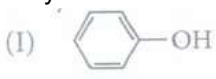
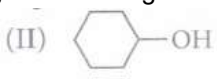
85. On heating glycerol with cone. H_2SO_4, a compound is obtained which has bad odour. The compound is:
a) acrolein b) formic acid c) allyl alcohol d) glycerol sulphate

86. An unknown alcohol is treated with the "Lucas reagent" to determine whether the alcohol is primary, secondary or tertiary. Which alcohol reacts fastest and by what mechanism?
a) Tertiary alcohol by S_N2 b) Secondary alcohol by S_N1 c) Tertiary alcohol by S_N1
d) Secondary alcohol by S_N2

87. IUPAC name of $CH_3CH_2CH_2CH(CH_2OH)CH_2CH_3$ is
a) 3-propylbutan-1-ol b) 2-ethylpentan -1- ol c) 3-methyl hydroxyhexane
d) 2-ethyl-2-propyl ethanol

88. Ethers have lower boiling points than their corresponding isomeric alcohols because of
a) hydrogen bonding in alcohols that is absent in ethers due to low polarity
b) hydrogen bonding in ethers due to high polarity
c) insolubility of ethers in water due to less polarity
d) inertness of ethers as compared to alcohols

89. Which of the following reaction(s) can be used for the preparation of alkyl halides?
(I) $CH_3CH_2OH + HCl \xrightarrow{anh.\ ZnCl_2}$
(II) $CH_3CH_2OH + HCl \longrightarrow$
(III) $(CH_3)_3COH + HCl \longrightarrow$
(IV) $(CH_3)_2CHOH + HCl \xrightarrow{anh.\ ZnCl_2}$
a) (I) and (II) only b) (IV) only c) (III) and (IV) only d) (I), (III) and (IV) only

90. Dehydration of the following in increasing order is
(I)  (II) 
(III) (IV)
a) I b) II < III c) I < III < IV < II d) None of these.

91. Assertion: Catalytic reduction of butanal gives butanol.
Reason: Aldehydes on reduction give corresponding primary alcohols.

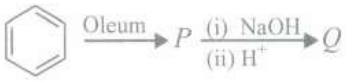
a)
If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

92. Order of esterification of alcohols is
a) 3°>1°>2° b) 2°>3°>1° c) 1° > 2° > 3° d) none of these

93. In the following sequence of reactions



the compound Q formed will be
a) aniline b) phenol c) benzaldehyde d) benzene sulphonic acid

94. The compounds which reacts fastest with Lucas reagent at room temperature is:
a) butan-1-ol b) butan-2-ol c) 2-methylpropan-1-ol d) 2-methylpropan-2-ol.

95. The boiling point of p-nitrophenol is higher than that of o-nitrophenol because _____ .
a) NO_2 group at p-position behaves in a different way from that at o-position
b) Intramolecular hydrogen bonding exists in p-nitrophenol
c) There is intermolecular hydrogen bonding in p-nitrophenol
d) p-nitrophenol has a higher molecular weight than o-nitrophenol

96. Following compounds are given:
(i) CH_3CH_3OH (ii) CH_3COCH_3 (iii) $CH_3-\underset{CH_3}{\underset{|}{C}}HOH$ (iv) CH_3OH

Which of the above compound(s), on being warmed with iodine solution and NaOH, will give iodoform?
a) (i), (iii) and (iv) b) Only (ii) c) (i), (ii) and (iii) d) (i) and (ii)

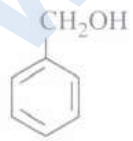
97. n-propyl alcohol and isopropyl alcohol can be chemically distinguished by which reagent:
a) PCl_5 b) reduction c) oxidation with potassium dichromate d) ozonolysis.

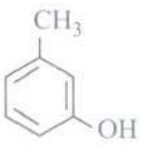
98. One mole of ethyl acetate on treatment with an excess of $LiAlH_4$ in dry ether and subsequent acidification produces:
a) 1 mol acetic acid +1 mol ethyl alcohol b) 1 mol ethyl alcohol +1 mol methyl alcohol
c) 2 moles of ethyl alcohol d) 1 mol of 2-butanol.

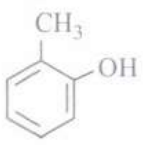
99. R- OH + HX ⟶ RX + H_2O In the above reaction, the reactivity of alcohols is
a) tertiary > secondary > primary b) tertiary < secondary < primary
c) tertiary> primary> secondary d) secondary> primary> tertiary

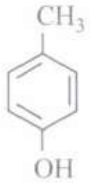
100. When phenol is treated with $CHCl_3$ and NaOH, the product formed is :
a) benzaldehyde b) salicylaldehyde c) salicylic acid d) benzoic acid

101. Which of the following compounds will give tribromo derivative on treatment with bromine water?

a) 

b) 

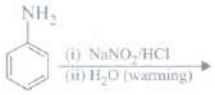
c) 

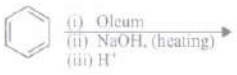
d) 

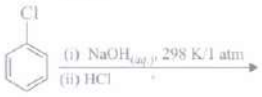
102. Ether is obtained from ethyl alcohol in presence of H_2SO_4 at
a) 113 K b) 443 K c) 413 K d) 213 K

103. Which of the following reactions will not yield phenol?

a)

b) 

c) 

d) 

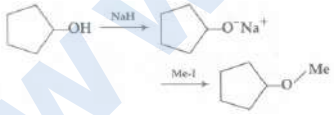
104. Propene, $CH_3CH = CH_2$ can be converted into I-propanol by oxidation. Indicate which set of reagents amongst the following is ideal for the above conversion?
a) $KMnO_4$ (alkaline) b) Osmium tetroxide (OsO_4/CH_2Cl_2) c) B_2H_6 and alk. H_2O_2
d) O_3/Zn.

105. Assertion: When alkyl aryl ethers react with excess of hydrogen halides, phenol and alkyl halide are produced.
Reason: Alkyl aryl ethers are cleaved at the alkyl-oxygen bond due to more stable aryl-oxygen bond.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

106. Unlike phenol, 2,4-dinitrophenol is soluble in sodium carbonate solution in water because
a) presence of two $-NO_2$ groups make the hydrogen bonding easier, making
b) nitro group reacts with Na_2CO_3 while -OH group does not
c)
presence of two-NO_2 groups in the ring makes 2, 4-dinitrophenol a stronger acid than phenol
d)
presence of two - NO_2 groups in the ring makes 2, 4-dinitrophenol a weaker acid than phenol

107. $HOCH_2.CH_2OH$ on heating with per-iodic acid gives:
a) 2HCOOH b) CHO c) d) $2CO_2$

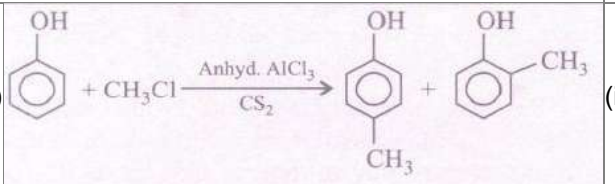
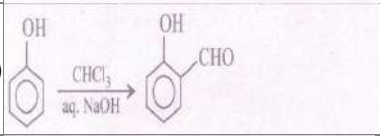
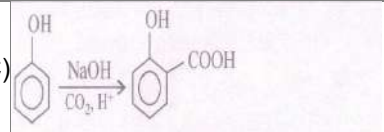
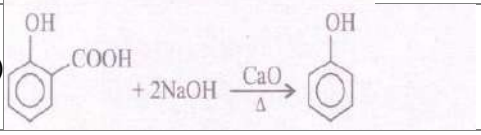
108. Which of the following products are not correctly matched in the given reactions?
a) $C_2H_5OCH_3 + HBr \xrightarrow{373K} C_2H_5OH + CH_3Br$
b) $C_2H_5OC_2H_5 + \underset{Excess}{2HI} \rightarrow C_2H_5I + C_2H_5OH$ c) $C_2H_5OC_2H_5 + HCl \xrightarrow{cold} [(C_2H_5)_2O^+H]Cl^-$
d) $(CH_3)_3COC_2H_5 \xrightarrow{HI} (CH_3)_3CI + C_2H_5OH$

109. The reaction


can be classified as :
a) dehydration reaction b) Williamson alcohol synthesis reaction
c) Williamson ether synthesis reaction d) alcohol formation reaction.

110. Assertion: Picric acid is a strong acid inspite of absence of carboxylic group.
Reason: Three $-NO_2$ groups in picric acid activate the phenolate ion.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

111. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)		(i)	Decarboxylation
(B)		(ii)	Friedel-Crafts reaction
(C)		(iii)	Reimer- Tiemann reaction
(D)		(iv)	Kolbe's reaction

a) (A) ⟶ 7 (i), (B) ⟶ 7 (ii), (C) ⟶ 7 (iii), (D) ⟶ 7 (iv)
b) (A) ⟶ 7 (ii), (B) ⟶ 7 (iii), (C) ⟶ 7 (iv), (D) ⟶ 7 (i)
c) (A) ⟶ 7 (iii), (B) ⟶ 7 (iv), (C) ⟶ 7 (i), (D) ⟶ 7 (ii)
d) (A) ⟶ 7 (iv), (B) ⟶ 7 (iii), (C) ⟶ 7 (ii), (D) ⟶ 7 (i)

112. Assertion: pK_a value of phenol is 10.0 while that of ethanol is 15.9
Reason: Ethanol is stronger acid than phenol.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If assertion is true but reason is false.

113. The correct sequence of decreasing acidity is
a) $(CH_3)_3COH > (CH_3)_2CHOH > C_2H_5OH > CH_3OH$
b) $CH_3OH > C_2H_5OH > (CH_3)_2CHOH > (CH_3)_3COH$
c) $C_2H_5OH > CH_3OH > (CH_3)_3COH > (CH_3)_2CHOH$
d) $(CH_3)_2CHOH > (CH_3)_3COH > C_2H_5OH > CH_3OH$

114. Tertiary butyl alcohol can be prepared by the reaction of
a) acetaldehyde and ethyl magnesium iodide
b) acetone and methyl magnesium iodide
c) formaldehyde and propyl magnesium iodid
d) butanone and methyl magnesium iodide

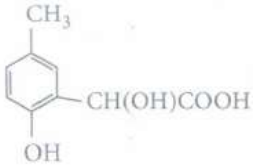
115. Cumene on reaction with oxygen followed by hydrolysis gives
a) CH_3OH and $C_6H_5COCH_3$ b) C_6H_5OH and $(CH_3)_2O$ c) $C_6H_5OCH_3$ and CH_3OH
d) C_6H_5OH and CH_3COCH_3

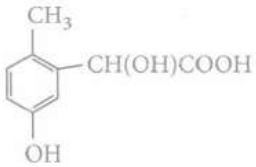
116. Which of the following will not be soluble in sodium hydrogen carbonate?
a) 2, 4, 6-Trinitorphenol b) Benzoic acid c) o-Nitrophenol
d) Benzene sulphonic acid

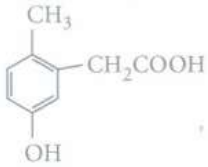
117. Which one of the following on oxidation gives a ketone?
a) Primary alcohol b) Secondary alcohol c) Tertiary alcohol d) All of these

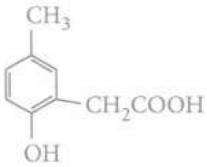
118. The C-O-C angle in ether is about
a) 180° b) 190°28' c) 110° d) 105°

119. p-Cresol reacts with chloroform in alkaline medium to give the compound A which adds hydrogen cyanide to form the compound B. The latter on acidic hydrolysis gives chiral carboxylic acid. The structure of the carboxylic acid is

a) 

b) 

c) 

d) 

120. An alkene $CH_3CH = CH_2$ is treated with B_2H_6 in presence of H_2O_2. The final product formed is
a) CH_3CH_2CHO b) $CH_3CH(OH)CH_3$ c) $CH_3CH_2CH_2OH$ d) $(CH_3CH_2CH_2)_3B$

121. Correct order of boiling points among following is
a) X > Y > Z b) Y > X > Z c) Z > X > Y d) Z > Y > X

122. Phenyl methyl ether (anisole) reacts with HI to give phenol and methyl iodide and not iodobenzene and methyl alcohol because
a) I- ion prefers to combine with the smaller group in order to minimise steric hindrance
b) I - ion is not reactive towards benzene
c) phenol is formed as a result of hydrolysis of iodobenzene
d) methyl alcohol formed during reaction reacts with I - to form methyl iodide.

123. Complete the missing links
$A \xrightarrow{CH_3MgBr} B \xrightarrow{H_3O^+} C$
a) CH_3COCH_3,$(CH_3)_3COMgBr$, $(CH_3)_3COH$
b) CH_3COOH,$(CH_3)_2CHOMgBr$, CH_3CH_2OH
c) $(CH_3COO)_2Ca$,CH_3CH_2OMgBr, $CH_3 - \underset{\underset{OH}{|}}{CH} - CH_3$
d) CH_3COCH_3,$(CH_3)_3COMgBr$,$CH_3 - \underset{\underset{OH}{|}}{CH} - CH_3$

124. Identify Z in the sequence of reactions:
$CH_3CH_2CH = CH_2 \xrightarrow{HBr/H_2O_2} Y \xrightarrow{C_2H_5ONa} Z$
a) $(CH_3) - (CH_2)_3 - O - CH_2CH_3$
b) $(CH_3)_2CH_2 - O - CH_2CH_3$ c) $CH_3(CH_2)_4 - O - CH_3$
d) $CH_3CH_2 - CH(CH_3) - O - CH_2CH_3$

125. HBr reacts fastest with:
a) 2-Methylpropan-1-ol b) Methylprpan-2-ol c) propane-2-ol d) propan-1-ol.

126. Assertion: Ethanol is obtained commercially by fermentation of molasses.
Reason: Fermentation takes place in aerobic conditions
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

127. An alcohol X on heating with concentrated H_2SO_4 gives an alkene Y which can show geometrical isomerism. The alcohol X is
a) $CH_3CH_2CH(OH)CH_3$ b) $(CH_3)_2C(OH)CH(CH_3)_2$ c) $(CH_3)_3C(OH)$
d) $(CH_3)_2C(OH)CH_2CH_3$

128. p-Nitrophenol is a stronger acid than phenol while p-cresol is a weaker acid. This can be explained as

a)
- CH_3 group decreases the electron density on oxygen of O - H group making p-cresol a weaker acid

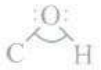
b)
NO_2 group decreases electron density on oxygen of O - H group making p-nitrophenol a stronger acid

c)
- CH_3 group increases the electron density on oxygen of O - H group making release of H^+ easier

d)
- NO_2 group increases the electron density on oxygen of O - H group making release of H^+ easier.

129. Ethylene oxide when treated with Grignard reagent yields:
a) primary alcohol b) secondary alcohol c) tertiary alcohol d) cyclopropyl alcohol

130. A compound X with the molecular formula, C_3H_8O can be oxidised to another compound Y whose molecular formula is $C_3H_6O_2$. The compound X may be:
a) $CH_3CH_2OCH_3$ b) CH_3CH_2CHO c) $CH_3CH_2CH_2OH$ d) $CH_3CHOHCH_3$

131. Assertion: The bond angle  in alcohols is slightly less than the tetrahedral angle.

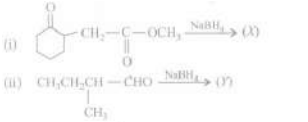
Reason: In alcohols, the oxygen of the -OH group is attached to carbon by a sigma bond formed by the overlap of a Sp^3 hybridised orbital of carbon with sp^3 hybridised orbital of oxygen.

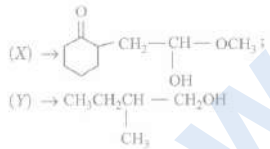
a)
If both assertion and reason are true and reason is the correct explanation of assertion.

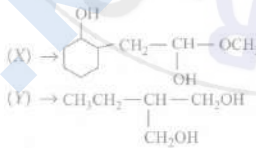
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

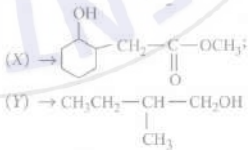
c) If assertion is true but reason is false. d) If both assertion and reason are false.

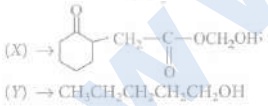
132. Choose the correct X and Y in the given reactions.



a) 

b) 

c) 

d) 

133. Which of the following is the proper method to prepare n-hexane from n-propyl alcohol?

$CH_3CH_2CH_2OH \xrightarrow{(X)} CH_3CH_2CH_2Br \xrightarrow{(Y)} CH_3(CH_2)_4CH_3$

a) (X) $\rightarrow$ HBr, (Y) $\rightarrow$ HCN b) (X) $\rightarrow$ HBr, (y) $\rightarrow$ Na, ether
c) (X) $\rightarrow$ Br_2, (y) $\rightarrow$ CH3CN d) (X) $\rightarrow$ Br_2, (y) $\rightarrow$ $KMnO_4$

134. Which of the following is phenol?
a) Cresol b) Catechol c) Benzenol d) All of these

135. Which of the following is correct?
a) On reduction of aldehyde, secondary alcohol is formed
b) Reaction of vegetable oil with H_2SO_4 gives glycerine
c) Sucrose on reaction with NaCl gives invert sugar
d) Alcoholic iodine gives idoform with NaOH

136. What type of isomerism exists between the following pairs of compounds?
(i) Pentan-1-ol and 3-Methylbutan-1-ol
(ii) Ethanol and Dimethyl ether
(iii) Butan-1-ol and Butan-2-ol

a)

i	ii	iii
Chain isomerism	Functional isomerism	Position isomerism

b)

i	ii	iii
Functional isomerism	Chain isomerism	Position isomerism

c)

i	ii	iii
Position isomerism	Chain isomerism	Functional isomerism

d)

i	ii	iii
Chain isomerism	Position isomerism	Functional isomerism

137. Increasing order of acidic strength among p-methoxy phenol (I),p-methyl phenol (III) and p-nitrophenol (III) is _____ .
a) III, I, II b) II, I, III c) III, II, I d) I, II, III

138. Which of the following alcohols reacts most readily with Lucas reagent?
a) $CH_3CH_2CH_2OH$ b) $CH_3-\underset{OH}{\underset{|}{CH}}-CH_3$ c) $CH_3-\underset{CH_3}{\overset{CH_3}{\overset{|}{\underset{|}{C}}}}-OH$ d) $CH_3-CH-\underset{CH_3}{\underset{|}{CH_2}}-OH$

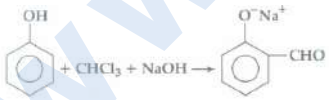
139. Which of the following reagents would distinguish cis-cyclopenta- 1, 2-diol from the trans-isomer?
a) Acetone b) Ozone c) MnO_2 d) Aluminium isoperoxide

140. Out of 2-chloroethanol and ethanol which is more acidic and why?
a) 2-Chloroethanol due to +1 effect of Cl b) Ethanol due to +1 effect of CH_3
c) 2-Chloroethanol due to -1 effect of Cl d) Ethanol due to -1 effect of CH_3

141. The major product of acid catalysed dehydration of 2-methykydohexanol and butan-l-ol are respectively
a) l-methylcydohexene and but-l-ene b) 2-methylcydohexene and but-Z-ene
c) 2-methylcydohexene and butane d) l-methylcyclohexene and but-Z-ene

142. Consider the following reaction sequence,
$CH_3CH(OH)CH_3 \xrightarrow[Heat]{Conc.H_2SO_4} X \xrightarrow[H_2O]{dil.H_2SO_4} Y$ X and Y in the reaction respectively are
a) $CH_3CH = CH_2$>$CH_3CH(OH)CH_3$ b) $CH_3CH = CHCH_3$, $CH_3CH_2CH_2OH$
c) $CH_3CH_2CH = CH_2$, $CH_3CH_2CH_2OH$ d) $CH_3CH_2CH_2CH_3$, $CH_3CH(OH)CH_2CH_3$

143. In the reaction



the electrophile involved is :
a) dichloromethyl cation ($\overset{\oplus}{C}HCl_2$) b) formyl cation ($\overset{\oplus}{C}HO$)
c) dichloromethyl anion ($\overset{\oplus}{C}HCl_2$) d) dichlorocarbene (: CCl_2)

144. Benzoquinone is prepared by reaction of phenol with
a) $Na_2Cr_2O_7$, H_2SO_4 b) $KMnO_4$, H_2SO_4 c) Na_2CrO_4, HCl d) K_2MnO_4, H_2SO_4

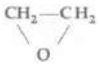
145. Diethyl ether when refluxed with excess of HI gives two molecules of (i). Ethers can be most commonly prepared by reaction of (ii) and (iii). The method is called (vi). (i), (ii), (iii) and (iv) respectively
a) ethyl iodide, sodium alkoxide, alkyl halide, Williamson's synthesis
b) ethanol, alcohol, alkyl halide, substitution

c) methyl iodide, Grignard's reagent, alkyl halide, Williamson's synthesis

d) ethyl iodide, phenol, ethyl iodide, esterification

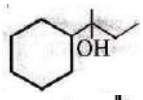
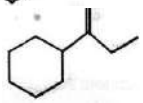
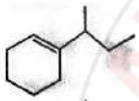
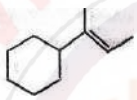
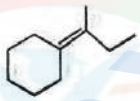
146. Methanol is industrially prepared by:
a) oxidation of CH_4 by steam at 900^0C b) reduction of HCHO using $LiAlH_4$
c) Reaction of HCHO with a solution of NaOH
d) reduction of CO using H_2 and ZnO - Cr_2O_3.

147. Tertiary butyl alcohol gives tertiary butyl chloride on treatment with
a) cone. HCl/anhydrous $ZnCl_2$ b) KCN c) NaOCl d) Cl_2

148. Reaction of  with RMgX leads to the formation of:
a) RCH2CH2OH b) RCHOHCH3 c) RCHOHR d)

149. Chlorobenzene reacts with Mg in dry ether to give a compound (A) which further reacts with ethanol to yield.
a) Phenol b) Benzene c) Ethyl benzene d) Phenyl ether

150. Consider the following reaction:
$$Phenol \xrightarrow{Zn\ dust} X \xrightarrow[anhyd.AlCl]{CH\ \ Cl} Y \xrightarrow{alkaline} \xrightarrow{KMnO_4} Z$$
The product Z is:
a) benzaldehyde b) benzoic acid c) benzene d) toluene

151. Which of the following is not the product of dehydration of?

a)  b)  c)  d) 

152. Which reducing agent is used for the following conversion?
$RCOOH \rightarrow RCH_2OH$
a) $LiAlH_4$ b) $NaBH_4$ c) K_2Cr2O_7 d) $KMnO_4$

153. Assertion: Phenol forms 2, 4, 6-tribromophenol on treatment with Br_2 in carbon disulphide at 273 K.
Reason: Bromine polarises in carbon disulphide.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

154. What would be the reactant and reagent used to obtain 2,4-dimethylpentan-3-ol ?
a) Propanal and propyl magnesium bromide
b) 3-Methylbutanal and 2-methyl magnesium iodid
c) 2, 2-Dimethylpropanone and methyl magnesium iodide
d) 2-Methylpropanal and isopropyl magnesium iodide

155. Which one of the following compounds is resistant to nucleophilic attack by hydroxyl ions?
a) Diethyl ether b) Acetonitrile c) Acetamide d) Methyl acetate

156. The alkyl halide is converted into an alcohol by _____ .
a) Addition b) Substitution c) Dehydrohalogenation d) Elimination

157. Out of benzene and phenol, phenol is more easily nitrated because

a)
presence of -OH group in phenol increases the electron density at ortho and para-position
b)
presence of -OH group in phenol decreases the electron density at ortho and para-position
c)
nitration being electrophilic substitution requires less density at ortho and para-position
d) phenol is more reactive than benzene due to -R effect.

158. The best reagent to convert pentent-2-ol into pent-3-en-2-one
a) acidic permanganate b) acidic dichromate
c) chromic anhydride in glacial acetic acid d) pyridinium chlorochromate

159. Which of the following statements is not correctly showing the trend of the properties mentioned?
a) $CH_3CH_2OH > CH_3CH_2CH_2OH > CH_3CH_2CH_2CH_2OH$ (Solubility)
b) $CH_3CH_2OH > CH_3CH_2CH_2OH > CH_3CH_2CH_2CH_2OH$ (Boiling point)
c)
$CH_3CH_2CH_2OH > CH_3-\underset{CH_3}{\overset{}{CH}}-CH_2OH > CH_3-\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-OH$ (Boiling point)
d)
$CH_3-\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-OH > CH_3-\underset{CH_3}{\overset{}{CH}}-CH_2OH > CH_3CH_2CH_2CH_2OH$ (Boiling point)

160. I-Phenylethanol can be prepared by the reaction of benzaldehyde with
a) methyl bromide b) ethyl iodide and magnesium c) methyl iodide and magnesium
d) methyl bromide and aluminium bromide

161. $C_5H_{12}O$ is a monohydric alcohol. How many isomers of this alcohol are possible? How many of these contain chiral centres as well as can exhibit enantiomerism?
a) 8 and 3 b) 6 and 2 c) 4 and 2 d) 12 and 4

162. ortho-Nitrophenol is less soluble in water than p- and m-nitrophenols because
a) o-nitrophenol shows intramolecular H-bonding
b) o-nitrophenol shows intermolecular H-bonding
c) melting point of o-nitrophenol is lower than those of m- and p-isomers
d) o-nitrophenol is more volatile in steam than those of m- and p-isomers

163. Which of the following is not correctly matched with its uses?
a) Methanol: As a solvent for paints, varnishes etc
b) Ethanol: For denaturing spirit, in manufacture of formaldehyde.
c) Ethers: To provide inert medium for chemical reactions, as anaesthetic.
d) All are correctly matched.

164. Ethanol and dimethyl ether form a pair of functional isomers. The boiling point of ethanol is higher than that of dimethyl ether, due to the presence of:
a) H-bonding in ethanol b) H-bonding in dimethyl ether c) CH_3 group is ethanol
d) CH_3 group in dimethyl ether.

165. The C-O- H bond angle in alcohols is slightly less than the tetrahedral angle whereas the C-O-C bond angle in ether is slightly greater because
a) of repulsion between the two bulky R groups.
b) O atom in both alcohols and ethers is Sp^3 -hybridised

c) lone pair - lone pair repulsion is greater than bond pair-bond pair repulsion.

d) none of these

166. Assertion: Cresols are less acidic than phenol.
Reason: Electron releasing groups do not favour the formation of phenoxide ion.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

167. An equimolar quantities of ethanol and propanol is heated with cone. H_2SO_4, The product formed is/are
a) $C_2H_5OC_2H_5$ b) $C_3H_7OC_3H_7$ c) $C_2H_5OC_3H_7$ d) all of these

168. The reaction,

$$CH_3-\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-ONa+CH_3CH_2Cl \xrightarrow{-NaCl} CH_3-\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-O+CH_2-CH_3$$

is called:
a) Etard reaction b) Gattermann-Koch reaction c) Williamson synthesis
d) Williamson continuous etherification process.

169. The major product obtained on interaction of phenol with sodium hydroxide and carbon dioxide is
a) benzoic acid b) salicylaldehyde c) salicylic acid d) phthalic acid.

170. Conversion of phenol to salicylic acid and to salicyaldehyde are known as (respectively)
a) Reimer- Tiemann reaction and Kolbe's reaction
b) Williamson's synthesis and Hydroboration-oxidation
c) Kolbe's reaction and Williamson's synthesis
d) Kolbe's reaction and Reimer- Tiemann reaction

171. Assertion Anisole undergoes electrophilic substitution at ortho and para-positions.
Reason: Anisole is less reactive than phenol towards electrophilic substitution reactions.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

172. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Williamson's synthesis	(i)	$C_6H_5OH + CH_3COCl$ in presence of pyridine
(B)	ROR'	(ii)	$C_2H_5ONa + C_2H_5Br$
(C)	p- Nitrophenol	(iii)	Unsymmetrical ether
(D)	Acetylation	(iv)	Intermolecular hydrogen bonding

a) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)
b) (A) → (iii), (B) → (i), (C) → (ii), (D) → (iv)
c) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)
d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

173. Assertion: The relative ease of dehydration of alcohols follow the following order:
Tertiary > Secondary > Primary
Reason: Formation of carbocation is the slowest step of the reaction

a)
If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

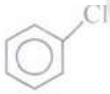
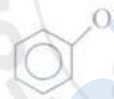
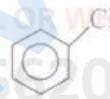
c) If assertion is true but reason is false. d) If both assertion and reason are false.

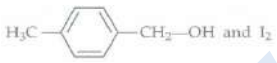
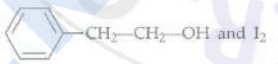
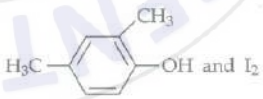
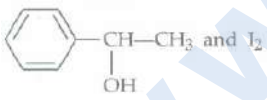
174. Propanone on reaction with alkyl magnesium bromide followed by hydrolysis will produce
a) primary alcohol b) secondary alcohol c) tertiary alcohol d) carboxylic acid

175. Arrange the following compounds in increasing order of boiling point.
Propan-1-ol, butan-1-ol, butan-2-ol, pentan-1-ol
a) Propan-1-ol, butan-2-ol, butan-1-ol, pentan-1-ol
b) Propan-1-ol, butan-1-ol, butan-2-ol, pentan-1-ol
c) Propan-1-ol, butan-2-ol, butan-1-ol, propan-1-ol
d) Propan-1-ol, butan-1-ol, butan-2-ol, propan-1-ol

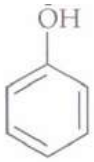
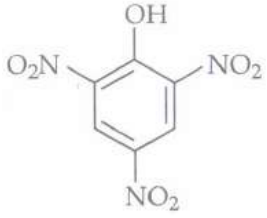
176. Which of the following is not a characteristic of alcohol?
a) They are lighter than water.
b) Their boiling points rise fairly uniformly with rising molecular weight.
c)
Lower members are insoluble in water and organic solvents but the solubility regularly increases with molecular mass.
d)
Lower members have a pleasant smell and burning taste, higher members are colourless and tasteless.

177. Lucas' reagent is:
a) conc. HCl and anhydrous $ZnCl_2$ b) cone. HNO_3 and hydrous $ZnCl_2$
c) conc. HCl and hydrous $ZnCl_2$ d) conc. HNO_3 and anhydrous $ZnCl_2$

178. Which of the following compounds will be most easily attacked by an electrophile?
a) b)  c)  d) 

179. Compound A, $C_8H_{10}O$, is found to react with NaOI (produced by reacting Y with NaOH) and yields a yellow precipitate with characteristic smell. A and Y are respectively.
a)  b)  c) 
d) 

180. Which one is formed when sodium phenoxide is heated with ethyl iodide?
a) Phenetole b) Ethyl phenyl alcohol c) Phenol d) None of the above

181. Which one of the most acidic compound?
a) b)  c) d) 

RAVI MATHS TUITION CENTRE , WHATSAPP - 8056206308

Time : 1 Mins **HALOALKANES' AND HALOARENES' 1** **Marks : 811**

1. Identify the products (A) and (B) in the reactions.

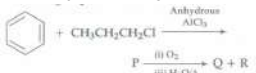
   RX+ AgCN $\longrightarrow$. $\underline{\quad (A) \quad}$ + AgX

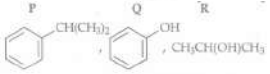
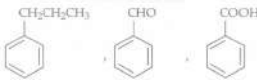
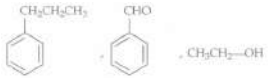
   RX + KCN $\longrightarrow$ $\underline{\quad (B) \quad}$ + KX

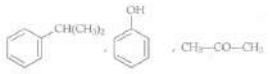
   a) (A)$\rightarrow$ RCN, (B) $\rightarrow$ RCN b) (A) $\rightarrow$ RCN, (B) $\rightarrow$ RNC c) (A) $\rightarrow$ RNC, (B)$\rightarrow$ RCN

   d) (A)$\rightarrow$ RNC, (B) $\rightarrow$ RNC

2. Identify the major products P, Q and R in the following sequence of reactions :



   a)  b)  c) 

   d) 

3. Arrange the compounds in increasing order of rate of reaction towards nucleophilic substitution

   a) (I) < (II) < (III) b) (II) < (I) < (III) c) (III) < (II) < (I) d) (I) < (III) < (II)

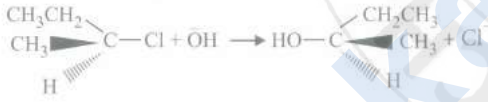
4. $CH_3CH_2Cl \xrightarrow{NaCN} X \xrightarrow{Ni/H_2} Y \xrightarrow[anhydride]{Acetic} Z$

   Z in the above reaction sequence is :

   a) $CH_3CH_2CH_2NHCOCH_3$ b) $CH_3CH_2CH_2NH_2$ c) $CH_3CH_2CH_2CONHCH_3$

   d) $CH_3CH_2CH_2CONHCOCH_3$

5. In the reaction given below:



   Which of the following statements is correct

   a) The reaction proceeds via S_N2 mechanism hence inversion of configuration takes place.

   b) The reaction proceeds via S_N1 mechanism hence inversion of configuration takes place.

   c) The reaction proceeds via S_N2 mechanism hence their is no change in the configuration.

   d) The reaction proceeds via S_N1 mechanism hence there is no change in the configuration.

6. Match the column I with column II and mark the appropriate choice.

	Column I		Column II
(A)	$CH_3(CH_2)_3OH \xrightarrow[H_2SO_4,\Delta]{NaBr}$	(i)	$CH_3CH(Br)(CH_2)_2CH_3$
(B)	$(CH_3)_3COH \xrightarrow[room\ temp]{Conc.HCl}$	(ii)	$CH_3CH_2CH_2Cl$
(C)	$CH_3CH(OH)(CH_2)_2CH_3 \xrightarrow{PBr_3}$	(iii)	$(CH_3)CCl$
(D)	$CH_3CH_2CH_2OH \xrightarrow{SOCl_2}$	(iv)	$CH_3(CH_2)_3Br$

   a) (A)$\rightarrow$ (iv), (B)$\rightarrow$ (iii), (C)$\rightarrow$ (i), (D) $\rightarrow$ (ii)

   b) (A) $\rightarrow$ (iv), (B) $\rightarrow$ (iii), (C)$\rightarrow$ (ii), (D) $\rightarrow$ (i)

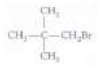
   c) (A) $\rightarrow$ (iii), (B) $\rightarrow$ (iv), (C) $\rightarrow$ (i), (D) $\rightarrow$ (ii)

   d) (A) $\rightarrow$ (iii), (B) $\rightarrow$ (iv), (C) $\rightarrow$ (ii), (D) $\rightarrow$ (i)

7. In a $^{S}N^2$ substitution reaction of the type

   R-Br + Cl^- $\xrightarrow{DMF}$ R-Cl + Br^-

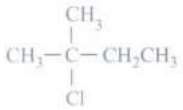
   Which one of the following has the highest relative rate?

a)  b) CH_3CH_2Br c) $CH_3CH_2CH_2Br$ d) $CH_3-\underset{CH_3}{\overset{CH}{|}}-CH_2Br$

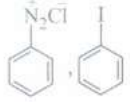
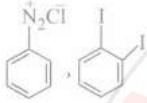
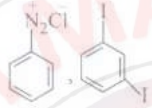
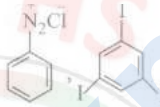
8. **Assertion:** Aryl halides are highly reactive towards nucleophilic substitution reactions.
Reason : In case of haloarenes, halogen atom is attached to sp hybridised carbon atom.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false.

9. Halogen acids react with alcohols to form alkyl halides. The reaction follows a nucleophilic substitution mechanism. What will be the major product of the following reaction?

$$CH_3-\underset{}{\overset{CH_3}{CH}}-\underset{OH}{CH}-CH_3+HCl\longrightarrow$$

a) $CH_3\underset{CH_3}{CH}-\underset{Cl}{CH}-CH_3$ b) $CH_3\underset{Cl}{CH}-\underset{CH_3}{CH}-CH_3$ c) 

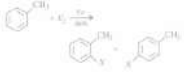
d) $CH_3CH_2CH_2CH_2CH_2Cl$

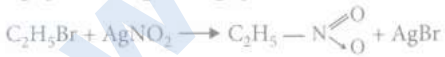
10.
X and Y in the reaction are
a)  b)  c)  d) 

11. Alkyl halides are formed when thionyl chloride and _____are refluxed in presence of pyridine. The order of reactivity (3° > 2° > 1°) is due to +1 effect of the alkyl group which _____the polarity of C-Xbond.
a) acids, decreases b) alcohols, increases c) aldehydes, changes
d) ketones, decreases

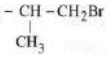
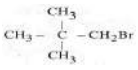
12. Benzene reacts with n-propyl chloride in the presence of anhydrous $AlCl_3$ to give:
a) 3-propyl-I-chlorobenzene b) n-propyl benzene c) no reaction d) isopropyl benzene.

13. Reactivity order of halides for dehydrohalogenation is:
a) R-F > R-Cl > R-Br > R-I b) R-I> R-Br > R-Cl > R-F c) R-I > R-Cl > R-Br > R-F
d) R-F > R-I > R-Br > R-Cl

14. Which of the following is halogen exchange reaction?
a) RX + NaI→RI + NaX b) c) $R-OH+HX\xrightarrow{ZnCl_2}R-X+H_2O$
d) 

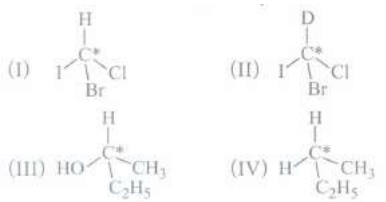
15. Which of the following reactions does not take place?
a) $C_2H_5Br+KNO_2\longrightarrow C_2H_5-O-N=O+KBr$
b) 
c) $C_2H_5Br+AgCN\longrightarrow C_2H_5NC+AgBr$ d) $C_2H_5Br+KCN\longrightarrow C_2H_5NC+KBr$

16. HBr reacts fastest with _____ .
a) 2 -methyl propan-1-ol b) 2 -methyl propan-2-ol c) propan-2-o1 d) propan-1-ol

17. In a S_N2 substitution reaction of the type $R-Br+Cl^-\xrightarrow{DMF}R-Cl+Br^-$ which one of the following has the highest relative rate?
a) $CH_3-CH_2-CH_2Br$ b)  c)  d) CH_3CH_2Br

18. A 10 g mixture of iso-butane and iso-butene requires 20 g of Br_2 (in CCl_4) for complete addition. If 10 g of the mixture is catalytically hydrogenated and the entire alkane is monobrominated in the presence of light at 127°C, how much of it would be formed? (Atomic weight of bromine = 80).
a) 24.21 g b) 24.21 g c) 30.0 g d) 12 g

19. In which of the following molecules carbon atom marked with asterisk (*) is asymmetric?



a) (I), (II), (III), (IV) b) (I), (II), (III) c) (II), (III), (IV) d) (I), (III), (IV)

20. Consider the following reaction and identify X and Y.

$$CH_3CH_2CH_2I \xrightarrow{alc.KOH} X \xrightarrow{Br_2} Y$$

a)

X	Y
$CH_3CH{=}CH_2$	$CH_3-\underset{Br}{CH}-CH_2Br$

b)

X	Y
$CH_3CH_2CH_2OH$	$CH_3CH_2CH_2Br$

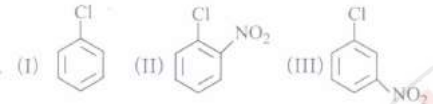
c)

X	Y
$CH_3-\underset{OH}{CH}-CH_3$	$CH_3-\underset{Br}{CH}-CH_3$

d)

X	Y
$CH_3CH=CH_2$	$CH_3CH_2CH_2Br$

21. Arrange the compounds in increasing order of rate of reaction towards nucleophilic substitution.



a) (I) < (II) < (III) b) (III) < (II) < (I) c) (I) < (III) < (II) d) (III) < (I) < (II)

22. The reaction of $C_6H_5CHCH{=}CH_3$ with HBr produces:

a) $C_6H_5CH_2CH_2CH_2Br$ b) c) $C_6H_5\underset{Br}{CH}\,CH_2CH_3$ d) $C_6H_5CH_2\underset{Br}{CH}\,CH_3$

23. Which is the correct increasing order of boiling points of the following compounds?
1-Iodobutane, 1-Bromobutane, 1-Chlorobutane, Butane

a) Butane < 1-Chlorobutane < 1-Bromobutane < 1-Iodobutane

b) 1-Iodobutane < 1-Bromobutane < 1-Chlorobutane < Butane

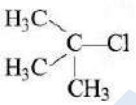
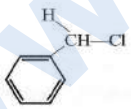
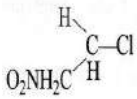
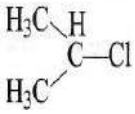
c) Butane < 1-Iodobutane <1-Bromobutane < 1-Chlorobutane

d) Butane < 1-Chlorobutane < 1-Iodobutane < 1-Bromobutane

24. The compound which reacts fastest with Lucas reagent is (at room temperature)

a) butan-1-ol b) butan-2-ol c) 2-methyl propan-1-ol d) 2-methyl propan-2-ol

25. In which of the following compounds, the C-Cl bond ionisation shall give most stable carbon ion?

a)  b)  c)  d) 

26. The order of reactivity of various alkyl halides towards nucleophilic substitution follows the order

a) R- I > R - Br > R - Cl > R - F b) R - F > R - Cl > R - Br > R - I

c) R-Cl > R-Br > R-I > R-F d) R-Br > R-I > R-Cl > R-F

27. Grignard reagent, a very useful starting compound for a number of organic reactions can be prepared by

a) reaction of alkyl halides with a solution of magnesium hydroxide

b) reaction of alkyl halides with dry magnesium powder in presence of dry ether

c) reaction of $MgCl_2$ with ether and alcohol

d) reaction of alkyl halide with magnesium in presence of alcohol.

28. Which of the following compounds is not chiral?

a) CH_3CHDCH_2Cl b) CH_3CH_2CHDCl c) $DCH_2CH_2CH_2Cl$ d) $CH_3CHClCH_2D$

29. Which of the following alkyl halides will undergo S_N1 reaction most readily?

a) $(CH_3)_3C$-F b) $(CH_3)_3C$-Cl c) $(CH_3)_3C$-Br d) $(CH_3)_3C$-I

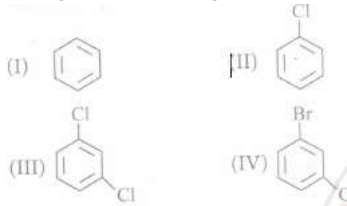
30. The most important chemical method to resolve a racemic mixture makes use of the formation of :
a) a meso compound b) enantiomers c) diastereomers d) racemetes

31. Which of the following compounds can yield only one mono chlorinated product upon free radical chlorination?
a) 2,2-Dimethylpropane b) 2-Methylpropane c) 2-Methylbutane d) n-Butane

32. Which of the following is not correctly matched with its IUPAC name?
a) $CHF_2CBrClF$: l-Brorno-Lchloro-1, 2, 2 -trifluoroethane
b) $(CCl_2)_3CCl$: 2-(Trichloromethyl)-1, 1, 1, 2, 3, 3, 3 -heptachloropropane
c) $CH_3C(p\text{-}ClC_6H_4)_2CH(Br)CH_3$: 2- Bromo-3,3-bis(4-chlorophenyl) butane
d) $o\text{-}BrC_6H_4CH(CH_3)CH_2CH_3$: 2- Bromo-1-methylpropylbenzene

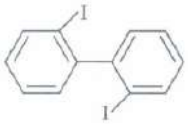
33. **Assertion :** Aryl halides cannot be prepared by replacement of hydroxyl group of phenol by halogen atom.
Reason: Phenols react with halogen acids violently.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

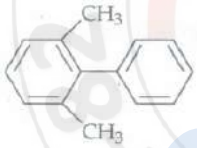
34. Arrange the following compounds in the increasing order of their densities.

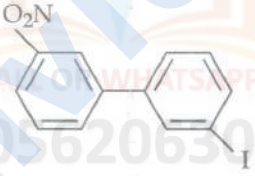


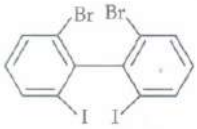
a) (I) < (II) < (III) < (IV) b) (I) < (III) < (IV) < (II) c) (IV) < (III) < (II) < (I)
d) (II) < (IV) < (III) < (I)

35. Which of the following biphenyl is optically active?

a) 

b) 

c) 

d) 

36. Methanol is industrially prepared by _____ .
a) Oxidation of CH_4 by steam at $900^\circ C$ b) Reduction of HCHO using $LiAlH_4$
c) Reaction of HCHO with a solution of NaOH
d) Reduction of CO using and $ZnO - Cr_2O_3$

37. Which alkyl halide exhibits complete racemisation in S_N1 reaction?
a) $(CH_3)_3CHCl$ b) $CH_3CH_2CH_2Cl$ c) CH_3CH_2Cl d) $C_6H_5CH_2Cl$

38. Which of the following is the most reactive towards nucleophilic substitution reaction?
a) $ClCH_2 - CH = CH_2$ b) $CH_2 = CH - Cl$ c) $CH_3CH=CH-Cl$ d) C_6H_5Cl

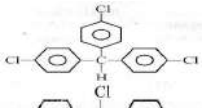
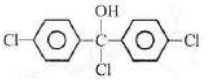
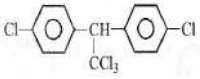
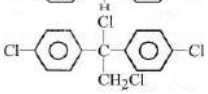
39. Which of the following will give enantiomeric pair on reaction with water due to presence of asymmetric carbon atom?
a) $C_2H_5 - \overset{\overset{C_2H_5}{|}}{\underset{\underset{C_2H_5}{|}}{C}} - Br$ b) $C_2H_5 - \overset{\overset{C_2H_5}{|}}{\underset{\underset{CH_3}{|}}{C}} - CI$ c) $C_2H_5 - \overset{\overset{H}{|}}{\underset{\underset{CH_3}{|}}{C}} - I$ d) $C_2H_5 - \overset{\overset{CH_3}{|}}{\underset{\underset{C_2H_5}{|}}{C}} - Br$

40. The negative part of the addendum (the molecule to be added) adds on to the carbon atom of the double bond containing the least number of hydrogen atoms. This rule is known as
a) Saytzeff's rule b) Peroxide rule c) Markovnikov's rule d) Hoffmann rule.

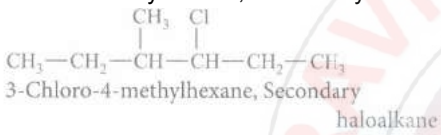
41. Reaction of t-butyl bromide with sodium methoxide produces:
a) sodium t-butaoxide b) t-butyl methyl ether c) isobutane d) isobutylene

42. The reaction of toluene with Cl_2 in presence of $FeCl_3$ gives 'X' and reaction in presence of light gives 'Y'. Thus, 'X' and 'Y' are:
a) X = Benzal chloride,Y = o- Chlorotoluene b) X = m - Chlorotoluene, Y = p-Chiorotoluene
c) X = o -and p-Chiorotoluene, Y = Trichloromethyl - benzene
d) X = Benzyl chloride, Y = m -Chlorotoluene

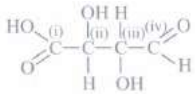
43. Elimination of bromine from 2-bromobutane results in the formation of
a) equimolar mixture of 1 and 2-butene b) predominantly 2-butene
c) predominantly I-butene d) predominantly 2-butyne.

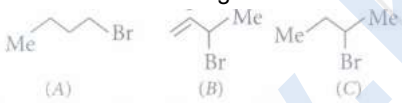
44. Trichloroacetaldehyde, CCl_3CHO reacts with chlorobenzene in presence of sulphuric acid and Produces:
a) 
b) 
c) 
d) 

45. Which of the following acid does not exhibit optical isomerism?
a) Maleic acid b) α-amino acid c) Lactic acid d) Tartaric acid

46. Which of the following halides is not correct according to the name and classification?
$CH_3CH_2C(CH_3)_2CH_2I$
a) 1-Iodo- 2, 2-dimethylbutane, Primary haloalkane
$(CH_3)_2CHCH(Cl)CH_3$
b) 2-Chloro-3-methylbutane, Secondary haloalkane
$CH_3C(Cl)(C_2H_5)CH_2CH_3$
c) 2-Chloro-2-ethylbutane, Secondary haloalkane
d) 

47. Which of the following is a primary halide?
a) iso-Propyl iodide b) see-Butyl iodide c) tert-Butyl bromide d) neo-Hexyl chloride

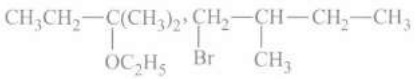
48. Which of the carbon atoms present in the molecule given below are asymmetric?

a) (i), (ii), (iii), (iv) b) (ii), (iii) c) (i), (iv) d) (i), (ii), (iii)

49. Consider the following bromides:


The correct order of S_N1 reactivity is
a) A>B>C b) B>C>A c) B > A > C d) C> B > A

50. Which of the following is most reactive towards aqueous NaOH?
a) C_6H_5Cl b) $C_6H_5CH_2Cl$ c) C_6H_5Br d) BrC_6H_4Br

51. Phosgene is a common name for _____ .
a) Phosphonyl chloride b) Thionyl chloride c) Carbon dioxide and phosphine
d) None of these

52. The products (A) and (B) are respectively
(i) $CH_3 - \underset{Br}{CH} - \underset{CH_3}{CH} - CH_3 \xrightarrow{C_2H_5ONa} A$
(ii) $CH_2 = \underset{CH_3}{C} - CH_2CH_3 \xrightarrow[Peroxide]{HBr} (B)$
a) $CH_3CH_2 - \overset{CH_3}{CH} - CH_3, CH_3(CH_2)_2CH_3$ b) 
c) $CH_3CH_2 - \underset{ONa}{CH} - CH_2CH_3, BrCH_2 - \overset{CH_3}{\underset{Br}{C}} - CH_2CH_3$

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d) $CH_3CH_2-CH_2CH_2CH_3, CH_3-\underset{Br}{CH}-CH_2CH_3$

53. Chlorobenzene is formed by reaction of chlorine with benzene in the presence of $AlCl_3$. Which of the following species attacks the benzene ring in this reaction:
a) Cl^- b) Cl^+ c) $AlCl_3$ d) $[AlCl_4]^-$

54. Haloalkanes contain halogen atom(s) attached to the Sp^3 hybridised carbon atom of an alkyl group. Identify haloalkane from the following compounds.
(i) 2- Bromopentane
(ii) Vinyl chloride
(iii) 2-Chloroacetophenon
(iv) Trichloromethane
a) Only (ii) b) (ii) and (iv) only c) (i) and (iv) only d) (i), (ii) and (iii) only

55. In the replacement reaction

The reaction will be most favorable if M happens to be :
a) Na b) K c) Rb d) Li

56. Which of the following statements is not correct about S_N2 reactions of alkyl halides?
a)
Nucleophile attacks the carbon from the side opposite to where the leaving group is attached.
b) The bond formation and bond breaking take place in one step
c) The rate of reaction depends upon the concentration of nucleophile
d) S_N2 mechanism is predominant in tertiary alkyl halides

57. What should be the correct IUPAC name for diethylbromomethane?
a) 1-Bromo-1, 1-diethylmethane b) 3-Bromopentane c) 1-Bromo-1-ethylpropane
d) 1-Brornopentane

58. Which of the following reactions will give the major and minor products?

$$CH_3-CH_2-\underset{Br}{CH}-CH_3 \xrightarrow[heat]{alc.KOH} \underset{(A)}{CH_3-CH=CH-CH_3} + \underset{(B)}{CH_3-CH_2-CH=CH_2}$$

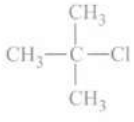
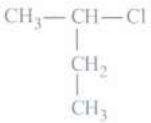
a) (A) is major product and (B) is minor product.
b) (A) is minor product and (B) is major product. c) Both (A) and (B) are major products.
d) Only (B) is formed and (A) is not formed.

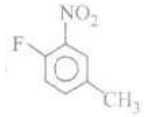
59. Which of the following alcohols will yield the corresponding alkyl chloride on reaction with concentrated HCl at room temperature?
a) CH_3CH_2-CH_2-OH b) $CH_3CH_2-\underset{CH_3}{CH}-OH$ c) $CH_3CH_2-\underset{CH_3}{CH}-CH_2OH$
d) $CH_3CH_2-\underset{CH_3}{\overset{CH_3}{C}}-OH$

60. Which one is most reactive towards S_N1 reaction?
a) $C_6H_5C(CH_3)(C_6H_5)Br$ b) $C_6H_5CH_2Br$ c) $C_6H_5CH(C_6H_5)Br$ d) $C_6H_5CH(CH_3)Br$

61. An alkyl chloride produces a single alkene on reaction with sodium ethoxide and ethanol. The alkene further undergoes hydrogenation to yield 2-methylbutane. Identify the alkyl chloride from amongst the following
a) $ClCH_2CH(CH_3)CH_2CH_3$ b) $ClCH_2CH_2CH_2CH_3$ c) $ClCH_2CH(CH_3)CH_2CH_3$
d) $CH_3C(Cl)(CH_3)CH_2CH$

62. When chlorine is passed through propene at 400°C, which of the following is formed?
a) PVC b) Allyl chloride c) Nickel chloride d) 1,2-dichloro ethane

63. S_N1 reaction is fastest in
a) CH_3CH_2Br b) $CH_3-\underset{Cl}{CH}-CH_3$ c)  d) 

64. The IUPAC name of the compound  is

a) 1-fluoro-4-methyl-2-nitrobenzene b) 4-fluoro-1-methyl-3-nitrobenzene
c) 4-methyl-1-fluoro-2-nitrobenzene d) 2-fluoro-S-methyl-1-nitrobenzene

65. Replacement Cl of chlorobenzene to give phenol requires drastic conditions but chlorine of 2, 4-dinitro chlorobenzene is readily replaced. This is because _____ .

a) NO_2 makes the ring electron rich at ortho and para-positions
b) NO_2 withdraw electrons from meta-position
c) NO_2 donates electrons at meta-position
d) NO_2 withdraw electrons from ortho/para-positions

66. **Assertion:** The boiling point of the compounds increases in the order: Isopropylchloride < 1-Chloropropane < 1-Chlorobutane.
Reason: Boiling point depends upon the molecular mass and surface area.

a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false.

67. Arrange the following alkyl halides in order of dehydrohalogenation; C_2H_5I, C_2H_5Cl, C_2H_5Br, C_2H_5F

a) C_2H_5:F > C_2H_5Cl > C_2H_5Br > C_2H_5I b) C_2H_5I > C_2H_5Br > C_2H_5Cl > C_2H_5F
c) C_2H_5I> C_2H_5Cl > C_2H_5Br > C_2H_SF d) C_2H_5F> C_2H_5I > C_2H_5Br > C_2H_5Cl

68. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	CH_3CHCl_2	(i)	Vinyl halide
(B)	CH_2ClCH_2Cl	(ii)	Alkylidene halide
(C)	$CHCl = CH_z$	(iii)	Alkylene dihalide
(D)	$ClCH_2$-CH=CH_2	(iv)	Allyl halide

a) (A) → (i), (B) → (ii), (C) → (iv), (D) → (iii)
b) (A) → (ii), (B) → (iii), (C) → (i), (D) → (iv)
c) (A) → (iii), (B) → (iv), (C)→ (ii), (D) → (i)
d) (A)→ (iv), (B) → (i), (C) → (iii), (D) → (ii)

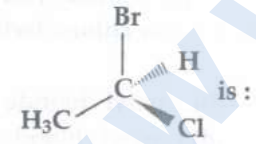
69. Methyl bromide reacts with AgF to give methyl fluoride and silver bromide. This reaction is called

a) Fittig reaction b) Swarts reaction c) Wurtz reaction d) Finkelstein reaction

70. Ethyl chloride is converted into diethyl ether by :

a) Perkins reaction b) Grignard reaction c) Wurtz synthesis d) Williamson's synthesis

71. The chirality of the compound:



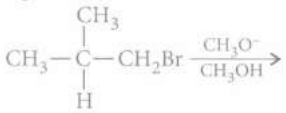
is

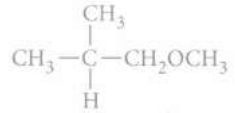
a) R b) S c) Z d) E

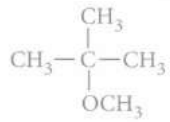
72. 0.0852 g of an organic halide (A) when dissolved in 2.0 g of camphor, the melting point of the mixture was found to be 167°C. Compound (A) when heated with sodium gives a gas (B). 280 mL of gas (B) at STP weighs 0.375 g. What would be 'A' in the whole process? Kj for camphor = 40, m.pt. of camphor = 179°C.

a) C_2H_5Br b) CH_3I c) $(CH_3)_2CHI$ d) C_3H_5Br

73. The major product formed in the following reaction is



a)  b) $CH_3 - \underset{OCH_3}{CH} - CH_2CH_3$ c) $CH_3 - \overset{CH_3}{C} = CH_2$

d) 

74. Elimination reaction of 2-Bromo-pentane to form pent-2-ene is:
(I) p-Elimination reaction
(2) Follow Zaitsev rule
(3) Dehydrohalogenation reaction
(4) Dehydration reaction
a) (I),(2),(3) b) (1),(2),(3) c) (I),(3),(4) d) (2),(3),(4)

75. A mixture of 1-chloropropane and 2-chloropropane when treated with alcoholic KOH gives
a) prop-1-ene b) prop-2-ene c) a mixture of prop-1-ene and prop-2-ene d) propanol.

76. Propene, $CH_3 - CH = CH_2$ can be converted into 1-propanol by oxidation. Indicate which set of reagents amongst the following is ideal to affect the above conversion?
a) $KMnO_4(alkaline)$ b) Osmium tetroxide (OsO_4/CH_2Cl_2)
c) B_2H_6 and alk H_2O_2 d) O_3/Zn

77. Consider the reaction, $CH_3CH_2CH_2Br$+ NaCN $\longrightarrow$ $CH_3CH_2CH_2CN$ + NaBr
This reaction will be the fastest in :
a) ethanol b) methanol c) N, N'-dimethylformamide (DMF) d) water

78. Which of the following is not chiral?
a) 2-Hydroxypropanoic acid b) 2-Butanol c) 2,3-Dibromopentane d) 3-Bromopentane

79. Toluene reacts with a halogen in the presence of iron (III) chloride giving ortho and para halo compounds. The reaction is
a) electrophilic elimination reaction b) electrophilic substitution reaction
c) free radical addition reaction d) nucleophilic substitution reaction.

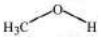
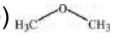
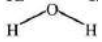
80. Reaction of with RMgX leads to formation of _____ .
a) $RCHOHR$ b) $RCHOHCH_3$ c) RCH_2CH_2OH d)

81. An alkyl halide with molecular formula $C_6H_{13}Br$ on dehydrohalogenation gives two isomeric alkenes X and Y with molecular formula C_6H_{12}. On reductive ozonolysis X and Y gave four compounds CH_3COCH_3, CH_3CHO, CH_3CH_2CHO and $(CH_3)_2CHCHO$. The alkyl halide is
a) 4-bromo-2-methylpentane b) 3-bromo- 2- methylpentane
c) 2-bromo-2,3-dimethylbutane d) 2, 2-dimethyl-l-bromobutane

82. **Assertion:** Electrophilic substitution reactions in haloarenes occur slowly and require more drastic conditions as compared to those in benzene.
Reason: Halogens are ortho and para-directors.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false.

83. Cyanide ion acts as an ambident nucleophile. From which end it acts as a stronger nucleophile in aqueous medium?
a) It acts as a stronger nucleophile from carbon end.
b) It acts as a stronger nucleophile from nitrogen end.
c) It depends on the nature of the alkyl halide d) It has same strength from both the ends

84. **Assertion:** Chloroform is stored in dark coloured bottles.
Reason : Chronic chloroform exposure may cause damage to the liver and kidneys.
a) If assertion is true but reason is false b) If both assertion and reason are false.
c) If both assertion and reason are true and reason is the correct explanation of assertion
d)
If both assertion and reason are true but reason is not the correct explanation of assertion.

85. The compound that is most difficult to protonate is:
a)  b)  c) d) 

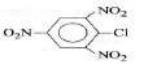
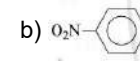
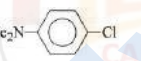
86. In an S_N1 reaction on chiral centres, there is:

a) inversion more than retention leading to partial racemisation b) 100% retention
c) 100% inversion d) 100% racemisation

87. The order of reactivity of following alcohols with halogen acids is_____
(I) CH_3CH_2-CH_2-OH
(II) $CH_3CH_2-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}H-OH$
(III) $CH_3CH_2-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-OH$
a) (I) > (II) > (III) b) (III) > (II) > (I) c) (II) > (I) > (III) d) (I) > (III) > (II)

88. The main difference in C - X bond of a haloalkane and a haloarene is
a) C - X bond in haloalkanes is shorter than haloarenes.
b)
in haloalkanes the C attached to halogen in C - X bond is Sp^3 hybridised while in haloarenes it is Sp^2 hybridised.
c)
C - X bond in haloarenes acquires a double bond character due to higher electronegativity of X than haloalkanes.
d)
haloalkanes are less reactive than haloarenes due to difficulty in C - X cleavage in halo alkanes.

89. Consider the reactions:
$(i)(Ca_3)_2CH-CH_2Br \xrightarrow{C_2H_5OH} (CH_3)_2CH-CH_2OC_2H_5+HBr$
$(ii)(CH_3)_2CH-CH_2Br \xrightarrow{C_2H_5O^-} (CH_3)_2CH-CH_2OC_2H_5+Br^-$
The mechanism of reactions (i) and (ii) are respectively:
a) S_N1 and S_N2 b) S_N1 and S_N1 c) S_N2 and S_N2 d) S_N2 and S_N1

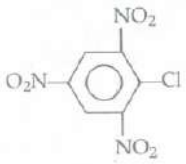
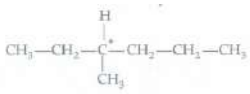
90. Which chloro derivative of benzene among the following would undergo hydrolysis most readily with aq. NaOH to furnish the corresponding hydroxy derivative?
a)  b)  c)  d) C_6H_5-Cl

91. Which of the following reactions follows Markovnikov's rule?
a) C_2H_4 + HBr b) C_3H_6 + Cl_2 c) C_3H_6 + HBr d) C_3H_6 + Br_2

92. The $Cl-C-Cl$ angle in 1, 1, 2, 2-tetra-chloroethene and tetrachloromethane will be about _____ .
a) 120° and $109^\circ 28'$ b) 90° and 109.5° c) 109.5° and $90'$
d) 109.5° and 120°

93. Which of the following statements regarding the S_N1 reaction shown by alkyl halide is not correct?
a) The added nucleophile plays no kinetic role in S_N1 reaction
b) The S_N1 reaction involves the inversion of configuration of the optically active substrate.
c) The $S_N1$reaction on the chiral starting material ends up with racemisation of the product
d) The more stable the carbo cation intermediate the faster the S_N1 reaction.

94. 36.4 g of 1, 1, 2, 2-tetrachloropropane was heated with zinc dust and the product was bubbled through ammoniacal $AgNO_3$.What is the weight of precipitate obtained?
a) 30.0 g b) 29.4 g c) 28.0 g d) 25.7 g

95. Which chloro derivative of benzene among the following would undergo hydrolysis most readily with aqueous sodium hydroxide to furnish the corresponding hydroxyl derivative?
a)  b)  c) d) C_6H_5Cl

96. The compound C_7H_8 undergoes the following reactions:
$C_7H_8 \xrightarrow{3CL_2/\triangle} A \xrightarrow{Br_2/Fe} B \xrightarrow{Zn/HCl} C$ The product 'C' is

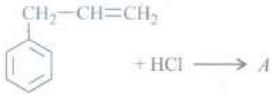
a) m-bromotoluene b) o-bromotoluene c) 3-bromo-2,4,6-trichlorotoluene
d) p-bromotoluene

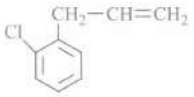
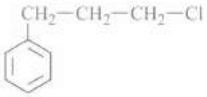
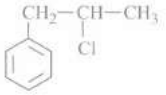
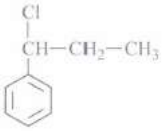
97. Molecules whose mirror image is nonsuperimposable over them are known as chiral. Which of the following molecules is chiral in nature?
a) 2-Bromobutane b) 1-Bromobutane c) 1-Bromobutane d) 2-Bromopropan-2-ol

98. Which one of the following is not correct order of boiling points of the alkyl/aryl halides?
a) $CHCl_3 > CH_2Cl_2$ b) $CH_3(CH_2)_3Cl > CH_3(CH_2)_2Cl$ c) $(CH_3)_3CCl > (CH_3)_2CHCH_2Cl$
d) $CH_3(CH_2)_3Cl > CH_3CH_2CHClCH_3$

99. Ethyl alcohol is obtained when ethyl chloride is boiled with
a) alcoholic KOH b) aqueous KOH c) water d) aqueous $KMnO_4$.

100. What is 'A' in the following reaction?



a) 
b) 
c) 
d) 

101. The (R) and (S) enantiomers of an optically active compound differ in :
a) their solubility in a chiral solvent b) their reactivity with a chiral reagent
c) their optical rotation of plane polarized light d) their melting points.

102. Identify the products X and Y formed in the following reaction.
$$CH_3 - CH_2 - CH = CH - CH_3 + HCl \longrightarrow X + Y$$
a) $X = CH_3CH_2CH_2CH_2CH_2Cl, Y = CH_3CH_2 - \underset{Cl}{CH} - CH_2CH_3$
b) $X = CH_3CH_2 - \underset{Cl}{CH} - CH_2CH_3, Y = CH_3CH_2\underset{Cl}{CH_2} - CH - CH_3$
c) $X = CH_3CH_2 - \underset{Cl}{CH} - CH_2CH_3, Y = CH_3 - \underset{Cl}{CH} - \underset{Cl}{CH} - CH_2CH_3$
d) $X = ClCH_2 - CH_2 - CH = CH - CH_3, Y = \underset{Cl}{CH_3}CH_2 - CH = CH - CH_2Cl$

103. **Assertion:** S_N1 reactions are generally carried out in polar protic solvents (like water, alcohol, acetic acid, etc.)
Reason : $C_6H_5CH(C_6H_5)Br$ is less reactive than $C_6H_5CH(CH_3)Br$ in S_N1 reactions.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

104. Which one is correct?
a) Freon-14 is CF_4, Freon-13 is CF_3Cl, Freon-12 is CF_2Cl_2 and Freon-II is $CFCl_3$
b) Freons are chlorofluorocarbons. c) Freons are used as refrigerants d) All the above.

105. Identify the product of the following reaction. $ClCH_2CH_2CH_2Br + KCN \rightarrow$ Product
a) $ClCH_2CH_2CH_2CN$ b) $CNCH_2CH_2Br$ c) $CNCH_2CH_2CH_2CN$
d) $CI\,C\underset{CN}{H}CH_2CH_2CH_2Br$

106. Grignard reagent is prepared by the reaction between:
a) magnesium and alkane b) magnesium and aromatic hydrocarbon
c) zinc and alkyl halide d) magnesium and alkyl halide

107. Among the choices of alkyl bromide, the least reactive bromide in S_N2 reaction is
a) l-bromopentane b) 2-bromo-2-methylbutane c) l-bromo-3-methylbutan
d) l-bromo-z-rnethylbutane.

108. Arrange the following compounds in order of their reactivity towards SN2 reaction.
(i) $CH_3(CH_2)_3CH_2Br$
(ii) $(CH_3)_2CHCH_2CH_2Br$

(iii) $CH_3CH_2-\overset{CH_3}{\underset{|}{C}}H-CH_2Br$

(iv) $CH_3-\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-CH_2Br$

a) (i) > (ii) > (iii) > (iv) b) (ii) > (iii) > (iv) > (i) c) (iii) > (i) > (ii) > (iv) d) (iv) > (ii) > (i) > (ill)

109. Which of the following compounds will give racemicmixture on nucleophilic substitution by OH^- ion?

(i)

$CH_3-\underset{C_2H_5}{\overset{}{\underset{|}{C}}}H-Br$

(ii)

$CH_3-\underset{C_2H_5}{\overset{Br}{\underset{|}{C}}}-CH_3$

(iii)

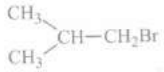
$CH_3-\underset{C_2H_5}{\overset{}{\underset{|}{C}}}H-CH_2Br$

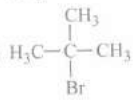
a) (I) b) (I), (II), (III) c) (II), (III) d) (I), (III)

110. In two separate experiments equal quantities of an alkyl halide, C_4H_9Cl, were treated at the same temperature with equal volume of 0.1 molar and 0.2 molar solutions of NaOH respectively. In the two experiments, $t_{1/2}$ of the two reactions were the same. The most likely structure of halide is:

a) $CH_3CH_2CH_2CH_2C$ b) $CH_3CH(Cl)CH_2CH_3$ c) $(CH_3)_2CHCH_2Cl$ d) $(CH_3)_2CCl$

111. Arrange the following compounds in increasing order of their boiling points.

(I)  (II) $CH_3CH_2CH_2CH_2Br$

(III) 

a) (II)< (1)< (III) b) (1) < (II) < (III) c) (III) < (1) < (II) d) (III) < (II)< (1)

112. **Assertion:** Replacement of -Cl group by -OH in chlorobenzene is easier if nitro group is present in the ring.

Reason: Nitro group leads to strengthening of the C-Cl bond in chlorobenzene.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

113. Bromination of methane in presence of sunlight is

a) nucleophilic substitution b) free radical substitution c) electrophilic substitution

d) nucleophilic addition

114. The reaction

$CH_2=CH-CH_3+HBr\longrightarrow CH_3-\overset{Br}{\underset{|}{C}}H-CH_3$ is an example of

a) nucleophilic addition b) free radical addition c) electrophilic addition

d) electrophilic substitution

115. Industrial preparation of chloroform employs acetone and _____ .

a) Phosgene b) Calcium hypochlorite c) Chlorine gas d) Sodium chloride

116. Classify the following compounds as primary, secondary and tertiary halides.

(i) 1-Bromobut-2-ene

(ii) 4-Bromopent-2-ene

(iii) 2- Bromo-2-methylpropane

a) (i)-secondary, (ii)-tertiary, (iii)-primary b) (i)-secondary, (ii)-primary, (iii)-tertiary

c) (i)-primary, (ii)-tertiary, (iii)-secondary d) (i)-prirnary, (ii)-secondary, (iii)-tertiary

117. Triiodomethane has antiseptic property because of

a) liberation of iodoform b) liberation of free iodine c) formation of phosgene gas

d) none of these

118. Chlorobenzene reacts with Mg in dry ether to give a compound (A) which further reacts with ethanol to yield:

a) phenol b) benzene c) ethyl benzene d) phenyl ether.

119. $CH_3 - \underset{Br}{CH} - CH_3 \xrightarrow{alc.KOH} X \xrightarrow[Peroxide]{HBr} Y \xrightarrow[Acetone]{NaI} Z$

In the given reaction what will be the final product?

a) $CH_3CH_2CH_2I$ b) CH_3CHICH_2I c) $CH_3CH_2CH_2CH_2CH_3$ d) $CH_3CH_2CHI_2$

120. Which of the following alkyl halides is hydrolysed by S_N1 mechanism?

a) CH_3Cl b) CH_3CH_2Cl c) $CH_3CH_2CH_2Cl$ d) $(CH_3)_3CCl$

121. **Assertion:** Haloalkanes react with KCN to form alkyl cyanides as main product while with AgCN form isocyanide as the main product.

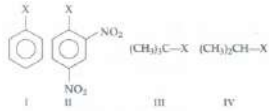
Reason : KCN and AgCN, both are ionic compounds.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false.

122. The correct order of increasing reactivity of

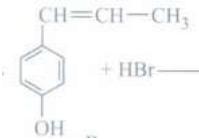


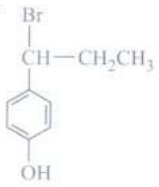
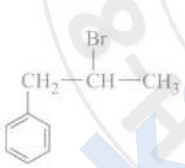
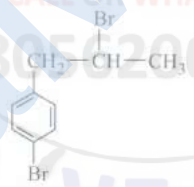
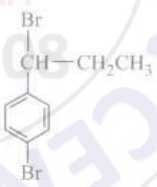
C-X bond towards nucleophile in the following compounds is :

a) I < II < IV < III b) II < III < I < IV c) IV < III < I < II d) III < II < I < IV

123. Which of the following undergoes nucleophilic substitution exclusively by $^{S}N^{1}$ mechanism?

a) Benzyl chloride b) Ethyl chloride c) Chlorobenzene d) Isopropyl chloride

124.  X in the reaction is

a)  b)  c)  d) 

125. Chloromethane on treatment with excess of ammonia yields mainly

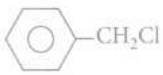
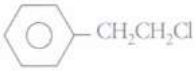
a) b) N-methylmethanamine (CH_3-NH-CH_3)

c) methanamine (CH_3NH_2) d) mixture containing all these in equal proportion.

126. A primary alkyl halide would prefer to undergo_____

a) S_N1 reaction b) S_N2 reaction c) a-elimination d) racemisation

127. Which one of the following chlorohydrocarbons readily undergoes solvolysis?

a) CH_2 = CHCl b) c)  d) 

128. Which of the following halo alkanes reacts with aqueous KOH most easily?

a) I-Bromobutane b) 2-Bromobutane c) 2-Bromo-2-methylpropane d) 2-Chlorobutane

129. Identify the products X and Y in the given reaction,

$$CH_3 - \underset{Br}{CH} - CH_3 + Mg \xrightarrow{Dry\ ether} X \xrightarrow{D_2o} Y$$

$X = CH_3 - \underset{Br}{CH} - CH_2Mg$, $X = CH_3 - \underset{MgBr}{C}H - CH_3$

a) $Y = CH_3 - CH_2CH_2CH_2OH$ b) $Y = CH_3 - \underset{D}{CH} - CH_3$

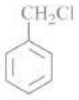
$X = CH_3 - \underset{MgBr}{C}H - CH_3$ $X = CH_3 - \underset{Br}{CH} - CH_2Mg$

c) $Y = CH_3 - \underset{OD}{CH} - CH_3$ d) $Y = CH_3 - \underset{OH}{CH} - CH_3$

130. In compound ' X ' all the bond angles are exactly $109^\circ 28$, 'X 'is _____ .
a) Chloromethane b) Carbon tetrachloride c) Iodoform d) Chloroform

131. The alkyl halide is converted into an alcohol by
a) elimination b) dehydrohalogenation c) addition d) substitution

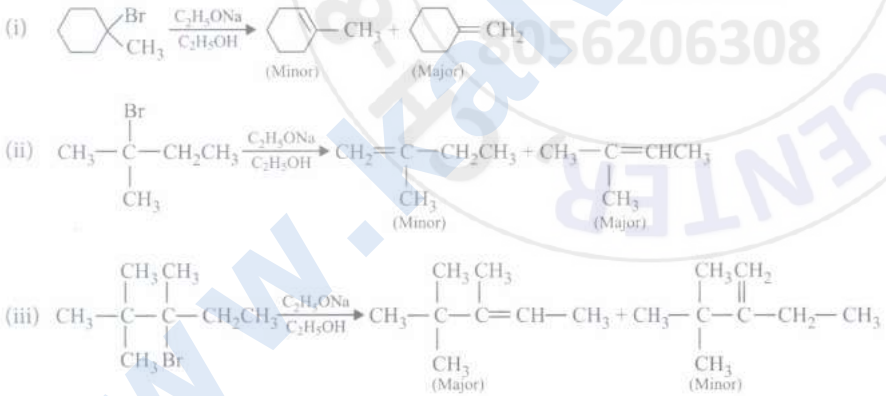
132. 2-Bromo-3, 3-dimethylbutane on reaction with aqueous KOH yields X as the major product. X is
a) 2, 3, 3-trimethylpropan-l-ol b) 2, 2-dimethylbutan-3-ol c) 2, 3-dimethylbutan-2-ol
d) 2, 2-dimethylpropan-2-ol

133. The reaction of toluene with chlorine in the presence of iron and in the absence of light yields _____
a)  b) c) d) mixture og (b) and (c)

134. Consider the reactions,
(i) $(CH_3)_2CH\text{-}CH_2Br \xrightarrow{C_2H_5OH} (CH_3)_2CH\text{-}CH_2OC_2H_5 + HBr$
(ii) $(CH_3)_2CH\text{-}CH_2Br \xrightarrow{C_2H_5O-} (CH_3)_2CH\text{-}CH_2OC_2H_5 + Br^-$
The mechanisms of reactions (i) and (ii) are respectively:
a) S_N1 and S_N2 b) S_N1 and S_N1 c) S_N2 and S_N2 d) S_N2 and S_N1

135. The ease of dehydrohalogenation of alkyl halide with alcoholic KOH is
a) 3°<2°<1° b) 3°>2°>1° c) 3°<2°>1° d) 3°>2°<1°

136. Which of the following products as shown by the dehydrohalogenation of alkyl halides with sodium ethoxide in ethanol is correctly marked as major product?

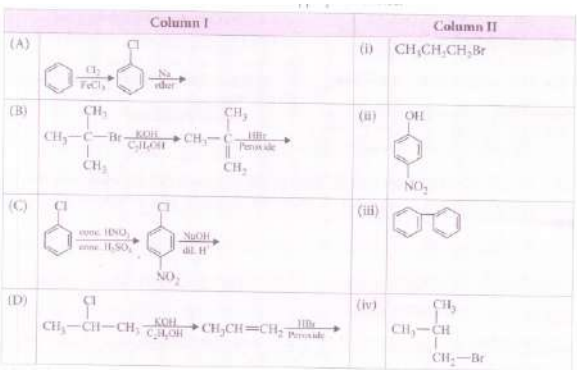


a) (i) and (ii) only b) (i) and (iii) only c) (ii) and (iii) only d) (ii) only

137. **Assertion:** On free radical monochlorination of $(CH_3)_2CHCH_2CH_3$ four monochloro structural isomers are possible.
Reason: In $(CH_3)CHCH_2CH_3$ there are four different types of hydrogen atoms
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

138. The position of - Br in the compound in $CH_3CH{=}CHC(Br)(CH_3)_2$ can be classified as_____
a) allyl b) aryl c) vinyl d) secondary

139. Match the column I with column II and mark the appropriate choice.



a) (A) → (iv), (B)→ (ii), (C) → (i), (D) → (iii)
b) (A)→ (iii), (B) → (iv), (C) → (ii), (D) → (i)
c) (A)→ (ii), (B) → (i), (C) → (iii), (D)→ (iv)
d) (A) → (i), (B) → (iii), (C) → (iv), (D)→ (ii)

140. Benzene reacts with CH_3Cl in the presence of anhydrous $AlCl_3$ to form:
a) Chlorobenzene b) Benzychloride c) Xylene d) Toluene

141. **Assertion:** Melting points of isomeric dihalobenzenes are nearly the same.
Reason : Isomeric dihalobenzenes have different molecular masses
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

142. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	Carbon tetrachloride	(i)	Paint remover
(B)	Methylene chloride	(ii)	Refrigerators and air conditioners
(C)	DDT	(iii)	Fire-extinguisher
(D)	Freons	(iv)	Non-biodegradable insecticide

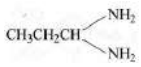
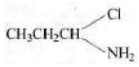
a) (A) → (ii), (B)→ iii), (C) → (i), (D)→ (iv)
b) (A)→ (iv), (B) → (iii), (C) → (ii), (D) → (i)
c) (A)→ (i), (B)→ (ii), (C) → (iii), (D) → (iv) d) (A)→ (iii), (B)→ (i), (C) → (iv), (D) → (ii)

143. Chloroform is kept in dark coloured bottles because
a) it reacts with clear glass b) it undergoes chlorination in transparent glass bottles
c) it is oxidised to poisonous gas, phosgene in sunlight
d) it starts burning when exposed to sunlight

144. Which one of the reactive S_N1 reaction?
a) $C_6H_5CH_2Br$ b) $C_6H_5CH(C_6H_5)Br$ c) $C_6H_5CH(CH_3)Br$
d) $C_6H_5C(CH_3)(C_6H_5)Br$

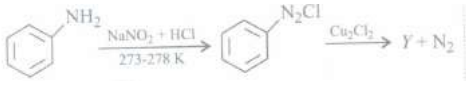
145. Which of the following is an optically active compound?
a) I-Butanol b) I-Propanol c) 2-Chlorobutane d) 4-Hydroxyheptane

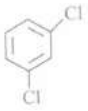
146. Alkyl halides are immiscible in water though they are polar because
a) they react with water to give alcohols b) they cannot form hydrogen bonds with water
c) C - X bond cannot be broken easily d) they are stable compounds and are not reactive

147. When $CH_3CH_2CHCl_2$ is treated with $NaNH_2$, the product formed is _____ .
a) $CH_3 - CH = CH_2$ b) $CH_3 - C \equiv CH$ c)  d) 

148. Tertiary alkyl halides are practically inert to substitution by S_N2 mechanism because
a) the carbocation formed is unstable b) there is steric hindrance
c) there is inductive effect d) the rate of reaction is faster in S_N2 mechanism.

149. Identify the compound' Y' in the following reaction.

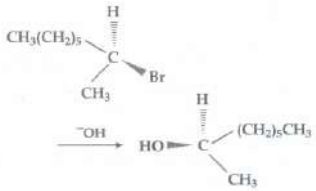


a) b) c)  d)

150. An alkyl halide, RXreacts with KCN to give propane nitrile. RX is
a) C_3H_7Br b) C_4H_9Br c) C_2H_5Br d) $C_5H_{11}Br$

151. A compound of molecular formula C_7H_{16} shows optical isomerism, compound will be :
a) 2,3-dimethylpentane b) 2,2-dimethylbutane c) 2-methylhexane d) None of these

152. The reaction is described as



a) $^{S}E^2$ b) $^{S}N^1$ c) $^{S}N^2$ d) $^{S}N^0$

153. **Assertion:** Common name of 1, I-dichloroethane is ethylidene chloride.
Reason: Ethylidene chloride is a gem-dihalide.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

154. Arrange the following compounds in decreasing order of their boiling points.
(i) CH_3Br
(ii) CH_3CH_2Br
(iii) $CH_3CH_2CH_2Br$
(iv) $CH_3CH_2CH_2CH_2Br$
a) (i) > (ii) > (iii) > (iv) b) (iv) > (Iii) > (ii) > (i) c) (i) > (iii) > (ii) > (iv) d) (iii) > (iv) > (i) > (ii)

155. Match the isomers given in column I with their names given in column II and mark the appropriate choice.

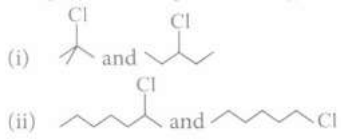
Column I	Column II	
(A)	(i)	2- Bromo- 3- methylbutane
(B)	(ii)	2- Bromopentane
(C)	(iii)	1-Bromo- 3- methylbutane
(D)	(iv)	1-Bromo- 2- methylbutane

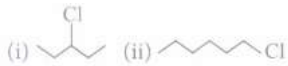
a) (A)→ (iii), (B)→ (i), (C)→ (iv), (D) → (ii)
b) (A) → (iv), (B)→ (iii), (C) → (ii), (D) → (i)
c) (A) → (i), (B)→ (ii), (C) → (iii), (D) → (iv)
d) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)

156. Consider the following SN2 reactions
I. $RX+Y^- \rightarrow R\text{-}Y+X^-$
II. $RX + Y \rightarrow R\text{-}Y^+ + X$
III. $RX^+ + Y^- \rightarrow R - Y + X$
IV. $RX^+ + Y \rightarrow R\text{-}Y^+ + X$
In which reactions there is large increase and large decrease in rate of reaction respectively with increase in polarity of the solvent.
a) II and III b) II and IV c) I and IV d) IV and I

157. Bottles containing C_6H_5I and $C_6H_5CH_2I$ lost their original labels. They were labelled A and B for testing. A and B were separately taken in test tubes and boiled with NaOH solution. The end solution in each tube was made acidic with dilute HNO_3 and some $AgNO_3$ solution added. Solution B gave a yellow precipitate. Which one of the following statements is true for the experiment?
a) Addition of HNO_3 was unnecessary b) A was C_6H_5I c) A was $C_6H_5CH_2I$
d) B was C_6H_sI

158. In the following pairs of halogen compounds, which compound undergoes faster S_N1 reaction?

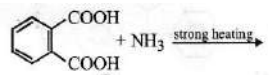


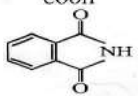
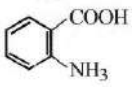
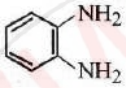
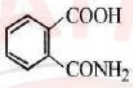
a)
b)
c) 
d)

159. Which one of the following pairs represents stereoisomerism
a) Chain isomerism and rotational isomerism
b) Structural isomerism and geometrical isomerism
c) Linkage isomerism and geometrical isomerism
d) Optical isomerism and geometrical isomerism

160. Which of the following alkyl halides undergoes hydrolysis with aqueous KOH at the fastest rate?
a) $CH_3CH_2CH_2Cl$ b) CH_3CH_2Cl c) $CH_3CH_2CH_2CH_2Cl$ d) $CH_3CH_2CH(Br)CH_3$

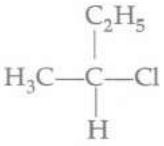
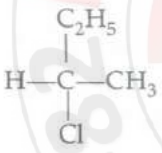
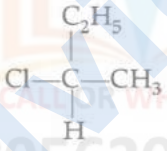
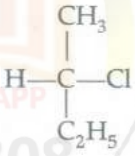
161. The major product of the following reaction is:



a) 
b) 
c) 
d) 

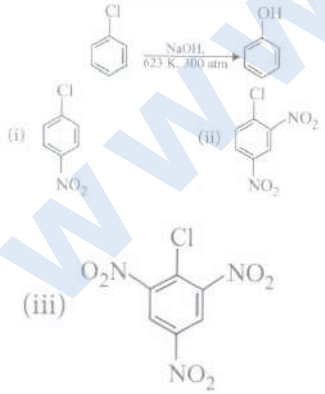
162. The fire extinguisher 'pyrene' contains
a) Carbon dioxide b) Carbon disulphide c) Carbon tetrachloride d) Chloroform

163. CH_3-CHCl-CH_2-CH_3 has a chiral centre which one of the following represents its R-configuration?

a) 
b) 
c) 
d) 

164. Which of the following is an example of vic-dihalide?
a) Dichloromethane b) 1,2-Dichloroethane c) Ethylidene chloride d) Allyl chloride

165. Chlorobenzene can be converted into phenol by heating in aqueous sodium hydroxide solution at a temperature of 623 K and a pressure of 300 atm.However the rate of reaction can be increased by presence of certain groups in benzene ring. What will be the order of reactivity of following compounds towards the above substitution reaction?



a) (iii) > (ii) > (i) b) (ii) > (iii) > (i) c) (i) > (ii) > (iii) d) (i) > (iii) > (ii)

166. When hydrochloric acid gas is treated with propene in presence of benzoyl peroxide, it gives _____ .
a) 2 -chloropropane b) Alkyl chioride c) No reaction d) N-propyl chloride

167. Which of the following reactions is not correctly matched?
a) $2C_2H_5Br + 2Na \xrightarrow{dry\ ether} C_4H_{10} + 2NaBr$: Wurtz reaction
b) $CH_3Br + AgF \rightarrow CH_3F + AgBr$: Etard reaction

c) $C_6H_5Br + 2Na + BrC_2H_5 \xrightarrow{dry\ ether} C_6H_5C_2H_5 + 2NaBr$:Wurtz-Fittig reaction

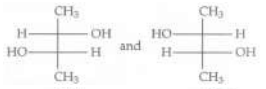
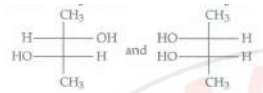
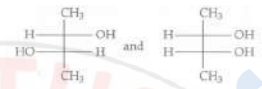
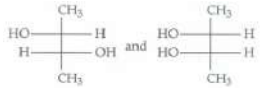
d) $2C_6H_5Br + 2Na \xrightarrow{dry\ ether} C_6H_5 - C_6H_5 + 2NaBr$: Fittig reaction

168. If there is no rotation of plane polarized light by a compound in a specific solvent, though to be chiral, it may mean that:
a) the compound is certainly meso b) there is no compound in the solvent
c) the compound may be a racemic mixture d) the compound is certainly a chiral.

169. The IUPAC name of tertiary butyl chloride is
a) 2-chloro-2-methypropane b) 3-chlorobutane c) 4-chlorobutane
d) 1,2-chloro-3-methylpropane.

170. Which of the following reactions is an example of nucleophilic substitution reaction?
a) 2RX + 2Na ⟶ R-R + 2NaX b) RX+ H_2⟶RH + HX c) RX+ Mg⟶RMgX
d) RX+ KOH⟶ROH + KX

171. Cyclic hydrocarbon 'A' has all the carbon and hydrogen atoms in a single plane. All the carbon-carbon bonds have the same length, less than 1.54 Aº , but more than 1.34 Aº. The $C - C - C$ bond angle will be _____ .
a) 109º28' b) 100º c) 180º d) 120º

172. Which of the following pairs of compounds are enantiomers ?
a)  b)  c) 
d) 

173. **Assertion:** CH_2=CH-CH_2-X is an example of allyl halides.
Reason : These are the compounds in which the halogen atom is bonded to an sl hybridised carbon atom
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

174. $C_8H_8Cl_2(A) \xrightarrow{Aq.NaOH} (B) \xrightarrow{Mild} \xrightarrow{Reduction} (C) \xrightarrow{I_2/NaOH} iodoform + acid \quad salt(D)$
In the given sequence of reaction, what would be the structure of (A)?
a) $PhCOCH_3$ b) $PhCH(OH)CH_3$ c) PhCOONa d) $PhC(Cl)_2CH_3$

175. 2-Chloro-2-methylpropane on reaction with alc. KOH gives X as the product. X is
a) but-2-ene b) 2- methylbut -l-ene c) 2- methylprop-l-ene d) 2-methylbutan-2-ol.

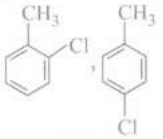
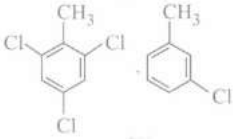
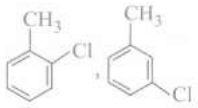
176. Which of the following is responsible for depletion of the ozone layer in the upper strata of the atmosphere?
a) Polyhalogens b) Ferrocene c) Fullerenes d) Freons

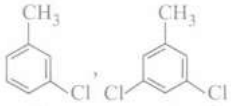
177. The IUPAC name of $(CH_3)_2CH$ - CH_z - CH_zBr is
a) l-bromopentane b) 1-bromo-3-methylbutane c) 2-methyl-4-bromobutane
d) 2-methyl-3-bromopropane.

178. **Assertion:** $CH_3 - \overset{Br}{\overset{|}{C}}H - CH_2 - CH_3$ on reaction with alcoholic KOH gives CH_3CH=$CHCH_3$ as a result of dehydrohalogenation.
Reason : Elimination reaction takes place in accordance with Markovnikov's rule
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

179. The process of separation of a racemic modification into d and l-enantiomers is called.
a) resolution b) dehydration c) revolution d) dehydrogenation

180. A compound X with molecular formula C_7H_5 is treated with Cl_2 in presence of $FeCl_3$. Which of the following compounds are formed during the reaction?

a)  b)  c) 

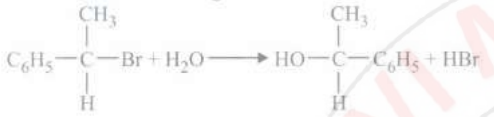
d) 

181. Ethylene dichloride and ethylidene chloride are isomeric compounds. The false statement about these isomers is that they
a) are both hydrolysed to the same product b) contain the same percentage of chlorine
c) are position isomers d) react with alcoholic potash and give the same product.

182. **Assertion:** The order of reactivity of alkyl halides towards S_N1 reaction is tertiary halide> secondary halide> primary halide.
Reason: The reaction follows carbocation mechanism
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

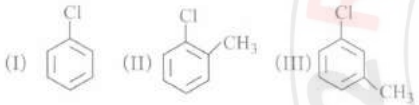
183. Which one is formed when sodium phenoxide is heated with ethyl iodide?
a) Phenetole b) Ethyl phenyl alcohol c) Phenol d) None of these

184. Consider the following reaction:



The reaction proceeds with 98% racemisation. The reaction may follow
a) S_N1 mechanism b) S_N2 mechanism c) EI mechanism d) E2 mechanism.

185. Arrange the compounds in increasing order of rate of reaction towards nucleophilic substitution

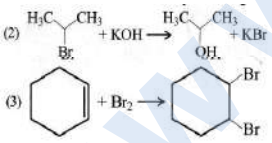


a) (I) < (II) < (III) b) (I) < (III) < (II) c) (III) < (II) < (I) d) (II) < (III) < (I)

186. In S_N2 reactions the sequence of bond breaking and bond formation is as follows
a) bond breaking and formation occur simultaneously
b) bond breaking and formation take place randomly
c) bond breaking is followed by formation d) bond formation is followed by breaking

187. For the following reactions:

$(1)\ CH_3CH_2CH_2Br + KOH \rightarrow CH_3CH = CH_2 + KBr + H_2O$



Which of the following statements is correct?
a) (1) and (2) are elimination reaction and (3) is addition reaction
b) (1) is elimination, (2) is substitution and (3) is addition reaction
c) (1) is elimination, (2) and (3) are substitution reactions
d) (1) is substitution, (2) and (3) are addition reaction

188. Two possible stereo-structures of $CH_3CHOHCOOH$, which are optically active, are called:
a) atropisomers b) enantiomers c) mesomers d) diastereomers

189. An organic compound A(C_4H_9Cl) on reaction with Na/diethyl ether gives a hydrocarbon which on monochlorination gives only one chloro derivative, then A is _____ .
a) tert-butyl chloride b) sec-butyl chloride c) iso-butyl chloride d) n-butyl chloride

190. Which of the following compounds has the highest boiling point?
a) $CH_3CH_2CH_2Cl$ b) $CH_3CH_2CH_2CH_2Cl$ c) $CH_3CH(CH_3)CH_2C$ d) $(CH_3)_3CCl$

191. Aryl halides are less reactive towards nucleophilic substitution reactions as compared to alkyl halides due to

a) formation of a less stable carbonium ion in aryl halides

b) resonance stabilisation in aryl halides c) presence of double bonds in alkyl halides

d) inductive effect in aryl halides

192. Identify (Z) in the following reaction series,

$$C_2H_5I \xrightarrow[KOH]{Alcoholic} (X) \xrightarrow{Br_2} (Y) \xrightarrow{KCN} (Z)$$

a) CH_3-CH_2-CN b) $\overset{CN}{\underset{|}{CH_2}}=\overset{CN}{\underset{|}{CH_2}}$ c) $\overset{Br}{\underset{|}{CH_2}}-\overset{CN}{\underset{|}{CH_2}}$ d) $\overset{Br}{\underset{|}{CH}}=\overset{CN}{\underset{|}{CH}}$

193. In the following reaction

C6H5CH2Br $\xrightarrow[2.H_3O^+]{1.Mg,\ Ether}$ X, the product 'X' is

a) $C_6H_5CH_2OCH_2C_2C_6H_5$ b) $C_6H_5CH_2OH$ c) $C_6H_5CH_3$ d) $C_6H_5CH_2CH_2C_6H_5$

194. Ethylidene chloride is a/an_____

a) vic-dihalide b) gem-dihalide c) allylic halide d) vinylic halide

195. Among the isomers of $C_5H_{11}Cl$, the one which is chiral is

(i) 2, 2-Dimethy-l-chloropropane

(ii) 2-Chloropentane

(iii) 2-Methyl- 2-chlorobutane

(iv) 3-Chloropentane

a) (i) and (ii) only b) (i), (ii) and (iii) only c) (i) and (iii) only d) only (ii)

196. **Assertion:** S_N2 reaction proceeds with racemisation while S_N1 reaction proceeds with complete stereochemical inversion.

Reason: S_N2 is two steps reaction while S_N is one step reaction.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

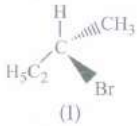
197. Choose the correct option from the following:

a) In the electrophilic substitution of toluene with Br_2, iron (III) bromide acts as a Lewis acid.

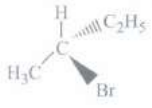
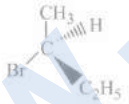
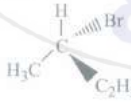
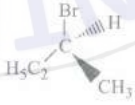
b) In the reaction of toluene with $Cl_2/FeCl_3$, ortho and para isomers are easily separated.

c) Similar reaction with iodine is reversible in nature. d) All of these.

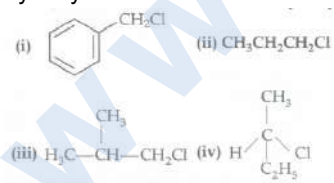
198. Which of the following structures is enantiomeric with the molecule (I) given below:



(I)

a)  b)  c)  d) 

199. Which of the following compounds will undergo racemisation when solution of KOH hydrolyses?



a) (i) and (ii) b) (ii) and (iv) c) (iii) and (iv) d) (i) and (iv)

200. Lucas reagent is _____ .

a) conc. HCl and anhy $ZnCl_2$ b) conc. HNO_3 and anhy. $ZnCl_2$

c) conc.HCl and hydrous $ZnCl_2$ d) conc. HNO_3 and hydrous $ZnCl_2$

201. Butane nitrile can be prepared by heating

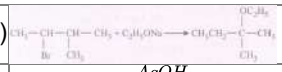
a) propyl alcohol with KCN b) butyl chloride with KCN c) butyl alcohol with KCN

d) propyl chloride with KCN.

202. When chlorine is passed through propene at 400°C, which of the following is formed?

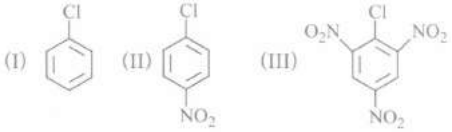
a) PVC b) Allyl chloride c) Propyl chloride d) 1, 2-Dichloroethane

203. Match the reactions given in column I with the type of reaction mentioned in column II and mark the appropriate choice.

Column I		Column II	
(A)		(i)	β-elimination
(B)	$CH_3CH_2Br \xrightarrow{AgOH} CH_3CH_2OH$	(ii)	S_N1 nucleophilic substitution
(C)	$CH_3CH = CH_2 + HBr \xrightarrow{peroxide} CH_3CH_2CH_2Br$	(iii)	S_N2 nucleophilic substitution
(D)	$CH_3 - CH_2Br$ + ale. KOH $\longrightarrow CH_2 = CH_2$	(iv)	Kharasch effect

a) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii) b) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i)
c) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (iii) d) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iv)

204. Arrange the compounds in increasing order of rate of reaction towards nucleophilic substitution

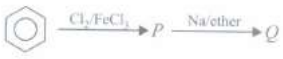


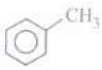
a) (III) < (II) < (I) b) (II) < (III) < (I) c) (I) < (III) < (II) d) (I) < (II) < (III)

205. An organic halogen compound which is used as refrigerant in refrigerators and air conditioners is
a) BHC b) CCl_4 c) freon d) $CHCl_3$

206. Which is the correct IUPAC name for $CH_3 - \underset{\underset{C_2H_5}{|}}{C}H - CH_2 - Br$?
a) 1-Bromo-2-ethylpropane b) 1-Bromo- 2-ethyl- 2-methylethane
c) 1-Bromo-2-methylbutane d) 2-Methyl-1-bromobutane

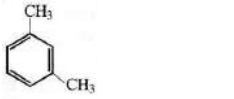
207. The end product (Q) in the following sequence of reactions is

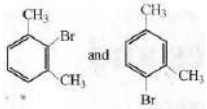
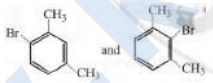
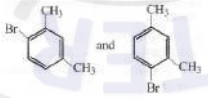


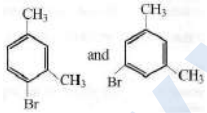
a) b)  c) d)

208. Choose the correct increasing order of density of the following compound
a) $C_3H_7Cl < C_3H_7I < CH_2Cl_2 < CCl_4$ b) $C_3H_7I < C_3H_7Cl < CH_2Cl_2 < CCl_4$
c) $C_3H_7I < C_3H_7Cl < CCl_4 < CH_2Cl_2$ d) $CCl_4 < CH_2Cl_2 < C_3H_7I < C_3H_7Cl$

209. What products are formed when the following compounds is treated with Br_2 in the presence of $FeBr_3$?



a)  b)  c) 

d) 

210. CH_3-CH_2-$\underset{\underset{Cl}{|}}{CH}$-$CH_3$ obtained by chlorination of n-butane will be:
a) meso form b) racemic mixture c) d-form d) L-form

211. Which of the following molecules has highest dipole moment?
a) CH_3Cl b) CH_2Cl_2 c) $CHCl_3$ d) CCl_4

212. Which of the following is not an allylic halide?
a) 4-Bromopent-2-ene b) 3-Bromo- 2-methylbut -1-ene c) 1-Bromebut-2-ene
d) 4- Bromobut -1-ene

213. Which of the following will exhibit chirality.
a) 2-methyl hexane b) Neopentane c) 3-methyl hexane d) Isopentane

214. How many stereoisomers does this molecule have $CH_3CH=CHCH_2CHBrCH_3$?
a) 8 b) 2 c) 4 d) 6

215. Reaction of $C_6H_5CH_2Br$ with aqueous sodium hydroxide follows _____
a) S_N1 mechanism b) S_N2 mechanism
c) Any of the above two depending upon the temperature of reaction d) Saytzeff rule

216. The order of reactivities of methyl halides in the formation of Grignard reagent is
a) $CH_3I > CH_3Br > CH_3Cl$ b) $CH_3Cl > CH_3Br > CH_3I$ c) $CH_3Br > CH_3Cl > CH_3I$
d) $CH_3Br > CH_3I > CH_3Cl$

217. Which of the following haloalkanes is most reactive?
a) l-Chloropropane b) l-Bromopropane c) 2-Chloropropane d) 2-Bromopropane

218. Which reagent will you use for the following reaction?
$CH_3CH_2CH_2CH_3 \longrightarrow CH_3CH_2CH_2CH_2Cl + CH_3CH_2CHClCH_3$
a) Cl_2/UV light b) $NaCl + H_2SO_4$ c) Cl_2 gas in dark
d) Cl_2 gas in the presence of iron in dark.

219. Cyclobutyl bromide on treatment with magnesium in dry ether forms an organometallic compound (A). The organometallic compound reacts with ethanal to give an alcohol (B) after mild acidification. Prolonged treatment of alcohol (B) with an equivalent amount of HBr gives (C). What will be the product 'C?
a) l-Chloro-1-ethylcyclopentane b) 1-Bromo-1-methylcyclopentane
c) 3-Bromo- 2-methylcyclopentane d) None of these.

220. Primary alkyl halide C_4H_9Br (X) reacts with ale. KOH to give compound (Y). (Y) reacts with HBr to give compound (Z) which is an isomer of (X). When (X) reacts with a metal it gives compounds (P). (X), (Y), (Z) and (P) are
a)

X	Y	Z	P
$CH_3-\underset{CH_3}{CH}-CH_2Br$	$CH_3-\underset{CH_3}{C}=CH_2$	$CH_3-\underset{CH_3}{\overset{Br}{C}}-CH_3$	C_8H_{18}

b)

X	Y	Z	P
$CH_3CH_2CH_2CH_2Br$	$CH_3CH=CHCH_3$	$CH_3-\underset{Br}{CH}-CH_2CH_3$	C_5H_{10}

c)

X	Y	Z	P
$CH_3-\underset{Br}{CH}-CH_2CH_3$	$CH_3CH=CHCH_3$	$CH_3CH_2CH_2CH_2Br$	C_7H_{14}

d)

X	Y	Z	P
$CH_3-\underset{CH_3}{CH}-CH_2Br$	$CH_3CH=CHCH_3$	$CH_3-\underset{Br}{CH}-CH_2CH_3$	C_6H_{12}

221. Which of the following compounds will have highest melting point?
a) Chlorobenzene b) a-Dichlorobenzene c) m- Dichlorobenzene d) p- Dichlorobenzene

222. Chlorobenzene on treatment with sodium in dry ether gives diphenyl. The name of the reaction is
a) Fittig reaction b) Wurtz- Fittig reaction c) Sandmeyer reaction
d) Gattermann reaction

223. Which is the correct increasing order of boiling points of the following compounds?
1-Bromoethane, 1-Brornopropane, 1-Brornobutane, Bromobenzene
a) Bromobenzene < 1-Bromobutane < 1-Bromopropane < 1-Bromoethane
b) Bromobenzene < 1-Bromoethane < 1-Bromopropane < 1-Bromobutane
c) 1-Bromopropane < 1-Bromobutane < 1-Bromoethane < Bromobenzene
d) 1-Brornoethane < 1-Bromopropane < 1-Bromobutane < Bromobenzene

RAVI MATHS TUITION CENTRE , WHATSAPP - 8056206308

Time : 1 Mins **COORDINATION COMPOUNDS 1** **Marks : 903**

1. $[CoF_6]^{3-}$ is
   a) paramagnetic and undergoes sp^3d^2 hybridisation
   b) diamagnetic and undergoes d^2sp^3 hybridisation
   c) paramagnetic and undergoes sp^3d hybridisation
   d) diamagnetic and undergoes sp^3 hybridisation.
2. Cobalt (III) chloride forms several octahedral complexes with ammonia. Which of the following will not give test for chloride ions with silver nitrate at 25°C
   a) $CoCl_3 \cdot 3NH_3$ b) $CoCl_3 \cdot 4NH_3$ c) $CoCl_3.5NH_3$ d) $CoCl_3.6NH_3$
3. The sum of coordination number and oxidation number of the metal M in the complex $[M(en)_2(C_2O_4)]Cl$ (where en is ethylenediamine) is:
   a) 9 b) 6 c) 7 d) 8
4. Hexaamminenickel(II) hexanitrocobaltate(III) can be written as
   a) $[Ni(NH_3)_6]_2[Co(NO_2)_6]_3$ b) $[Ni(NH_3)_6]_3[Co(NO_2)6]_2$ c) $[Ni(NH_3)_6]\ [CO(NO_2)_6]$
   d) $[Ni(NH_3MNO_2)_6]Co$
5. Which of the following does not have a metalcarbon bond?
   a) $Al(OC_2H_5)_3$ b) C_2H_5MgBr c) $K[Pt(C_2H_4)Cl_3]$ d) $Ni(CO)_4$
6. Which one of the following complexes is not expected to exhibit isomerism?
   a) $\left[Ni\left(NH_3\right)_4\left(H_2O\right)_2\right]^{2+}$ b) $\left[Pt\left(NH_3\right)_2Cl_2\right]$ c) $\left[Ni\left(NH_3\right)_2\left(Cl_2\right]\right.$ d) $\left[Ni(\ en\ )_3\right]^{2+}$
7. The increasing order of crystal field splitting strength of the given ligands is:
   a) $NH_3 < Cl^- < CN^- < F^- < CO < H_2O$ b) $F^- < Cl^- < NH_3 < CN^- < H_2O < CO$
   c) $Cl^- < F^- < H_2O < NH_3 < CN^- < CO$ d) CO < CN- < $NH_3 < H_2O < F < Cl^-$
8. According to IUPAC nomenclature sodium nitroprusside is named as :
   a) sodium pentacyanonitrosyl ferrate (II) b) sodium pentacyanonitrosyl ferrate (III)
   c) sodium nitroferricyanide d) sodium nitroferrocyanide
9. Which one of the following is an outer orbital complex and exhibits paramagnetic behaviour?
   a) $[Ni(NH_3)_6]^{2+}$ b) $[Zn(NH_3)_6]^{2+}$ c) $[Cr(NH_3)_6]^{3+}$ d) $[Cu(NH_3)_6]^{3+}$
10. Which of the following complexes exists as pair of enantiomers?
    a) $[Co(NH_3)_4Cl_2]^+$ b) $[Cr(en)_3]^{3+}$ c) $[Co(P(C_2H_5)_3)_2ClBr]$ d) trans-$[Co(en)_2Cl_2]^+$
11. A coordination complex compound of cobalt has the molecular formula containing five ammonia molecules, one nitro group and two chlorine atoms for one cobalt atom. One mole of this compound produces three mole ions in an aqueous solution. On reacting this solution with

excess of $AgNO_3$ solution, we get two moles of AgCl precipitate. The ionic formula for this complex would be :

a) $[Co(NH_3)_5(NO_2)]Cl_2$ b) $[Co(NH_3)_5Cl][Cl(NO_2)]$ c) $[Co(NH_3)_4(NO_2)Cl]$ $[(NH_3)Cl]$

d) $[Co(NH_3)_5][(NO_2)_2Cl_2]$

12. $[Co(NH_3)_4(NO_2)_2]Cl$ exhibits:

a) linkage isomerism, geometrical isomerism and optical isomerism

b) linkage isomerism, ionization isomerism and optical isomerism

c) linkage isomerism, ionization isomerism and geometrical isomerism

d) ionization isomerism, geometrical isomerism and optical isomerism

13. Which of the following complexes exhibits the I highest paramagnetic behaviour? where, gly = glycine, en = ethylene diamine and bpy = bipyridyl moities) (Atomic number of Ti = 22, V = 23, Fe = 26, Co = 27)

a) $[V(gly)_2(OH)_2(NH_3)_2]^+$ b) $[Fe(en)(py)(NH_3)_2]^{2+}$ c) $[Co(ox)_2(OH)_2]^-$ d) $[Ti(NH_3)_6]^{3+}$

14. The hybridisation involved in $[CO(C_2O_4)]^{3-}$ is

a) $sp^3 d^2$ b) $sp^3 d^3$ c) dSp^3 d) $d^2 sp^3$

15. Which one of the following complexes will have four isomers?

a) $[Co(en)_3]Cl_3$ b) $[Co(en)_2Cl_2]Cl$ c) $[Co(PPh_3)_2(NH_3)Cl_2]Cl$ d) $[Co(PPh_3)_3Cl]Cl_2$

16. Urea reacts with water to form A which will decompose to form B. B when passed through Cu^{2+}(aq), deep blue colour solution C is formed. What is the formula of C from the following?

a) $CuCO_3 \cdot Cu(OH)_2$ b) $CuSO_4$ c) $\left[Cu\left(NH_3\right)_4\right]^{2+}$ d) $Cu(OH)_2$

17. The total number of possible isomers of the complex compound $[Cu^{II}(NH_3)_4]$ $[Pt^{II}Cl_4]$ are:

a) 5 b) 6 c) 3 d) 4

18. Due to the presence of ambidentate ligands coordination compounds show isomerism. Palladium complexes of the type $[Pd(C_6H_5)_2(SCN)_2]$ and $[Pd(C_6H_5)_2(NCS)_2]$ are

a) linkage isomers b) coordination isomers c) ionisation isomers

d) geometrical isomers.

19. The coordination number and oxidation state of Cr in $K_3[Cr(C_2O_4)_3]$ are respectively.

a) 3 and +3 b) 3 and 0 c) 6 and +3 d) 4 and +2

20. Which of the following is not a neutral ligand?

a) H_2O b) NH_3 c) ONO d) CO

21. Using valence bond theory, the complex $[Cr(H_2O)_6]^{3+}$ can be described as

a) sp^3d^2, outer orbital complex, paramagnetic b) dsp^2, inner orbital complex, diamagnetic

c) d^2sp^3, inner orbital complex, paramagnetic d) d^2sp^3, outer orbital complex, diamagnetic

22. In which of the following is an inner optical complex as well as diagmagnetic in behaviour? (Atomic number: $Zn = 30, Cr = 24, Co = 27, Ni = 28$)

a) $\left[Zn\left(NH_3\right)_6\right]^{2+}$ b) $\left[Cr\left(NH_3\right)_6\right]^{3+}$ c) $\left[Co\left(NH_3\right)_6\right]^{3+}$ d) $\left[Ni\left(NH_3\right)_6\right]^{2+}$

23. Atomic number of Cr and Fe are respectively 24 and 26, which of the following is paramagnetic with the spin of electron?

a) $[Cr(CO)_6]$ b) $[Fe(CO)_5]$ c) $[Fe(CN)_6]^{4-}$ d) $[Cr(NH_3)_6]^{3+}$

24. Which of the following does not depict the correct name of the compound?
    a) $K_2[Zn(OH)_4]$: Potassium tetrahydroxozincate(II)
    b) $[Co(NH_3)sCO_3]Cl$: Pentaammine carbonatochlorocobaltate(III)
    c) $Na_3[Co(NO_2)_6]$: Sodium hexanitrocobaltate(III)
    d) $K_3[Cr(CN)_6]$: Potassium hexacyanochromate(III)

25. The correct IUPAC name of $[Pt(NH_3)_2Cl_2]$ is
    a) diamminedichloridoplatinum (II) b) diamminedichloridoplatinum (IV)
    c) diamminedichloridoplatinum (O) d) dichloridodiarnmineplatinum (IV)

26. The CFSE for octahedral $[CoCl_6]^{4-}$ is 18,000 cm^{-l} The CFSE for tetrahedral $[CoCl_4]^{2-}$ will be
    a) 18,000 cm^{-1} b) 16,000 cm^{-1} c) 8,000 cm^{-1} d) 20,000 cm^{-1}

27. In a particular isomer of $\left[Co\left(NH_3\right)_4Cl_2\right]$, the $Cl-Co-Cl$ angle is 90°, the ismoer is known as _____ .
    a) Optical isomer b) Cis-isomer c) Position isomer d) Linkage isomer

28. The overall complex dissociation equilibrium constant for the complex $[Cu(NH_3)_4]^{2+}$ ion will be ($\beta_4$for this complex is 2.1×10^{13})
    a) 4.7×10^{-14} b) 2.1×10^{13} c) 11.9×10^{-2} d) 2.1×10^{-13}

29. IUPAC name of $[Pt(NH_3)_3(Br)(NO_2)Cl]Cl$ is:
    a) triamminebromochloronitroplatinum (IV) chloride
    b) triamminebromonitrochloroplatinum (IV) chloride
    c) triamminechlorobromonitroplatinum (IV) chloride
    d) triamminenitrochlorobromoplatinum (IV) chloride

30. Among the following which is not the π-bonded organometallic compound?
    a) $K\left[PtCl_3\left(n^2-C_2H_4\right)\right]$ b) $Fe\left(n^5-C_5H_5\right)_2$ c) $Cr\left(n^6-C_6H_6\right)_2$ d) $\left(CH_3\right)_4Sn$

31. Match the complex ions given in column I with their colour given in column II and mark the appropriate choice.

	Column - I (Complex ion)		**Column - II (colour)**
(A)	$[CoF_6]^{3-}$	(i)	Blue-green
(B)	$[Co(NH_3)_6]^{3+}$	(ii)	Pale yellow
(C)	$[Co(H_2O)_6]^{3+}$	(iii)	Green
(D)	$[Co(CN)6]^{3-}$	(iv)	Yellow-orange

    a) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)
    b) (A) → (iii), (B) → (iv), (C) → (ii), (D) → (i)
    c) (A) → (i), (B) → (iii), (C) → (iv), (D) → (ii)
    d) (A) → (iv), (B) → (i), (C) → (iii), (D) → (ii)

32. Arrange the following complexes in increasing order of conductivity of their solutions.
    (i) $[Co(NH_3)_3Cl_3]$
    (ii) $[Co(NH_3)_4Cl_2]Cl$

(iii) $[Co(NH_3)_6]Cl_3$

(iv) $[Co(NH_3)_5Cl]Cl_2$

a) (i) < (ii) < (iv) < (iii) b) (ii) < (i) < (iii) < (iv) c) (i) < (iii) < (ii) < (iv) d) (iv) < (i) < (ii) < (iii)

33. The correct structure of $Fe(CO)_5$ is (Z = 26 for Fe)

a) octahedral b) tetrahedral c) square pyramidal d) trigonal bipyramidal

34. The type of isomerism shown by the complex $[CoCl_2(en)_2]$ is

a) Ionization isomerism b) Coordination isomerism c) Geometrical isomerism

d) Linkage isomerism

35. The magnitude of magnetic moment (spin only) of $[NiCl_4]^{2-}$ will be

a) 2.82 B.M. b) 3.25 B.M. c) 1.23 B.M. d) 5.64 B.M.

36. A substance appears coloured because

a)

it absorbs light at specific wavelength in the visible part and reflects rest of the wavelengths

b) ligands absorb different wavelengths of light which give colour to the complex

c) it absorbs white light and shows different colours at different wavelength

d) it is diamagnetic in nature.

37. Among the following complexes (K-P): $K_3[Fe(CN)_6]$ -K; $[Co(NH_3)_6]Cl_3$-L; $Na_3[Co(oxalateh]$-M; $[Ni(H_2O)_6]Cl_2$ -N; $K_2[Pt(CN)_4]$-O and $[Zn(H_2O)_6](NO_3)_2$- P; the diamagnetic complexes are:

a) K,L,M,N b) K,M,O,P c) L,M,O,P d) L,M,N,O

38. $\left[Cr\left(H_2O\right)_6\right]Cl_3$ (At. no. of Cr=24 has a magnetic moment of 3.83 B.M. The correct distribution of 3d electrons in the chromium of the complex is _____ .

a) $3d^1_{xy}, 3d^1_{yz}, 3d^1_{z^2}$ b) $3d^1_{\left(x^2-y^2\right)}, 3d^1_{z^2}, 3d^1_{xz}$ c) $3d^1_{xy}, 3d^1_{\left(x^2-y^2\right)}, 3d^1_{yz}$ d) $3d^1_{xy}, 3d^1_{yz}, 3d^1_{xz}$

39. The complex, $[Pt(Py)(NH_3)BrCl]$ will have how many geometrical isomers?

a) 4 b) 0 c) 2 d) 3

40. Which of the following compounds exhibits linkage isomerism?

a) $[CO(en)_3]Cl_3$ b) $[CO(NH_3)_6]\ [Cr(en)_3]$ c) $[CO(en)_2(NO_2)Cl]Br$ d) $[CO(NH_3)_5Cl]Br_2$

41. Which of the following is correct?

a) Valence bond theory explains the colour of the coordination compounds.

b) $[NiCl_4]^{2-}$ is diamagnetic in nature. c) Ambident ligands can show linkage isomerism.

d) A bidentate ligand can have four coordination sites.

42. $CuSo_4.5H_2O$ is blue in colour while $CuSO_4$ is colourless due to

a) presence of strong field ligand in $CuSo_4.5H_2O$

b) absence of water (ligand), d - d transitions are not possible in $CuSO_4$

c) anhydrous $CuSO_4$ undergoes d - d transitions due to crystal field splitting

d) colour is lost due to loss of unpaired electrons.

43. Which of the following pairs of isomers is not correctly matched with its type of isomerism?

a) $[Cr(NH_3)_6]\ [Cr(CN)_6]$ and $[Cr(NH_3)_4(CN)_2]\ [Cr(NH_3)_2(CN)_4]$ - Coordination isomerism

b) $[Co(NH_3)_5NO_2]Cl_2$ and $[Co(NH_3)_5ONO]Cl_2$ - Linkage isomerism

c) $[Co(py)_2(H_2O)_2Cl_2]Cl$ and $[Co(py)_2(H_2O)Cl_3]H_2O$ - Coordination isomerism

d) $[Pt(NH_3)_4Br_2]Cl_2$ and $[Pt(NH_3)_4Cl_2]Br_2$ - Ionisation isomerism

44. The complex $[Co(NH_3)_6][Cr(CN)_6]$ and $[Cr(NH_3)_6]$ $[Co(CN)_6]$ are the examples of which type of isomerism?
a) ionization isomerism b) coordination isomerism c) geometrical isomerism
d) linkage isomerism

45. Low spin tetrahedral complexes are not formed because
a) for tetrahedral complexes, the CFSE is lower than pairing energy
b) for tetrahedral complexes, the CFSE is higher than pairing energy
c) electrons do not go to e_g in case of tetrahedral complexes
d) tetrahedral complexes are formed by weak field ligands only.

46. Mark the incorrect statement regarding the stability of the complexes.
a) Higher the charge density on the central ion, greater is the stability of the complex.
b) Higher the oxidation state of metal, higher is the stability of the complex.
c) Higher the basicity of the ligand, higher is the stability of the complex.
d) More the chelation tendency of ligand, lower is the stability of the complex.

47. Which one of the following statements is not correct?
a) Mercury (II) iodide dissolves in excess of potassium iodide solution
b) Tin (IV) chloride is made by dissolving tin solution in concentrated hydrochloric acid
c) Zinc dissolves in sodium hydroxide solution
d) Carbon monoxide reduces iron (III) oxide to iron

48. Cr-C bond in the compound $[Cr(CO)_6]$ shows π-character due to
a) coordinate bonding b) synergic bonding c) ionic bonding. d) covalent bonding

49. Crystal field splitting energy for high spin d^4 octahedral complex is _____ .
a) $-1.2\Delta_0$ b) $-0.6\Delta_0$ c) $-0.8\Delta_0$ d) $-1.6\Delta_0$

50. Which one of the following is expected to exhibit optical isomerism? (en = ethylenediamine)
a) Cis-$[Pt(NH_3)_2Cl_2]$ b) Trans-$[Co(en)_2Cl_2]^+$ c) Trans-$[Pt(NH_3)Cl_2]$ d) Cis-$[Co(en)_2Cl_2]^+$

51. How many geometrical isomers are there for $[Co(NH_3)_2Cl_4]^-$ (octahedral) and $[AuCl_2Br_2]$ (square planar)?
a) Two cis and trans, no geometrical isomers. b) Two cis and trans, two cis and trans.
c) No geometrical isomers, two cis and trans.
d) No geometrical isomers, no geometrical isomers.

52. Which of the following will not show geometrical isomerism?
a) $[Cr(NH_3)_4Cl_2]Cl$ b) $[Co(en)_2Cl_2]Cl$ c) $[Co(NH_3)5NO_2]Cl_2$ d) $[Pt(NH_3)_2Cl_2]$

53. Which one of the following is an inner orbital complex as well as diamagnetic in behaviour? (Atomic number of Zn = 30, Cr = 24, Co = 27, Ni = 28)
a) $[Zn(NH_3)_6]^{2+}$ b) $[Cr(NH_3)_6]^{3+}$ c) $[Co(NH_3)_6]^{3+}$ d) $[Ni(NH_3)_6]^{2+}$

54. In metal carbonyl having general formula $M(CO)^X$ where, M = metal, x = 4 and the metal is bonded to:
a) carbon and oxygen b) CO c) oxygen d) carbon

55. The colour of the Coordination compounds depends on the crystal field splitting. What will be the correct order of absorption of wavelength of light in the visible region, for the complexes, $[Co(NH_3)_6]^{3+}$, $[Co(CN)_6]^{3-}$, $[Co(H_2O)_6]^{3+}$?
a) $[Co(CN)_6]^{3-} > [Co(NH_3)_6]^{3+} > [Co(H_2O)_6]^{3-}$ b) $[Co(NH_3)_6]^{3+} > [Co(H_2O)_6]^{3+} > [Co(CN)_6]^{3-}$
c) $[Co(H_2O)_6]^{3+} > [Co(NH_3)_6]^{3+} > [CO(CN)_6]^{3+}$
d) $[Co(NH_3)6]^{3+} > [Co(CN)_6]^{3-} > [Co(H_2O)_6]^{3+}$

56. For the square planar complex [Mabcd] where Mis the central atom and a, b, c, dare monodentante ligands, the number of possible geometrical isomers are
a) one b) two c) three d) four

57. **Assertion:** $[Co(NH_3)_5Br]SO_4$ gives white precipitate with barium chloride.
Reason: The complex $[Co(NH_3)Br]SO_4$ dissociates in the solution to give Br^- and SO_4^{2-}
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertiona nd reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

58. Which of these statements about $[CO(CN)_6]^{3-}$is true?
a) $[Co(C)_6]^{3-}$has no unpaired electrons and will be in a low spin configuration.
b) $[CO(CN)_6]^{3-}$has four unpaired electrons and will be in a low spin configuration.
c) $[CO(CN)_6]^{3-}$has four unpaired electrons and will be in a high spin configuration
d) $[CO(CN)_6]^{3-}$has no unpaired electrons and will be in a high-spin configuration.

59. Identify the statement which is not correct.
a) Coordination compounds are mainly known for transition metals.
b) Coordination number and oxidation state of a metal are same
c) A ligand donates at least one electron pair to the metal atom to form a bond.
d) $[Co(NH_3)4Cl_2]^+$ is a heteroleptic complex.

60. The number of unpaired electrons in the complex ion $[CoF_6]^{3-}$ is (Atomic number of Co = 27)
a) 3 b) 2 c) 4 d) 0

61. Which of the following complexes is used to be as an anticancer agent?
a) Mer-$[Co(NH_3)_3Cl_3]$ b) Cis-$[PtCl_2(NH_3)_2]$ c) Cis-$K_2[PtCl_2Br_2]$ d) Na_2CoCl_4

62. When one mole of each of the following complexes is treated with excess of $AgNO_3$, which will give maximum amount of AgCI?
a) $[Co(NH_3)_6]Cl_3$ b) $[Co(NH_3)_5Cl]Cl_2$ c) $[Co(NH_3)_4Cl_2]Cl$ d) $[Co(NH_3)_3Cl_3]$

63. Which one of the following has largest number of isomers?
(R = alkyl group, en = ethylenediamine)
a) $[Ru(NH_3)_4Cl_2]^+$ b) $[Co(NH_3)_5Cl]^{2+}$ c) $[Ir(PR_3)_2H(CO)]^{2+}$ d) $[Co(en)_2Cl_2]^+$

64. **Assertion:** β for the $[Cu(NH_3)_4]^{2+}$ ion is 2.1×10^{13}, hence its instability constant is 4.76×10^{-14}.
Reason: Instability constant or dissociation constant is reciprocal of the formation constant.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If assertion is true but reason is false.

65. The d-electron configuration of Cr^{2+}, Mn^{2+}, Fe^{2+} and Ni^{2+} are $3d^4$, $3d^5$, $3d^6$ and $3d^8$ respectively. Which one of the following aqua complexes will exhibit the minimum paramagnetic behaviour?
(At. No. Cr = 24, Mn = 25, Fe = 26, Ni = 28)

a) $\left[Fe(H_2O)_6\right]^{2+}$ b) $\left[Ni(H_2O)_6\right]^{2+}$ c) $\left[Cr(H_2O)_6\right]^{2+}$ d) $\left[Mn(H_2O)_6\right]^{2+}$

66. The correct IUPAC name the $\left[CrF_2(en)_2\right]Cl$ is _____ .

a) Chloro diflurido ethylene diaminechromium (III) chloride
b) Difluoridobis (ethylene diamine) chromium (III) chloride
c) Difluorobis-(ethylene diamine) chromium (III) chloride
d) Chloro difluoridobis (ethylene diamine) chromium(III)

67. The magnitude of CFSE (Crystal Field Splitting Energy, $\triangle_o$) can be related to the configuration of d-orbitals in a coordination entity as

a) $\triangle_0$ < P, the configuration is $t_{2g}^3 e_g^1$ weak field ligand and high spin complex
b) $\triangle_0$ > P, the configuration is $t_{2g}^3 e_g^1$ weak field ligand and high spin complex
c) $\triangle_0$ > P the configuration is $t_{2g}^4 e_g^0$ weak field ligand and high spin complex
d) $\triangle_0$ = P, the configuration is $t_{2g}^4 e_g^0$ weak field ligand and high spin complex

68. The name of the compound $[Co(NH_3)_5NO_2]Cl_2$ will be
a) penta ammino nitro cobalt(II) chloride b) penta ammine nitro chloridecobaltate(III)
c) penta ammine nitro cobalt(III) chloride d) penta nitroso ammine chlorocobaltate(III).

69. CN^- is strong field ligand. This is due to the fact that:
a) it carries negative charge b) it is a pseudohalide
c) it can accept electrons from metal species
d) it forms high spin complexes with metal species

70. Which of the following complex compounds will exhibit highest paramagnetic behaviour?
(At. No. Ti = 22, Cr = 24, Co = 27, Zn = 30)

a) $\left[Ti(NH_3)_6\right]^{3+}$ b) $\left[Cr(NH_3)_6\right]^{3+}$ c) $\left[Co(NH_3)_6\right]^{3+}$ d) $\left[Zn(NH_3)_6\right]^{2+}$)

71. Which of the following has longest C-O bond length? (Free C-O bond length in CO is 1.128Å)
a) $[Fe(CN)_4]^{2-}$ b) $[Mn(CO)_6]^+$ c) $Ni(CO)_4$ d) $[Co(CO)_4]^-$

72. The number of ions given by $[Pt(NH_3)_6]Cl_4$ in aqueous solution will be
a) two b) three c) five d) eleven.

73. When excess of ammonia is added to copper sulphate solution, the deep blue coloured complex is formed. The complex is
a) tetrahedral and paramagnetic b) tetrahedral and diamagnetic
c) square planar and diamagnetic d) square planar and paramagnetic

74. The spin only magnetic moment value of $Cr(CO)_6$ is:
a) 2.84 B.M. b) 4.90 B.M. c) 5.92 B.M. d) 0 B.M.

75. The existence of two different coloured complexes with the composition of $[Co(NH_3)_4Cl_2]^+$ is due to :

a) linkage isomerism b) geometrical isomerism c) coordination isomerism
d) ionisation isomerism

76. Coordination number of Ni in $[Ni(C_2O_4]^{4-}$ is:
a) 3 b) 6 c) 4 d) 2

77. Fill in the blanks:
According to Werner's coordination theory, there are _____ kinds of valency, _____ and _____.The primary valency of a central metal ion is satisfied with _____.
a) three, negative, positive, cations b) different, negative, positive, anions
c) two, primary, secondary, anions d) two, saturated, unsaturated, cations

78. Which of the following descriptions about $[FeCl_6]^{4-}$ is correct about the complex ion?
a) sp^3d, inner orbital complex, diamagnetic b) sp^3d^2, outer orbital complex, paramagnetic
c) d^2sl, inner orbital complex, paramagnetic d) d^2sp^3, outer orbital complex, diamagnetic.

79. Which of the following isomers will give white precipitate with $BaCl_2$ solution?
a) $[Co(NH_3)_5SO_4]Br$ b) $[Co(NH_3)_5Br]SO_4$ c) $[Co(NH_3)_4(SO_4)_2]Br$ d) $[Co(NH_3)_4Br(SO_4)]$

80. $[Co(NH_3)Cl(en)_2]^{2+}$shows two geometrical isomers cis and trans. Which of the following statements is correct?
a) trans-isomer will show optical isomerism. b) cis-isomer will show optical isomerism
c) Both trans and cis-isomers will show optical isomerism.
d) Neither cis nor trans-isomer will show optical isomerism.

81. In which of the following coordination entities, the magnitude of Δ_0 (CFSE in octahedral field) will be maximum? (Atomic number of Co = 27)
a) $[CO(H_2O)_6]^{3+}$ b) $[CO(NH_3)_6]^{3+}$ c) $[CO(CN_6)]^{3-}$ d) $[CO(C_2O_4)_3]^{3-}$

82. Match the examples given in column I with the shapes of the compounds given in column II and mark the appropriate choice.

Column - I		**Column - II**	
(A)	$[Ag(NH_3)_2]^+$	(i)	d^2sp^3, octahedral
(B)	$[Ni(CN)_4]^{2-}$	(ii)	dsp^2, square planar
(C)	$[Ni(CO)_4]$	(iii)	sp, linear
(D)	$[Fe(CN)_6]^{3-}$	(iv)	Sp^3, tetrahedral

a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)
b) (A) → (iii), (B) → (ii), (C) → (iv), (D) → (i)
c) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)
d) (A) → (ii), (B) → (i), (C) → (iii), (D) → (iv)

83. Which of the following has largest paramagnetism?
a) $[Cr(H_2O)_6]^{3+}$ b) $[Fe(H_2O)_6]^{2+}$ c) $[CU(H_2O)_6)^{2+}$ d) $[Zn(H_2O)_2]^{2+}$

84. The correct IUPAC name of the following compound is $[Cr(NH_3)_5(NCS)[ZnCl_4]$
a) pentaammineisothiocyanatochromium(III) tetrachlorozincate(II)
b) pentammineisothiocyanatezinc chloridechromate(III)
c) pentaammineisothiocyanatochromate(II)
d) isothiocyanatopentaamminechromium(II) zinc chloride(IV).

85. Which of the following complexes formed by Cu^{2+} ions is most stable?

a) $Cu^{2+} + 4NH_3 \leftrightharpoons [Cu(NH_3)_4]^{2+}$ log K = 11.6 b) $Cu^{2+} + 4CN^- \leftrightharpoons [Cu(CN)_4]^{2-}$ log K = 27.3

c) $Cu^{2+} + 2en \rightleftharpoons [Cu(en)_2]^{2+}$ log K = 15.4 d) $Cu^{2+} + 4H_2O \leftrightharpoons [Cu(H_2O)_4]^{2+}$ log K = 8.9

86. A solution contains 2.675 g of $CoCl_3 \cdot 6NH_3$ (molar mass = 267.5 g mol^{-1}) is passed through a cation exchanger. The chloride ions obtained in solution were treated with excess of $AgNO_3$ to give 4.78 g of AgCl (molar mass = 143.5 g mol^{-1}). The formula of the complex is (At. mass of Ag = 108 u)

a) $[CoCl(NH_3)_5]Cl_2$ b) $[Co(NH_3)_6]Cl_3$ c) $[CoCl_2(NH_3)_4]Cl$ d) $[CoCl_3(NH_3)_3]$

87. $[Pt(NH_3)_4][CuCl_4]$ and $[Cu(NH_3)_4][PtCl_4]$ are known as

a) ionisation isomers b) coordination isomers c) linkage isomers

d) polymerisation isomers.

88. Which state is incorrect?

a) $Ni(CO)_4^-$ tetrahedral, paramagnetic b) $[Ni(CN)_4]_-^{2-}$ square planar, diamagnetic

c) $Ni(CO)_4^-$tetrahedral, diamagnetic d) $[Ni(CII)_4]^{2-}$ tetrahedral, paramagnetic

89. The number of geometrical isomers of the complex $[Co(NO_2)_3(NH_3)_3]$ is :

a) 4 b) 0 c) 2 d) 3

90. Iron carbonyl, $Fe(CO)_5$ is :

a) Trinuclear b) Mononuclear c) Tetranuclear d) Dinuclear

91. **Assertion:** Coordination number of Fe and Co in $[Fe(C_2O_4)_3]^{3-}$ and $[Co(en)_3]^{3+}$ respectively is 6.

Reason: $C_2O_4^{2-}$ and en (ethane-1,2-diamine) are didentate ligands.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertiona nd reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false d) If both assertion and reason are false.

92. Which of the following ligands form a chelate?

a) Acetate b) Oxalate c) Cyanide d) Ammonia

93. Which of the following will give maximum number of isomers?

a) $[Co(NH_3)_4Cl_2]$ b) $[Ni(en)(NH_3)_4]^{2+}$ c) $[Ni(C_2O_4)(en)_2]^{2-}$ d) $[Cr(SCN)_2(NH_3)_4]^+$

94. Which statement is incorrect?

a) $Ni(CO)_4$-tetrahedral, paramagnetic b) $Ni(CN)_4^{2-}$-square planar, diamagnetic

c) $Ni(CO)_4$-tetrahedral, diamagnetic d) $Ni(Cl)_4^{2-}$-tetrahedral, paramagnetic

95. Among the following complexes, the one which shows zero crystal field stabilization energy (CFSE) is:

a) $[Mn(H_2O)_6]^{3+}$ b) $[Fe(H_2O)_6]^{3+}$ c) $[CO(H_2O)_6]^{2+}$ d) $[Co(H_2O)_6]^{3+}$

96. Few isomers are given below. Mark the correct statement regarding them.

(i) $[Cr(H_2O)_6]Cl_3$

(ii) $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$

(iii) $[Cr(H_2O)_4Cl_2]Cl \cdot 2H_2O$

a) (i), (ii) and (iii) are hydrate isomers b) (i), (ii) and (iii) are coordination isomers.

c) (i), (ii) and (iii) are ionisation isomers d) (i) and (ii) are stereoisomers.

97. When excess of aqueous KCN solution is added to an aqueous solution of copper sulphate, the complex $[CU(CN)_4]^{2-}$ is formed. On passing H_2S gas through this solution no precipitate of CuS is formed because:

a) sulphide ions cannot replace CN^- ions

b) $[CU(CN)_4]^{2-}$ does not give Cu^{2+} ion in the solution

c) sulphide ions from H_2S do not form complexes

d) sulphide ions cannot replace sulphate ions from copper sulphate solution.

98. Which of the following complex species is not expected to exhibit optical isomerism?

a) $[CO(en)(NH_3)_2Cl_2]^+$ b) $[CO(en)_3]^{3+}$ c) $[CO(en)_2Cl_2]^+$ d) $[CO(NH_3)_3Cl_3]$

99. The lowest value of paramagnetism is shown by

a) $[Co(CN)_6]^{3-}$ b) $[Fe(CN)_6]^{3-}$ c) $[Cr(CN)_6]^{3-}$ d) $[Mn(CN)_6]^{3-}$

100. Electronic configuration of $[Cu(NH_3)_6]^{2+}$ on the basis of crystal field splitting theory is

a) $t_{2g}^4 e_g^5$ b) $t_{2g}^6 e_g^3$ c) $t_{2g}^9 e_g^0$ d) $t_{2g}^5 e_g^4$

101. The complex ion $[Co(NH_3)_6]^{3+}$ is formed by sp^3d^2 hybridisation. Hence, the ion should possess:

a) octahedral geometry b) tetrahedral geometry c) square planar geometry

d) tetragonal geometry

102. The charges x and y on the following ions are

(i) $[Co(NH_3)_2Cl_4]^x$ (ii) $[Fe(CN_6)]^y$ (Oxidation state of Co is +3 and Fe is +2 in their respective complexes.)

a) x=+1,y=-1 b) x=-1,y=+3 c) x=-1,y=-4 d) x= -2,y= -3

103. Which of the following carbonyls will have the strongest C-O bond?

a) $Mn(CO)_6^+$ b) $Cr(CO)_6$ c) $V(CO)_6^-$ d) $Fe(CO)_5$

104. Which of the following complexes will show maximum paramagnetism?

a) $3d^4$ b) $3d^5$ c) $3d^6$ d) $3d^7$

105. The calculated spin only magnetic moment of Cr^{2+} ion is:

a) 2.84 BM b) 3.87 BM c) 4.90 BM d) 5.92 BM

106. The stabilisation of coordination compounds due to chelation is called the chelate effect. Which of the following is the most stable complex species?

a) $[Fe(CO)_5]$ b) $[Fe(CN)_6]^{3-}$ c) $[Fe(C_2O_4h)^{3-}$ d) $[Fe(H_2O)_6)^{3+}$

107. Match the column I with column II and mark the appropriate choice.

	Column I (Complex)		**Column II (Isomerism)**
(A)	$[Co(NH_3)_6]$ $[Cr(CN)_6]$	(i)	Geometrical isomerism
(B)	$[Co(en)_2(NO_2)Cl]Br$	(ii)	Optical isomerism
(C)	$[Pt(en)_2Cl_2]$	(iii)	Coordination isomerism
(D)	$[Cr(CN)_2(NH_3)4]^{2+}$	(iv)	Linkage isomerism

a) (A) → (iv), (B) → (ii), (C) → (iii), (D) → (i) b) (A) → (ii), (B) → (iii), (C) → (i), (D) → (iv)
c) (A) → (iii), (B) → (iv), (C) → (ii), (D)→ (i) d) (A) → (i), (B) → (iii), (C) → (iv), (D) → (ii)

108. Which among the following is a paramagnetic complex?
(At. No. Mo=42, Pt=78)

a) $\left[Co\left(NH_3\right)_6\right]^{3+}$ b) $\left[Pt(en)Cl_2\right]$ c) $\left[CoBr_4\right]^{2-}$ d) $Mo(CO)_6$

109. Which of the following complex ions is not expected to absorb visible light?
a) $[Ni(CN)_4]^{2-}$ b) $[Cr(NH_3)_6]^{3+}$ c) $[Fe(H_2O)_6]^{2+}$ d) $[Ni(H_2O)_6]^{2+}$

110. $[Fe(CN)^6]^{4-}$and $[Fe(H_2O)_6]^{2+}$ show different colours in dilute solution because
a)
CN^- is a strong field ligand and H_2O is a weak field ligand hence magnitude of CFSE is different

b) both CN^- and H_2O absorb same wavelength of energy

c) complexes of weak field ligands are generally colourless

d) the sizes of CN^- and H_2O are different hence their colours are also different.

111. Which of the following shows maximum number of isomers?
a) $[Co(NH_3)_4Cl_2]$ b) $[Ni(en)(NH_3)_4]^{2+}$ c) $[Ni(C_2O_4)(en)_2]^{2-}$ d) $[Cr(SCN)_2(NH_3)_4]^+$

112. In the separation of Cu^{2+} and Cd^{2+} of IInd group in qualitative analysis of cations, tetrammine copper (II) sulphate and tetrammine cadmium (II) sulphate react with KCN to form the corresponding cyano complexes, which one of the following pairs of the complexes and their relative stability enables the separation of Cu^{2+} and Cd^{2+}?
a) $K_3[Cu(CN)_4]$: less stable and $K_3[Cd(CN)_4]$ more stable
b) $K_3[Cu(CN)_4]$: more stable and $K_3[Cd(CN)_4]$ less stable
c) $K_2[Cu(CN)_4]$: less stable and $K_2[Cd(CN)_4]$ more stable
d) $K_2[Cu(CN)_4]$: more stable and $K_2[Cd(CN)_4]$ less stable

113. Which of the following sets of examples and geometry of the compounds is not correct?
a) Octahedral- $[Co(NH_3)_6]^{3+}$, $[Fe(CN)_6]^{3-}$ b) Square planar - $[Ni(CN)_4]^{2-}$ $[Cu(NH_3)_4]^{2+}$
c) Tetrahedral- $[Ni(CO)_4]$, $[ZnCl_4]^{2-}$ d) Trigonal bipyramidal- $[Fe(NH_3)_6]^{2+}$, $[CuCl_4]^{2-}$

114. The number of geometrical isomers for $[Pt(NH_3)_2]$ Cl_2 is:
a) 3 b) 4 c) 1 d) 2

115. Consider the following isomers.
(i) $[Pt(NH_3)_4$ $Cl_2]Br_2$
(ii) $[Pt(NH_3)_4]SO_4$
(iii) $[Co(NH_3)_4Cl_2]NO_2$
Which of the following observations is correct?
a) (i) will give a pale yellow and (ii) will give a white precipitate with $AgNO_3$ solution.
b) (iii) will give a white precipitate with $AgNO_3$ solution.
c) (i), (ii) and (iii) will give white precipitate with $AgNO_3$ solution.
d) None 'of the above isomers will give white precipitate with $AgNO_3$ solution.

116. The terminal and bridged CO ligands in the compound $[Co_2(CO)_8]$ are respectively
a) 0,2 b) 6,1 c) 5,2 d) 6,2

117. **Assertion:** Aqueous solution of the compound $COCl_3 \cdot 4NH_3$ when treated with excess of $AgNO_3$' 1 mole of AgCl is precipitated.
Reason: The compound $COCl_3 \cdot 4NH_3$ has six primary valencies and one secondary valency.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertiona nd reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

118. The formula of dichlorobis (urea) copper (II) is
a) [Cu $\{OC(NH_2)_2Cl\}$]Cl b) $[CuCl_2\{OC(NH_2)_2Cl\}_2]$ c) $[Cu\{OC(NH_2)2\}]Cl_2$
d) $[CuCl_2\{OC(NH_2)_2H_2\}]$

119. Correct increasing order for the wave lengths of absorption in the visible region for the complexes of CO^{3+} is:
a) $[Co(en)_3]^{3+}$, $[Co(NH_3)_6]^{3+}$,$[Co(H_2O)_6]^{3+}$ b) $[Co(H_2O)_6]^{3+}$,$[Co(en)_3]^{3+}$,$[CO(NH_3)_6]^{3+}$
c) $[Co(H_2O)_6]^{3+}$, $[Co(NH_3)_6]^{3+}$, $[Co(en)_3]^{3+}$ d) $[Co(NH_3)_6]^{3+}$, $[Co(en)_3]^{3+}$, $[Co(H_2O)_6]^{3+}$

120. Which of the following primary and secondary valencies are not correctly marked against the compound?
a) $[Cr(NH_3)_6]Cl_3,\ p = 3, s = 6$ b) $K_2[PtCl_4],\ p = 2, s = 4$ c) $[Pt(NH_3)_2Cl_2],\ p = 2, s = 4$
d) $[Cu(NH_3)_4]SO_4,\ p = 4, s = 4$

121. Match each coordination compound in List -I with an appropriate pair of characteristics from List-II and select the correct answer using the code given below the lists.
{en = $H_2NCH_2CH_2NH_2$; At. Nos. : Ti = 22; Cr = 24; Co = 27; Pt = 78}

	List - I		List - II
(P)	$[Cr(NH_3)_4]Cl_2]Cl$	1.	Paramagnetic and exhibits ionisation isomerism
(Q)	$[Ti(H_2O)_5Cl](NO_3)_2$	2.	Diamagnetic and exhibits cis-trans isomerism
(R)	$[Pt(en)(NH_3)Cl]NO_3$	3.	Paramagnetic and exhibits cis-transisomerism
(S)	$[CO(NH_3)_4(NO_3)_2]NO_3$	4.	Diamagnetic and exhibits ionisation isomerism

a)

P	Q	R	S
4	2	3	1

b)

P	Q	R	S
3	1	4	2

c)

P	Q	R	S
2	1	3	4

d)

P	Q	R	S
1	3	4	2

122. Which of the following statements is correct for $[Mn(CN)_6]^{3-}$ according to valence bond theory?
a) d^2sp^3, inner orbital complex, paramagnetic, 2.87 B.M.
b) d^2sp^3, inner orbital complex, diamagnetic, zero magnetic moment.
c) d^2sp^3, outer orbital complex, paramagnetic, 3.87 B.M.
d) dsp^2, outer orbital complex, diamagnetic, zero magnetic moment.

123. Which of the following statements is incorrect regarding the importance of coordination compounds in biological systems?
a) Vitamin B_{12} used to prevent anaemia is a complex compound of zinc.
b) Haemoglobin is the red pigment of blood and contains iron.
c) Chlorophyll is the green pigment of plants and contains magnesium. d) All are correct.

124. **Assertion :** $N(CH_2CH_2NH_2)_3$ and EDTA are examples of polydentate ligands.
Reason : Ligands which can ligate through two different atoms is called polydentate ligand.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertiona nd reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false d) If both assertion and reason are false.

125. Pick out the correct statement with respect to $[Mn(CN)_6]_3$
a) It is sp^3d^2 hybridised and tetrahedral. b) It is d^2sp^3 hybridised and octahedral.
c) It is dsp^2 hybridised and square planar. d) It is sp^3d^2 hybridised and octahedral.

126. Assertion: Geometrical isomerism is also called cis-trans isomerism.
Reason: Tetrahedral complexes show geometrical isomerism.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

127. 0.02 mole of $[Co(NH_3)_5Br]Cl_2$ and 0.02 mole of $[Co(NH_3)_5Cl]SO_4$ are present in 200 cc of a solution X. The number of moles of the precipitates Y and Z
that are formed when the solution X is treated with excess silver nitrate and excess barium chloride are respectively:
a) 0.02, 0.02 b) 0.01, 0.02 c) 0.02, 0.04 d) 0.04, 0.02

128. What type of isomerism exists in the following pairs of complexes?
(i) $[Co(NH_3)_5NO_3]SO_4$ and $[Co(NH_3)_5SO_4]NO_3$
(ii) $[Co(en)(H_2O)_2Cl_2]Cl$ and $[Co(en)(H_2O)Cl_3]H_2O$
a) (i) Ionisation (ii) Hydrate b) (i) Linkage (ii) Hydrate c) (i) Ionisation (ii) Linkage
d) (i) Linkage (ii) Coordination

129. $CrCl_3 \cdot 6H_2O$ exists in different isomeric forms which show different colours like violet and green. This is due to
a) ionisation isomerism b) coordination isomerism c) optical isomerism
d) hydrate isomerism

130. The coordination number and the oxidation state of the element E in the complex $[E(en)_2(C_2O_4)]NO_2$ (where (en) is ethylenediamine) are, respectively
a) 6 and 3 b) 6 and 2 c) 4 and 2 d) 4 and 3

131. The value of the 'spin only' magnetic moment for one of the following configurations is 2.84 BM. The correct one is:
a) d^4 (in strong ligand field) b) d^4 (in weak ligand field)
c) d^3 (in weak as well as in strong fields) d) d^5 (in strong ligand field)

132. **Assertion:** $[Ti(H_2O)_6]Cl_3$ on heating becomes colourless.
Reason: Water is removed on heating $[Ti(H_2O)_6]$ Cl_3.
a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

133. What are the correct oxidation state, coordination number, configuration, magnetic character and magnetic moment of $K_4[Mn(CN)_6]$?

a)

O.S	C.N	Configuration	Magnetic Character	Magnetic Moment
+6	6	t_{2g}^5	Diamagnetic	0

b)

O.S	C.N	Configuration	Magnetic Character	Magnetic Moment
+4	6	$t_{2g}^4 e_g^1$	Paramagnetic	1.732 B.M.

c)

O.S	C.N	Configuration	Magnetic Character	Magnetic Moment
+2	6	t_{2g}^5	Paramagnetic	1.732 B.M.

d)

O.S	C.N	Configuration	Magnetic Character	Magnetic Moment
+4	6	$t_{2g}^3 e_g^2$	Diamagnetic	0

134. Which of the following species is not expected to be a ligand?
a) NO b) NH_4^+ c) $NH_2CH_2CH_2NH_2$ d) CO

135. An excess of $AgNO_3$ is added to 100 mL of a 0.01 M solution of dichlorotetraaquachromium (III) chloride. The number of moles of AgCl precipitated would be:
a) 0.003 b) 0.01 c) 0.001 d) 0.002

136. $[Fef_6]^{3-}$ is paramagnetic due to presence of unpaired electrons in the complex. The five electrons remain unpaired because
a) fluorine is the most electronegative element.
b) F^- is a weak field ligand hence does not cause pairing of electrons.
c) F^- is a strong field ligand hence does not cause pairing of electrons.
d) pairing does not take place in iron complexes.

137. Ammonia acts as a very good ligand but ammonium ion does not form complexes because
a) NH_3 is a gas while NH^+_4 is in liquid form
b) NH_3 undergoes sp^3 hybridisation while NH_4^+ undergoes sp^3d hybridisation
c) NH^+_4 ion does not have any lone pair of electrons
d) NH^+_4 ion has one unpaired electron while NH_3 has two unpaired electrons.

138. The hypothetical complex chloro diaquatriammine cobalt (III) chloride can be represented as
a) $[CoCl(NH_3)_3(H_2O)_2]Cl_2$ b) $[Co(NH_3)_3(H_2O)Cl_3]$ c) $[Co(NH_2)_3(H_2O)_2Cl]$
d) $[Co(NH_3)_3(H_2O_3]Cl_3$

139. Which of the following facts about the complex $[Cr(NH_3)_6]Cl_3$ is wrong?
a) The complex involves d^2sp^3 hybridisation and is octahedral in shape.
b) The complex is paramagnetic. c) The complex is an outer orbital complex.
d) The complex gives white precipitate with silver nitrate solution.

140. Give reason for the statement. '$[Ni(CN)_4]^{2-}$ isdiamagnetic while $[Ni(CN)_4]^{2-}$ is paramagnetic in nature:

a)

In $[NiCl_4]^{2-}$, no unpaired electrons are present while in $[Ni(CN)_2]^{2-}$ two unpaired electrons are present.

b)

In $[Ni(CN)_4]^{2-}$, no unpaired electrons are present while in $[NiCl_4]^{2-}$ two unpaired electrons are present.

c) $[NiCl_4]^{2-}$ shows dspz hybridisation hence it is paramagnetic.

d) $[Ni(CN)_4]^{2-}$shows Sp^3 hybridisation hence it is diamagnetic.

141. Low spin complex of d^6-cation in an octahedral field will have the following energy.
(Δ_0 = crystal field splitting energy in an octahedral field, P = Electron Pairing energy)

a) $\frac{-12}{5}\Delta_0 + P$ b) $\frac{-12}{5}\Delta_0 + 3P$ c) $\frac{-2}{5}\Delta_0 + 2P$ d) $\frac{-2}{5}\Delta_0 + P$

142. Out of TiF_6^{2-},CoF_6^{3-},CU_2Cl_2 and $NiCl_4^{2-}$(Atomic number Z of Ti = 22, Co = 27, Cu = 29, Ni = 28), the colourless species are:

a) TiF_6^{2-} and CoF_6^{3-} b) CU_2Cl_2 and $NiCl_4^{2-}$ c) TiF_6^{2-} and CU_2Cl_2 d) COF_6^{3-} and $NiCl_4^{2-}$

143. When 1 mol $CrCl_3 \cdot 6H_2O$ is treated with excess of $AgNO_3$, 3 mol of AgCl are obtained. The formula of the complex is

a) $[CrCl_3(H_2OH) \cdot 3H_2O$ b) $[CrCl_2(H_2O)_4)Cl \cdot 2H_2O$ c) $[CrCl(H_2O)_5)Cl_2 \cdot H_2O$

d) $[Cr(H_2O)_6]Cl_3$

144. **Assertion:** Inner orbital complexes are low spin complexes.
Reason : In low spin complexes, inner d-orbital (3d) is used in hybridisation.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

145. Match the complexes given in column I with the oxidation states of central metal atoms given in column II and mark the appropriate choice.

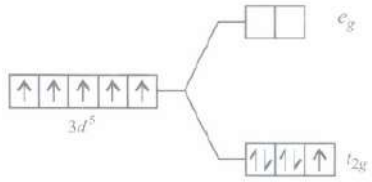
	Column I (Complex)		**Column II (Oxidation state of central atom)**
(A)	$K_3[Co(C_2O_4)_2Cl_2]$	(i)	0
(B)	$[Pt(C_2H_4)Cl_3]^-$	(ii)	+1
(C)	$[Fe(H_2O)_5NO]SO_4$	(iii)	+3
(D)	$[Ni(CO)_4]$	(iv)	+2

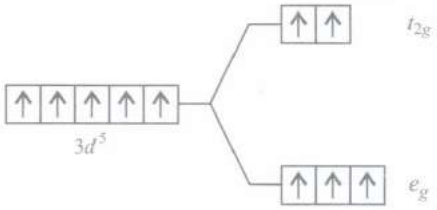
a) (A) → (ii), (B) → (i), (C) → (iv), (0)→ (iii) b) (A)→ (iv), (B) → (ii), (C) → (i), (0) → (iii)
c) (A) → (iii), (B) → (iv), (C) → (ii), (0) → (i) d) (A) → (i), (B) → (ii), (C)→(iii), (D) → (iv)

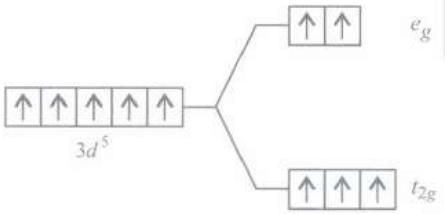
146. Which is diamagnetic?

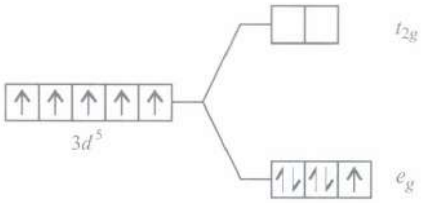
a) $\left[Co(F)_6\right]^{3-}$ b) $\left[NiCl_4\right]^{2-}$ c) $\left[Ni(CN)_4\right]^{2-}$ d) $\left[Fe(CN)_6\right]^{3-}$

147. Which of the following energy level diagram for $[FeF_6]^{3-}$ is correct on the basis of crystal field theory?

a) 

b) 

c) 

d) 

148. Which of the following is not correctly matched?
a) Coordination compound containing cationic complex ion: $[Fe(H_2O)_2(C_2O_4)_2]SO_4$
b) Coordination compound containing anionic complex ion:$[Ag(NH_3)_2]Cl$
c) Non-ionic coordination compound: $[Co(NO_2)_3(NH_3)_3]$
d) Coordination compound containing cationic and anionic complex ion:$[Pt(NH_3)_4][CuCl_4]$

149. Which of the following statements is/are correct?
(i) In octahedral complexes, t_{2g} orbitals possess low energy as compared to e_g orbitals.
(ii) In tetrahedral complexes, t_{2g} orbitals possess high energy as compared to e_g orbitals.
(iii) In octahedral complexes, eg orbitals possess low energy as compared to t_{2g} orbitals.
a) (ii) only b) (iii) only c) (i) and (ii) d) (i) and (iii)

150. Which among the following will be named as dibromidobis (ethylenediamine) chromi urn (III) bromide?
a) $[Cr(en)_2Br_2]Br$ b) $[Cr(en)Br_4]^-$ c) $[Cr(en)Br_2]Br$ d) $[Cr(en)_3]Br_3$

151. Shape of Fe(CO)s is :
a) octahedral b) square planar c) trigonal bipyramidal d) square pyramidal

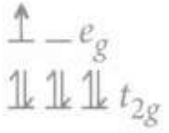
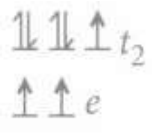
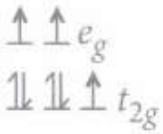
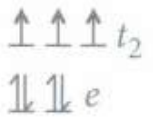
152. Which of the following organometallic compounds is σ and π-bonded?
a) $[Fe(\eta^5\text{-}C_5H_5)^2]$ b) $K[PtCl_3(\eta^2\text{-}C_2H_4)]$ c) $[Co(CO)_5NH_3]^{2+}$ d) $Fe(CH_3)^3$

153. A chelating agent has two or more than two donor atoms to bind to a single metal ion. Which of the following is not a chelating agent?
a) Thiosulphato b) Oxalato c) Glycinato d) Ethane-1,2-diamine

154. If excess of $AgNO_3$ solution is added to 100 mL of a 0.024 M solution of dichlorobis (ethylenediamine) cobalt(III) chloride, how many moles of AgCl be precipitated?
a) 0.0012 b) 0.0016 c) 0.0024 d) 0.0048

155. **Assertion :** $K_2[Ni(EDTA)]$ is more stable than $K_3[Al(C_2O_4)_3]$.
Reason : Ni is a transition element while Al is a non-transition element
a) If assertion is true but reason is false. b) If both assertion and reason are false.
c) If both assertion and reason are true and reason is the correct explanation of assertion.
d)
If both assertion and reason are true but reason is not the correct explanation of assertion.

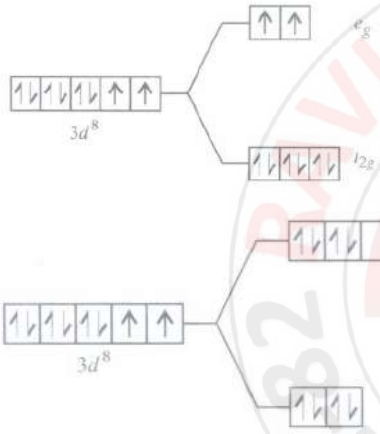
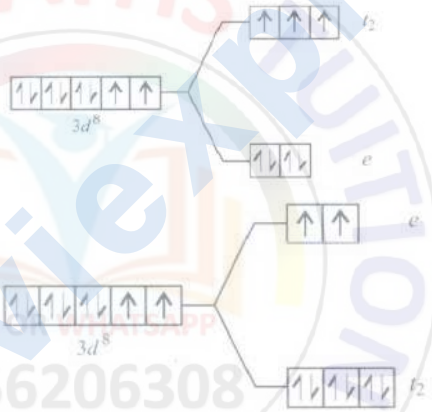
156. Which of the following energy diagrams shows the electron distribution according to the crystal field model of the 3d-electrons in $[CoCl_4]^{2-}$?

a)  b)  c)  d) 

157. Which of the following coordination compounds would exhibit optical isomerism?
a) Pentaamminenitrocobalt (III) iodide b) Diamminedichloroplatinum (II)
c) Trans-dicyanobis (ehtylenediamine) chromium (III) chloride
d) Tris-(ethylenediamine) cobalt (III) bromide

158. **Assertion:** According to crystal field theory, during complex formation, the d-orbitals split and form two sets of orbitals t_{2g} and e_g.
Reason: Splitting of d-orbitals occurs only in case of strong field ligands.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

159. The correct energy level diagram for $[NiCl_4]^{2-}$ is:

a)  b) 

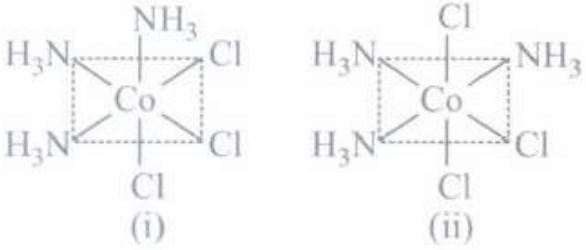
c) d)

160. When 0.1 mol $CoCl_3(NH_3)_5$ is treated with excess of $AgNO_3$, 0.2 mol of AgCl are obtained. The conductivity of solution will correspond to
a) 1: 3 electrolyte b) 1: 2 electrolyte c) 1: 1 electrolyte d) 3: 1 electrolyte

161. The hybridization involved in complex $\left[Ni(CN)_4\right]^{2-}$ is _____ .
a) sp^3 b) d^2sp^2 c) d^2sp^3 d) dsp^2

162. The formula of the complex diamminechloro- (ethylenediamine)nitroplatinum(IV)chloride is
a) $[Pt(NH_3)_2Cl(en)NO_2]Cl_2$ b) $Pt[Pt(NH_3)_2(en)Cl_2NO_2]$ c) $Pt[(NH_3)_2(en)NO_2]Cl_2$
d) $Pt[(NH_3)_2(en)NO_2Cl_2]$

163. Two isomers of a compound $Co(NH_3)_3Cl_3$ (MA_3B_3 type) are shown in the figures.



The isomers can be classified as

a) (i) fac-isomers (ii) mer-isomer b) (i) optical-isomer (ii) trans-isomer
c) (i) mer-isomer (ii) fac-isomer d) (i) trans-isomer (ii) cis-isomer.

164. **Assertion:** $[Fe(H_2O)_6]^{2+}$ is sp^3d^2 hybridised and paramagnetic complex ion.
Reason: $[Fe(H_2O)_6]^{2+}$ has four unpaired electrons as H_2O is a weak field ligand.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

165. Mark the correct statements regarding the geometry of complex ions.
(i) The geometry of the complex ion depends upon the coordination number.
(ii) If coordination number is 6, the complex is octahedral.
(iii) If coordination number is 4, the geometry of the complex may be tetrahedral or square planar.
a) (i), (ii) and (iii) b) (i) and (ii) only c) (i) and (iii) only d) (ii) and (iii) only.

166. Copper sulphate dissolves in ammonia due to the formation of
a) Cu_2O b) $[Cu(NH_3)_4]SO_4$ c) $[Cu(NH_3)_4]OH$ d) $[Cu(H_2O)_4]SO_4$

167. **Assertion:** In tetrahedral complexes low spin configurations are rarely observed.
Reason: $\triangle_t = \left(\frac{4}{9}\right)\triangle_0$
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

168. **Assertion:** $[Fe(H_2O)_6]^{3+}$ is strongly paramagnetic whereas $[Fe(CN)_6]^{3-}$ is weakly paramagnetic.
Reason: H_20 is a weak field ligand and CN^- is a strong field ligand.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

169. Among the following, which are ambidentate ligands?
(i) SCN^-
(ii) NO^-_3
(iii) NO^-_2
(iv) $C_2O^{2-}_4$
a) (i) and (iii) b) (i) and (iv) c) (ii) and (iii) d) (ii) and (iv)

170. Considering H_2O as a week field ligand, the number of unpaired electrons in $[Mn(H_2O)_6]^{2+}$ will be : (Atomic number of Mn = 25)
a) 3 b) 5 c) 2 d) 4

171. Jahn-Teller effect is not observed in high spin complexes of
a) d^7 b) d^8 c) d^4 d) d^9

172. Which of the following shall form an octahedral complex?
a) d^4 (low spin) b) d^8 (high spin) c) d^6 (low spin) d) None of these.

173. Both geometrical and optical isomerism are shown by
a) $[Co(en)_2Cl_2]^+$ b) $[Co(NH_3)_5Cl]^{2+}$ c) $[Co(NH_3)_4Cl_2]^+$ d) $[Cr(ox)_3]^{3-}$

174. Which of the following rules is not correct regarding IUPAC nomenclature of complex ions?
a) Cation is named first and then anion.
b) In coordination sphere, the ligands are named alphabetically.
c) Positively charged ligands have suffix 'ate'.
d) More than one ligand of a particular type are indicated by using di, tri, tetra, etc.

175. When aqueous solution of potassium fluoride is added to the blue coloured aqueous CUS04 solution, a green precipitate is formed. This observation can be explained as follows.
a)
On adding KF, H_2O being weak field ligand is replaced by F^- ions forming $[CuF_4]^{2-}$ which is green in colour.
b) Potassium is coordinated to $[Cu(H_2O)_4]^{2+}$ ion present in $CuSO_4$ and gives green colour.
c) On adding KF, Cu^{2+} are replaced by K^+ forming a green complex.
d) Blue colour of $CuSO_4$ and yellow colour of KI form green colour on mixing.

176. Which of the following ligands is expected to be bidentate?
a) CH_3NH_2 b) CH_3CN c) Br d) $C_2O_4^{2-}$

177. Indicate the complex ion which shows geometrical isomerism.
a) $[Cr(H_2O)_4Cl_2]^+$ b) $[Pt(NH_3)_3Cl]$ c) $[Co(NH_3)_6]^{3+}$ d) $[Co(CN)_5(NC)]^{3-}$

178. Correct formula of tetraamminechloronitroplatinum (IV) sulphate can be written as
a) $[Pt(NH_3MONO)Cl]SO_4$ b) $[Pt(NH_3)_4Cl_2NO_2]_2SO_4$ c) $[Pt(NH_3MNO_2)Cl]SO_4$
d) $[PtCl(ONO)NH_3(SO_4)]$

179. **Assertion:** The complex $K_3[Cr(C_2O_4)_3]$ when present in aqueous solution, will give test for K+, Cr^{3+} and oxalate ions.
Reason: The complex $K_3[Cr(C_2O_4)_3]$ will dissociate completely in solution.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertiona nd reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

180. Mark the incorrect statement.
a) Inner orbital (low spin) complexes involve d^2sp^3 hybridisation.
b) Outer orbital (high spin) complexes involve Sp^3d^2 hybridisation.
c) Tetrahedral complexes generally involve dsp^2' hybridisation.
d) Stereoisomerism involves geometrical and optical isomerism.

181. Assertion: In a coordination entity $[PtCl_2(en)_2]^{2+}$ only the cis-isomer shows optical activity.
Reason : Optical isomerism is common in octahedral complexes involving didentate ligands.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false d) If both assertion and reason are false.

182. A coordination compound X gives pale yellow colour with $AgNO_3$ solution while its isomer Y gives white precipitate with $BaCl_2$.Two compounds are isomers of $CoBrSO_4 \cdot 5NH_3$. What could be the possible formula of X and Y?

a) $X = [Co(NH_3)_5SO_4]Br, Y = [Co(NH_3)_5Br]SO_4$ b) $X = [Co(NH_3)_5Br]SO_4, Y = [Co(NH_3)_5SO_4]Br$

c) $X = [Co(NH_3)_5Br(SO_4)], Y = [CoBr(SO_4)(NH_3)_5]$ d) $X = [Co(Br)_5NH_3]SO_4, Y = [CoBr(SO_4)](NH_3)$

183. The correct order of the stoichiometrics of AgCl formed when $AgNO_3$ in excess is treated with the complexes, $COCl_3.6NH_3.COCl_3.5NH_3$, $COCl_3.4NH_3$ respectively is :

a) 1 AgCl, 3 AgCl, 2 AgCl b) 3 AgCl, 1 AgCl, 2 AgCl c) 3 AgCl, 2 AgCl, 1 AgCl

d) 2 AgCl, 3 AgCl, 1 AgCl

184. **Assertion:** Tetrahedral complexes having two different types of unidentate ligands coordinated with central metal ion will show geometrical isomerism.

Reason : Geometrical isomerism arises in homoleptic complexes due to different possible geometric arrangement of the ligands.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

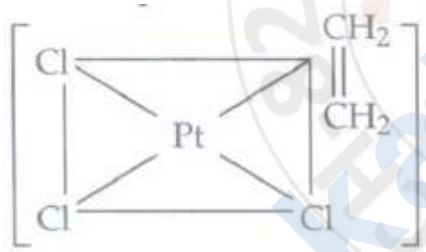
If both assertiona nd reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false d) If both assertion and reason are false.

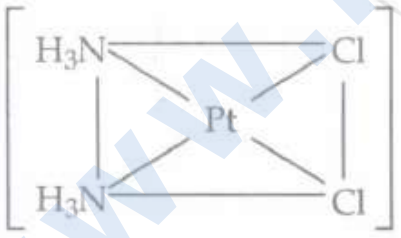
185. Which of the following complexes will have a tetrahedral shape?

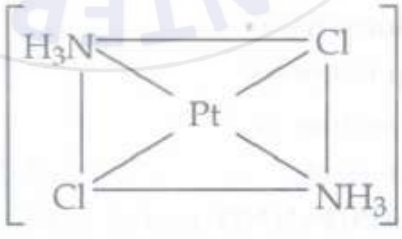
a) $[PdCl_4]^{2-}$ b) $[Pd(CN)_4]^{2-}$ c) $[Ni(CN)_4]^{2-}$ d) $[NiCl_4]^{2-}$

186. Which of the following is considered to be an anticancer species?

a) 

b)

c) 

d) 

187. In an octahedral structure, the pair of d orbitals involved in d^2sp^3 hybridisation is _____ .

a) $d_{x^2-y^2}, d_{z^2}$ b) $d_{xz}, d_{x^2-y^2}$ c) $d_{z^2}d_{xz}$ d) d_{xy}, d_{yz}

188. Which of the following complex ions is expected to absorb visible light? [Atomic number of Zn = 30, Sc = 21, Ti = 22, Cr = 24]

a) $[Sc(H_2O)_3(NH_3)_3]^{3+}$ b) $[Ti(en)_2(NH_3)_2]^{4+}$ c) $[Cr(NH_3)_6]^{3+}$ d) $[Zn(NH_3)_6]^{2+}$

189. A coordination compound $CrCl_3 \cdot 4H_2O$ gives white precipitate of AgCl with $AgNO_3$. The molar conductance of the compound corresponds to two ions. The structural formula of the compound is

a) $[Cr(H_2O)_4Cl_3]$ b) $[Cr(H_2O)_3Cl_3]H_2O$ c) $[Cr(H_2O)_4Cl_2]Cl$ d) $[Cr(H_2O)_4Cl]Cl_2$

190. Among $[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$, $[NiCl_4]^{2-}$ species, the hybridization states of the Ni atom are, respectively (Atomic number of Ni = 28)
a) sp^3, dsp^2, dsp^2 b) sp^3, dsp^2, sp^3 c) sp^3, sp^3, dsp^2 d) dsp^2, sp^3, sp^3

191. $[Cr(H_2O)_6]Cl_3$ (at. no. of Cr = 24) has a magnetic moment of 3.83 B.M. The correct distribution of 3d electrons in the chromium present in the complex is
a) $3d^1_{xy}, 3d^1_{yz}, 3d^1_{zx}$ b) $3d^1_{xy}, 3d^1_{yz}, 3d^1_{z^2}$ c) $3d^1_{(x^2-y^2)} 3d^1_{z^2}, 3d^1_{xz}$ d) $3d^1_{xy}, 3d^1_{(x^2-y^2)}, 3d^1_{yz}$

192. Which of the following statements is correct about $[Co(H_2O)_6]^{2+}$ complex?
a) Electronic configuration = $3d^7 \longrightarrow t^5_{2g}\, e^2_g$, no. of unpaired electrons = 3, μ = 3.87 B.M.
b) Electronic configuration = $3d^6 \longrightarrow t^4_{2g} e^2_g$, no. of unpaired electrons = 2, μ = 2.87 B.M.
c) Electronic configuration = $3d^7 \longrightarrow t^6_{2g}\, e^1_g$, no. of unpaired electrons = 3, μ = 2.87 B.M.
d) Electronic configuration = $3d^7 \longrightarrow t^3_{2g}\, e^4_g$, no. of unpaired electrons = 3, μ = 3.87 B.M.

193. The correct increasing order of trans-effect of the following species is :
a) $NH_3 > CN^- > Br^- > C_6H_5$ b) $CN^- > C_6H_5^- > Br^- > NH_3$ c) $Br^- > CN^- > NH_3 > C_6H_5^-$
d) $CN^- > Br^- > C_6H_5- > NH_3$

194. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	$[Fe(CN)_6]^{3-}$	(i)	Zero
(B)	$[CoF_6]^{3-}$	(ii)	5.92 B.M
(C)	$[Fe(H_2O)_6]^{3+}$	(iii)	4.89 B.M
(D)	$[Co(NH_3)_6]^{3+}$	(iv)	1.732 B.M

a) $(A) \longrightarrow (ii)$, $(B) \longrightarrow (iii)$, $(C) \longrightarrow (iv)$, $(D) \longrightarrow (i)$
b) $(A) \longrightarrow (iii)$, $(B) \longrightarrow (ii)$, $(C) \longrightarrow (i)$, $(D) \longrightarrow (iv)$
c) $(A) \longrightarrow (i)$, $(B) \longrightarrow (iii)$, $(C) \longrightarrow (iv)$, $(D) \longrightarrow (ii)$
d) $(A) \longrightarrow (iv)$, $(B) \longrightarrow (iii)$, $(C) \longrightarrow (ii)$, $(D) \longrightarrow (i)$

195. Which of the following is the correct order of increasing field strength of ligands to form coordination compounds?
a) $CN^- < C_2O_4^{2-} < SCN^- < F^-$ b) $SCN^- < F^- < C_2O_4^{2-} < CN^-$
c) $SCN^- < F^- < CN^- < C_2O_4^{2-}$ d) $F^- < SCN^- < C_2O_4^{2-} < CN^-$

196. Mark the correct labelling of different terms used in coordination compounds:

a) (i) Central atom, (ii) Ionisation sphere, (iii) Coordination number, (iv) Ligands
b) (i) Ligands, (ii) Coordination number, (iii) Valency, (iv) Ionisation sphere
c) (i) Ionisation sphere, (ii) Ligands, (iii) Coordination number, (iv) Central atom
d) (i) Ligands, (ii) Ionisation sphere, (iii) Coordination number, (iv) Central atom

197. Match the column I with column II and mark the appropriate choice.

	Column -I		Column -II
(A)	Estimation of hardness of water	(i)	cis-Platin
(B)	Detection and estimation of nickel	(ii)	EDTA
(C)	Electroplating	(iii)	Dimethylglyoxime
(D)	Treatment of cancer	(iv)	Potassium dicyanoargentate

a) (A) → (i), (B) → (iv), (C) → (ii), (D) → (iii)
b) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)
c) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)
d) (A) → (iv), (B) → (ii), (C) → (iii), (D) → (i)

198. The anion of acetylacetone (acac) forms $Co(acac)_3$ chelate with Co^{3+}. The rings of the chelate are:
a) Five membered b) Four membered c) Six membered d) Three membered

199. Among the following compounds which is both paramagnetic and coloured?
a) $K_2Cr_2O_7$ b) $[CO(SO_4)]$ c) $(NH_4)_2[TiCl_6]$ d) $K_3[Cu(CN)_4]$

200. Number of possible isomers for the complex $[Co(en)_2Cl_2]Cl$ will be (en = ethylene diamine)
a) 2 b) 1 c) 3 d) 4

201. Of the following complex ions which is diamagnetic in nature?
a) $[Ni(CN)_4]^{2-}$ b) $[CuCl_4]^{2-}$ c) $[COF_6]^{3-}$ d) $[NiCl_4]^{2-}$

202. Which of the following will exhibit maximum ionic conductivity?
a) $[Cu(NH_3)_4]Cl_2$ b) $[Ni(CO)_4]$ c) $K_4[Fe(CN)_6]$ d) $[Co(NH_3)_6]Cl_3$

203. Match the column I with the column II and mark the appropriate choice.

Column I		**Column - II**	
(A)	Analytical chemistry	(i)	EDTA
(B)	Volumetric estimation	(ii)	Silver complexes
(C)	Catalyst	(iii)	Cu^{2+}, Fe^{3+}, Ni^{2+}
(D)	Electroplating	(iv)	$(Ph_3P)_3RhCl$

a) (A) → (ii), (B) → (iii), (C) → (i), (D) → (iv)
b) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)
c) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)
d) (A) → (i), (B) → (iv), (C) → (ii), (D) → (iii)

204. Hexacyano complexes of metals in their +2 oxidation state are usually yellow while the corresponding hexaaqua compounds are often blue or green. This is so because
a)
hexacyano complexes absorb orange or red light thus appear yellow while hexaaqua complexes absorb indigo thus appear yellow

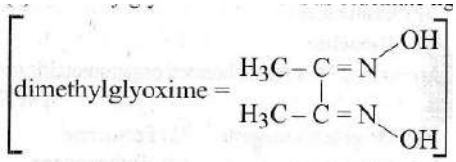
b)
hexacyano complexes absorb indigo thus appearing yellow while hexaaqua complexes absorb orange or red light thus appear blue or green

c) hexacyano complexes absorb yellow light while hexaaqua complexes absorb blue light

d) CN^- ions are yellow in colour while aqua ions are blue or green in colour.

205. An example of a sigma bonded organometallic compound is :
a) Ruthenocene b) Grignard's reagent c) Ferrocene d) Cobaltocene

206. Red precipitate is obtained when ethanol solution of dimethylglyoxime is added to ammonical Ni(II). which of the following statement is not true?



a) Red complex has a square plannar geometry. b) Complex has symmetrical H-bonding
c) Red complex has a tetrahedral geometry.
d) Dimethylglvoxime functions as bidentate ligand.

207. Which of the following is a tridentate ligand?
a) $EDTA^{4-}$ b) $(COO)^{2-}_2$ c) dien d) NO^-_2

208. Which one of the following octahedral complexes will not show geometrical isomerism? (A and B are monodentate ligands)
a) $[MA_4B_2]$ b) $[MA_5B]$ c) $[MA_2B_4]$ d) $[MA_3B_3]$

209. In the silver plating of copper, $K\left[Ag(CN)_2\right]$ is used instead of $AgNO_3$. The reason is _____ .
a) A thin layer of Ag is formed on Cu. b) More voltage is required.
c) Ag^+ ions are completely removed from solution.
d) Less availability of Ag^+ ions, as Cu can not displace Ag from $\left[Ag(CN)_2\right]$ - ion.

210. The correct IUPAC name of the coordination compound $K_3[Fe(CN)_5NO]$ is
a) potassium pentacyanonitrosylferrate(II) b) potassium pentacyanonitroferrate(III)
c) potassium nitritopentacyanoferrate(IV) d) potassium nitritepentacyanoiron(II).

211. The geometry possessed by $[Ni(CO)_4]$ is:
a) tetrahedral b) square planar c) linear
d) octahedralIn [Ni(CO)4], oxidation state of Ni = 0

212. $[CO(C_2O4_2)_3]^{3-}$ is a diamagnetic complex because
a) $C_2O_4^{2-}$ is strong field ligand hence causes pairing of electrons
b) $C_2O_4^{2-}$ is a bidentate ligand hence causes pairing of electrons
c) Co^{3+} is a strong central atom hence in all complexes of Co^{3+} electrons are paired
d) $C_2O_4^{2-}$ is a strong field ligand hence causes splitting of d-orbitals.

213. IUPAC name of $[Pt(NH_3)_2CI(NO_2)]$ is
a) platinum diaminechloronitrite b) chloronitrito-N-ammineplatinum (II)
c) diamminechloridonitrito- N-platinum (II) d) diamminechloronitrito- N-platinate (II).

214. What kind of isomerism exists between $[Cr(H_2O)_6]Cl_3$ (violet) and $[Cr(H_2O)_5CI)Cl_2 \cdot H_2O$ (greyish-green)?
a) Linkage isomerism b) Solvate isomerism c) Ionisation isomerism
d) Coordination isomerism

215. A magnetic moment at 1.73 BM will be shown by one among of the following:
a) $TiCl_4$ b) $\left[CoCl_6\right]^4$ c) $\left[Cu\left(NH_3\right)_4\right]^{2+}$ d) $\left[Ni(CN)_4\right]^{2-}$

216. Which of the following ligands will not show chelation?
a) EOTA b) OMG c) Ethane-1, 2-diamine d) SCN

217. The compounds $[CO(SO_4)(NH_3)_5]Br$ and $[CO(SO_4)(NH_3)_5]Cl$ represent
a) linkage isomerism b) ionisation isomerism c) coordination isomerism
d) no isomerism.

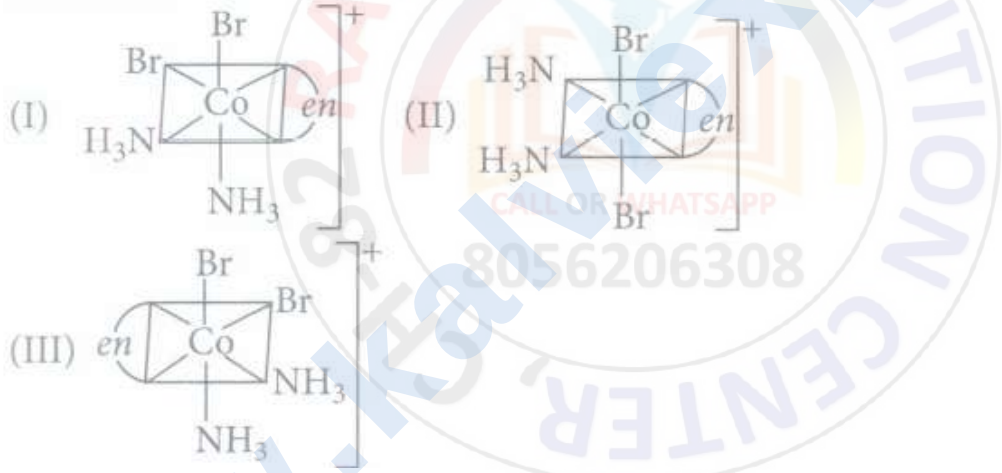
218. Which of the following does not show optical isomerism? (en = ethylenediamine)
a) $[Co(en)_2Cl_2]^+$ b) $[Co(NH_3)_3Cl_3]^0$ c) $[Co(en)Cl_2(NH_3)_2]^+$ d) $[Co(en)_3]^{3+}$

219. The ligand $N(CH_2CH_2NH_2)$ is
a) bidentate b) tridentate c) tetradentate d) pentadentate

220. Mark the incorrect match.
a) Insulin - Zinc b) Haemoglobin - Iron c) Vitamin B_{12}- Cobalt d) Chlorophyll- Chromium

221. According to Werner's theory of coordination compounds,
a) primary valency is ionisable b) secondary valency is ionisable
c) primary and secondary valencies are ionisable
d) neither primary nor secondary valencyis ionisable

222. Three arrangements are shown for the complex, $[Co(en)(NH_3)_2Br_2]^+$. Which one is the wrong statement?



a) I and II are geometrical isomers. b) II and III are optical isomers.
c) I and III are optical isomers. d) II and III are geometrical isomers.

223. The geometry and magnetic behaviour of the complex $[Ni(CO)_4]$ are:
a) Square planar geometry and paramagnetic b) Tetrahedral geometry and diamagnetic
c) Square planar geometry and diamagnetic d) Tetrahedral geometry and paramagnetic

224. Select the true statement from the following for metal carbonyls?
a) π back bonding strengthens M - C bond order as well as CO bond order.
b) π back bonding weakens M - C bond order as well as CO bond order.
c) π back bonding weakens M - C bond order but strengthens CO bond order.
d) π back bonding strengthens M - C bond order and weakens CO bond order.

225. Which of the following will give a pair of enantiomers? (en = $NH_2CH_2CH_2NH_2$)
a) $[Cr(NH_3)_6]\ [Co(CN)_6]$ b) $[Co(en)_2Cl_2]\ Cl$ c) $[Pt(NH_3)_4][PtCl_6]$ d) $[Co(NH_3)_4Cl_2]NO_2$

226. The stability constants of the complexes formed by a metal ion ($M2^+$) with NH_3, CN^-, H_2O and en are of the order 10^{11}, 10^{27}, 10^{15} and 10^8 respectively. Then
a) en is the strongest ligand b) CN^- is the strongest ligand
c) these values cannot predict the strength of the ligand d) allligands are equally strong.

227. The name of complex ion $[Fe(CN)_6]^{3-}$ is :
a) hexacyanoiron (III) ion b) hexacyanitoferrate (III) ion c) tricyanoferra te (III) ion
d) hexacyanidoferrate (III) ion

228. The complex ion which has no d-electrons in the central metal atom is:
a) $[MnO_4]^-$ b) $[CO(NH_3)_6]^{3+}$ c) $[Fe(CN)_6]^{3-}$ d) $[Cr(H_2O)_6]^{3+}$

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Time : 1 Mins **d f BLOCK ELEMENTS 1** **Marks : 1005**

1. Which one of the following ions has electronic configuration [Ar] $3d^6$? (Atomic number Mn = 25, Fe = 26, Co = 27, Ni = 28)
   a) Ni^{3+} b) Mn^{3+} c) Fe^{3+} d) CO^{3+}
2. Compound that is both paramagnetic and coloured is
   a) $K_2Cr_2O_7$ b) $(NH_4)_2[TiCl_6]$ c) $VOSO_4$ d) $K_3[Cu(CN)_4]$
3. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
   Assertion: In transition elements radii of 5d series are virtually the same as those of the corresponding members of 4d series.
   Reason: The filling of 4f orbitals before 5d orbitals results in regular decrease in atomic radii.
   a)
   If both assertion and reason are true and reason is the correct explanation of assertion
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion.
   c) If assertion is true but reason is false d) If both assertion and reason are false
4. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as
   Assertion: In the series Sc to Zn, the enthalpy of atomisation of zinc is the lowest.
   Reason : Zinc has greater number of unpaired electrons.
   a)
   If both assertion and reason are true and reason is the correct explanation of assertion.
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion
   c) If assertion is true but reason is false. d) If both assertion and reason are false.
5. Which of the following reactions are disproportionation reactions?
   (I) $Cu^+ \longrightarrow Cu^{2+} + Cu$
   (II) $3MnO_4^- + 4H^+ \longrightarrow 2MnO_4^- + MnO_2$
   (III) $2KMnO_4 \longrightarrow K_2MnO_4 + MnO_2 + O_2$
   (IV) $2MnO_{4'} + 3Mn_2+ + 2H_2O \longrightarrow 5MnO_2 + 4H^+$

a) (I), (II) b) (I), (II), (III) c) (II), (III), (IV) d) (I), (IV)

6. Which of the following statements is correct about stability of the complexes of lanthanoids?
   a) Stability of complexes increases as the size of lanthanoid decreases.
   b) Stability of complexes decreases as the size of lanthanoid decreases
   c) Lanthanoids do not form complexes
   d) All the complexes of lanthanoids have same stability

7. In which of the following pairs of ions, the higher oxidation state in aqueous solution is more stable than the other?
   I. Tl^{+},Tl^{3+}
   II. Cu^{+}, Cu^{2+}
   III. Cr^{2+}, Cr^{3+}
   IV. V^{2+}, VO^{2+} (V^{4+})
   a) I, II b) II, III c) II, IV d) II, III, IV

8. Colour of transition metal ions are due to absorption of some wavelength. This results in
   a) d-s transition b) s-s transition c) s-d transition d) d-d transition

9. Which of the following statements is not correct about magnetic behaviour of substances?
   a) Diamagnetic substances are repelled by an applied magnetic field
   b) Paramagnetic substances are attracted by an applied magnetic field
   c) Magnetic moment of n unpaired electrons is given by $\mu = \sqrt{n(n-2)}B.M.$
   d) Magnetic moment increases as the number of unpaired electrons increases

10. The d-electron configurations of C^{2+}, Mn^{2+} Fe^{2+} and CO^{2+} are d^4, d^5, d^6 and d^7 respectively. Which one of the following will exhibit minimum paramagnetic behaviour? (At. no. Cr = 24, Mn = 25, Fe = 26, Co = 2)
    a) $[Fe(H_2O)_6]^{2+}$ b) $[Co(H_2O)_6]^{2+}$ c) $[Cr(H_2O)_6]^{2+}$ d) $[Mn(H_2O)_6]^{2+}$

11. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
    Assertion.: The maximum oxidation state of chromium in its compounds is +6.
    Reason: Chromium has only six electrons in ns and (n - 1)d orbitals.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false

12. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
    Assertion: Iron(III) catalyses the reaction between iodide and persulphate ions.
    Reason: Transition metals act as catalysts.

a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false

13. In acidic medium, H_2O_2 changes $Cr_2O_7^{2-}$ to CrO_5 which has two (-0-0-) bonds. Oxidation state of Cr in CrO_5 is :
a) +5 b) +3 c) +6 d) -10

14. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Copper dissolves in dilute nitric acid but not in dilute HCl.
Reason: Copper has positive E^0.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

15. The magnetic nature of elements depends on the presence of unpaired electrons. Identify the configuration of transition element, which shows highest magnetic moment.
a) $3d^7$ b) $3d^5$ c) $3d^8$ d) $3d^2$

16. More number of oxidation states are exhibited by the actinoids than by the lanthanoids. The main reason for this is _____ .
a) More active nature of the actinoids
b)
More energy difference between 5f and 6d orbitals than that between 4f and 5d orbitals.
c)
Lesser energy difference between 5f and 6d orbitals than that between 4f and 5d orbitals.
d)
Greater metallic character of the lanthanoids than that of the corresponding actinoids.

17. The most convenient method to protect the bottom of ship made of iron is _____ .
a) Coating it with red lead oxide b) White tin plating c) Connecting it with Mg block
d) Connecting it with Pb block

18. Identify the incorrect statement among the following
a) There is a decrease in the radii of the atoms or ions as one proceeds from La or Lu
b) Lanthanide contraction is the accumulation of successive shrinkages

c)
As a result of lanthanide contraction, the properties of 4d series of the transition elements have no similarities with the 5d series of elements
d) Shielding power of 4f electrons is quite weak.

19. Electronic configuration of a transition element X in +3 oxidation state is $[Ar]3d^5$ What is its atomic number?
a) 25 b) 26 c) 27 d) 24

20. Most of the transition metals exhibit
(i) paramagnetic behaviour
(ii) diamagnetic behaviour
(iii) variable oxidation states
(iv) formation of coloured ions
a) (ii), (iii) and (iv) b) (i), (iii) and (iv) c) (i), (ii) and (iii) d) (i), (ii) and (iv)

21. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Zr and Hf occur together in nature and are difficult to separate.
Reason: Zr and Hf have identical radii due to lanthanide contraction.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is fals d) If both assertion and reason are false

22. Which of the following lanthanide ion is paramagnetic?
a) Ce^{4+} b) Yb^{2+} c) Lu^{3+} d) Eu^{2+}

23. Identify the alloy containing a non-mental as a constituent in it.
a) Invar b) Steel c) Bell metal d) Bronze

24. The angular moment of electrons in d-orbital is equal to:
a) $\sqrt{6}\hbar$ b) $\sqrt{2}\hbar$ c) $2\sqrt{3}\hbar$ d) $0\hbar$

25. Which one of the following ions is the most stable in aqueous solution? (Atomic number Ti = 22,Y = 23, Cr = 24,Mn = 25)
a) Cr^{3+} b) V^{3+} c) Ti^{3+} d) Mn^{3+}

26. $HgCl_2$ and I_2 both when dissolved in water containing I^- ions, the pair of species formed is _____ .
a) HgI_2, I^- b) HgI_4^{2-}, I_3^- c) Hg_2I_2, I^- d) HgI_2, I_3^-

27. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
A)	An element which can show +8 oxidation state	(i)	Ce
(B)	An element with +7 as the most stable oxidation state in its oxides	(ii)	Pm

Column I		Column II	
(C)	Radioactive lanthanoid	(iii)	Os
(D)	Lanthanoid which shows +4 oxidation state	(iv)	Mn

a) (A) → (i), (B) →(ii), (C)→ (iii), (D) → (iv)
b) (A) →(ii), (B) → (iii), (C)→ (iv), (D) → (i)
c) (A)→ (iv), (B) → (i), (C) → (ii), (D)→ (iii)
d) (A) → (iii), (B) → (iv), (C) → (ii), (D) →(i)

28. Zr and Hf have almost equal atomic and ionic radii because of
a) diagonal relationship b) lanthanoid contraction c) actinoid contraction
d) belonging to the same group

29. Reactivity of transition elements decreases almost regularly from Sc to Cu because of
a) lanthanoid contraction b) regular increase in ionisation enthalpy
c) regular decrease in ionisation enthalpy d) increase in number of oxidation states

30. Although Zirconium belongs to 4d transition series and Hafnium to 5d transition series even then they show similar physical and chemical properties because
a) both belong to d-block b) both have same number of electrons
c) both have similar atomic radius
d) both belong to the same group of the periodic table

31. Acidified potassium dichromate reacts with potassium iodide and oxidises it to I_2.What is the oxidation state of chromium in the products of the reaction?
a) +4 b) +6 c) +3 d) +2

32. Oxidation state of Fe in Fe_3O_4 is :
a) 3/2 b) 4/5 c) 5/4 d) 8/3

33. Potassium dichromate is prepared from
a)
chromate obtained by the fusion of chromite ore with sodium carbonate in free access of air
b) pyrolusite which is fused with potassium hydroxide in the presence of air
c) iron pyrites by the fusion with potassium carbonate in presence of moisture
d) none of these.

34. Which of the following statements is wrong?
a) $Ti^{4+}$and Ag^+ are repelled by magnetic field
b) Mn^{2+} shows maximum magnetic character among the first transition series
c) $Fe^{2+}$is more stable than Mn^{2+} towards oxidation to +3 state
d) Cr in CrO_4^{2-}ion involves sp^3d^2 hybridisation

35. Nitriding is the process of surface hardening of steel by treating it in an atmosphere of :
a) NH_3 b) N_2 c) O_3 d) H_2S

36. Fill the missing products in the following reactions

(i) $2MnO_4^- + 16H^+ + 10I^- \rightarrow 2Mn^{2+} + 8H_2O + \_\_\_\_\_$

(ii) $2MnO_4^- + H_2O + I^- \rightarrow 2Mn_2 + 2OH^- + \_\_\_\_\_$

a) (i) HI; (ii) I_2 b) (i) 12 (ii)IO_3^- c) (i) I_2;(ii) I_2 d) (i) IO_3^-; (ii) I_2

37. Complete the given reaction.

$2Mn^{2+} + 5(i) + 8H_2O \rightarrow 2\ (ii) + 10\ (iii) + 16H^+$

a)

(i)	(ii)	(iii)
SO_4^{2-}	MnO_4^-	$S_2O_8^{2-}$

b)

(i)	(ii)	(iii)
$S_2O_8^{2-}$	MnO_4^-	SO_4^{2-}

c)

(i)	(ii)	(iii)
MnO_4^-	$S_2O_8^{2-}$	SO_4^{2-}

d)

(i)	(ii)	(iii)
$S_2O_8^{2-}$	SO_4^{2-}	MnO_4^-

38. Generally transition elements form coloured salts due to the presence of unpaired electrons. Which of the following compounds will be coloured in solid state?

a) Ag_2SO_4 b) CuF_2 c) ZnF_2 d) Cu_2Cl_2

39. What happens when potassium iodide reacts with acidic solution of potassium dichromate?

a) It liberates iodine b) Potassium sulphate is formed.

c) Chromium sulphate is formed. d) All the above products are formed

40. Which of the following is amphoteric oxide? Mn_2O_7, CrO_3, Cr_2O_3, CrO, V_2O_5, V_2O_4

a) V_2O_5, Cr_2O_3 b) Mn_2O_7, CrO_3 c) CrO, V_2O_5 d) V_2O_5, V_2O_4

41. $E_{Mn^{3+}/Fe^{2+}}$ is highly positive than that of $E_{Cr^{3+}/Cl^{2+}}$ or $E_{Fe^{3+}/Fe^{2+}}$ because:

a) Mn^{2+} (d^5) can be easily oxidised to Mn^{3+}(d^4) due to low ionisation enthalpy

b)

third ionisation enthalpy of Mn is much larger due to stable half filled d^5 electronic configuration of Mn^{2+}

c) Mn^{3+} is more stable than Mn^{2+} due to higher oxidation state

d) second ionisation enthalpy of Mn is higher than third ionisation enthalpy.

42. Which one of the following ionic species will impart colour to an aqueous solution?

a) Ti^{4+} b) Cu^+ c) Zn^{2+} d) Cr^{3+}

43. Identify the incorrect statement among the following:

a) Lanthanoid contraction is the accumulation of successive shrinkages.

b)

As a result of lanthanoid contraction, the properties of 4d series of the transition elements have no similarities with the 5d series of elements.

c) Shielding power of 4f electrons is quite weak.

d) There is a decrease in the radii of the atoms or ions as one proceeds from La to Lu.

44. Identify the incorrect statement among the following

a) 4f and 5f orbitals are equally shielded

b) d-Block elements show irregular and erratic chemical properties among themselves.

c) La and Lu have partially filled d-orbitals and no other partially filled orbitals.

d) The chemistry of various lanthanoids is very similar.

45. General electronic configuration of lanthanides is:
a) (n - 2) f^{1-14} (n - 1) $s^2p^6d^{0-1}ns^2$ b) (n - 2) f^{10-14} (n - 1) $d^{0-1}ns^2$
c) (n - 2) f^{0-14} (n - 1) $d^{10}ns^2$ d) (n - 2) d^{0-1} (n -1)f^{1-14} ns^2

46. Identify the correct order of solubility in aqueous medium.
a) $Na_2S > CuS > ZnS$ b) $Na_2S > ZnS > CuS$ c) $CuS > ZnS > Na_2S$
d) $ZnS > Na_2S > CuS$

47. Which of the following catalysts is not correctly matched with the reaction?
a) Vanadium (V) oxide in contact process for oxidation of SO_2 to SO_3,
b) Finely divided iron in Haber's process in conversion of N, and H_2 to NH_3.
c) $PtCl_2$ catalyses the oxidation of ethyne to ethanal in the Wacker process.
d) Ni in presence of hydrogen for conversion of vegetable oil to ghee.

48. What would happen when a solution of potassium chromate is treated with an excess of dilute nitric acid?
a) $Cr3^+$ and $Cr_2O_7^{2-}$ are formed b) $Cr_2O_7^{2-}$ and H_2O are formed
c) $Cr_2O_4^{2-}$ is reduced to +3 state of Cr d) $Cr_2O_4^{2-}$ is oxidised to +7 state of Cr

49. Mercury is a liquid metal because
a) it has a completely filled d-orbital that prevents d-d overlapping of orbitals
b) it has a completely filled d-orbital that causes d-d overlapping
c) it has a completely filled s-orbital d) it has a small atomic size

50. The transition elements have a general electronic configuration.
a) $ns^2np^6nd^{1-10}$ b) (n - 1)d^{1-10}, ns^{0-2}, np^{0-6} c) (n - 1)d^{1-10}, ns^{1-2} d) nd^{1-10}, ns^2

51. Which one of the following ions exhibits d-d transition and paramagnetism as well?
a) CrO_4^{2-} b) $Cr_2O_7^{2-}$ c) MnO_4^- d) MnO_4^{2-}

52. The electronic configuration of Cu(II) is $3d^9$ whereas that of Cu(I) is $3d^{10}$. Which of the following is correct?
a) Cu(II) is more stable b) Cu(II) is less stable. c) Cu(I) and Cu(II) are equally stable
d) Stability of Cu(I) and Cu(II) depends on nature of copper salts

53. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Cr(VI) in the form of dichromate in acidic medium is a strong oxidising agent where MoO_3 and WO_3 are not.
Reason: In d-block elements higher oxidation states are favoured by heavier members.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

54. Which of the following oxidation states is the most common among the lanthanoids?

a) 4 b) 2 c) 5 d) 3

55. Which of the following statements concerning lanthanide elements is false?
a) All lanthanides are highly dense metals.
b) More characteristic oxidation state of lanthanide elements is +3.
c) Lanthanides are separated from one another by ion exchange method.
d)
Ionic radii of trivalent lanthanides steadily increases with increase in the atomic number.

56. The main reason for larger number of oxidation states exhibited by the actinides than the corresponding lanthanides, is :
a) lesser energy difference between 5f and 6d-orbitals than between 4f and 5d-orbitals
b) larger atomic size of actinides than the lanthanides
c) more energy difference between 5f and 6d-orbitals than between 4f and 5d-orbitals
d) greater reactive nature of the actinides than the lanthanides

57. Which one of the elements with the following outer orbital configuration may exhibit the largest number of oxidation states?
a) $3d^5 4s^1$ b) $3dd4s^2$ c) $3d^2 4s^2$ d) $3d^3 4s^2$

58. Which one of the following is a 'd-block element'?
a) Gd b) Hs c) Es d) Cs

59. Composition of mischmetal is
a) 5% of a lanthanoid metal, 95% of iron and traces of S, C, Ca and Al
b) 95% of an actinoid metal, 5% of iron and traces of S, C, Ca and Al
c) 95% of a lanthanoid metal, 5% of iron and traces of S, C, Ca and Al
d) 95% of a transition metal, 5% of iron and traces of S, C, Ca and Al.

60. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Zn, Cd and Hg are not regarded as transition elements.
Reason : The electronic configurations of Zn, Cd and Hg are represented by the general formula (n - 1)$d^{10}ns^2$
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false.

61. Which of the following is correct representation of reaction of acidified permanganate solution with sulphurous acid?
a) $2MnO_4^{2-} + 5SO_3^{2-} + 6H^+ \rightarrow 5SO_4^{2-} + 2Mn^{2+} + 3H_2O$
b) $MnO_4^- + SO_3^{2-} + 2H_2O \rightarrow S + Mn^{2+} + 4H^+$
c) $2MnO_4^- + 5SO_3^{2-} + 2H_2O \rightarrow 4SO_4^{2-} + Mn^{2+} + 4H^+$
d) $3MnO_4^- + 2SO_3^{2-} + 2H_2O \rightarrow 2S + 3Mn^{2+} + 4H^+$

62. When acidified $K_2Cr_2O_7$ solution is added to Sn^{2+} salts, then Sn^{2+} changes to
a) Sn b) Sn^{3+} c) Sn^{4+} d) Sn^{+}

63. In which of the following ions, the colour is not due to d-d transition
a) $[Ti(H_2O)_6]^{3+}$ b) $[Cu(NH_3)4]^{2+}$ c) $[CoF_6]^{3-}$ d) CrO_4^{2-}

64. The melting point of copper is higher than that of zinc because
a) the s, p as well as d-electrons of copper are involved in metallic bonding
b) the atomic volume of copper is higher
c) the d-electrons of copper are involved in metallic bonding
d) the s as well as d-electrons of copper are involved in metallic bonding

65. Match the column I with column II and mark the appropriate choice.

	Column I (Property)		**Column II (Metal)**
(A)	Element with highest second ionisation enthalpy	(i)	Cr
(B)	Element with highest third ionisation enthalpy	(ii)	Cu
(C)	M in $M(CO)_6$ is	(iii)	Zn
(D)	Element with highest heat of atomisation	(iv)	V

a) (A)→(ii), (B) → (iii), (C)→(i), (D) →(iv)
b) (A)→(iv), (B) → (iii), (C)→ (i), (D) → (ii)
c) (A) → (iii), (B) → (i), (C) → (ii), (D) → (iv)
d) (A) → (i), (B) → (ii), (C) → (iii), (D) →(iv)

66. The correct configuration off-block elements is:
a) $(n - 2)f^{1-14}$ $(n - l)d^{0-1}$ ns^2 b) $(n - 1)f^{1-14}$ $(n - 1)d^{0-1}$ ns^2
c) $(n - 3)f^{1-14}$ $(n - 1)d^{0-1}$ $(n-1)s^2$ d) $(n - 2)f^{1-14}(n - 1)d^{0-1}$ ns^2

67. Gadolinium belongs to 4f series. Its atomic number is 64. Which of the following is the correct electronic configuration of gadolinium?
a) $[Xc]4f^{-9}5s^1$ b) $[Xe]4f^7 5\,d6\,s^2$ c) $[Xe]4f^6 5d^2 6s^2$ d) $[Xe]4f^8 6d^2$

68. Reason of lanthanoid contraction is _____ .
a) Negligible screening effect of 'f-orbitals. b) Increasing nuclear charge.
c) Decreasing nuclear charge. d) Decreasing screening effect

69. Which of the following transition metal ions is colourless?
a) V^{2+} b) Cr^{3+} c) Zn^{2+} d) Ti^{3+}

70. In which of the following compounds manganese has oxidation number equal to that of iodine in KIO_4?
a) Potassium manganate b) Potassium permanganate
c) Dimanganese decacarbonyl d) Manganese chloride

71. The common oxidation state shown by Europium in their compounds is
a) +1 b) +3 c) +5 d) +6

72. Cu^{+} ion is not stable in aqueous solution because

a) second ionisation enthalpy of copper is less than the first ionisation enthalpy

b)

large value of second ionisation enthalpy of copper is compensated by much more negative hydration energy of $Cu^{2+}_{(aq)}$

c) hydration energy $Cu^{2+}_{(aq)}$ s much more negative than that of $Cu^{2+}_{(aq)}$

d)

many copper (I) compounds are unstable in aqueous solution and undergo disproportionation reaction.

73. Interstitial compounds are formed when small atoms are trapped inside the crystal lattice of metals. Which of the following is not the characteristic property of interstitial compounds?

a) They have high melting points in comparison to pure metals. b) They are very hard

c) They retain metallic conductivity d) They are chemically very reactive.

74. Which of the following d-block element has halffilled penultimate as well as valence subshell?

a) Cu b) Au c) Ag d) Cr

75. Actinides:

a) are all synthetic elements b) include element 104 c) have any short-lived isotopes d) have variable valency

76. Which of the following lanthanoid ions is diamagnetic? (Atomic number Ce = 58, Sm = 62, Eu = 63, Yb = 70)

a) Ce^{2+} b) Sm^{2+} c) Eu^{2+} d) Yb^{2+}

77. When MnO_2 is fused with KOH and O_2, what is the product formed and its colour?

$MnO_2 + KOH + O_2 \rightarrow$ ____?____ $+ H_2O$

a) MnO - colourless b) $KMnO_4$ - purple c) K_2MnO_4 - dark green d) MnO_3 - black

78. $K_2Cr_2O_7$ on heating with aqueous NaOH gives:

a) CrO_4^{2-} b) $Cr(OH)_3$ c) $Cr_2O_7^{2-}$ d) $Cr(OH)_2$

79. The electronic configurations of Eu (Atomic No. 63), Gd (Atomic No. 64) and Tb (Atomic No. 65) are:

a) $[Xe]4f^6\ 5d^1\ 6s^2$, $[Xe]4f^7\ 5d^1\ 6s^2$ and $[Xe]4f^8\ 5d^1\ 6s^2$

b) $[Xe]4f^7\ 6s^2$, $[Xe]4f^7\ 5d^1\ 6s^2$and $[Xe]4f^9\ 6s^2$

c) $[Xe]4f^7\ 6s^2$, $[Xe]4f^8\ 6s^2$ and $[Xe]4f^8\ 5d^1\ 6s^2$

d) $[Xe]4f^6\ 5d^1\ 6s^2$, $[Xe]4f^7\ 5d^1\ 6s^2$ and $[Xe]4f^9\ 6s^2$

80. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: Copper(II) iodide is not known.

Reason: Cu^{2+} oxidises I^- to I_2,

a)
If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false.

81. Because of lanthanoid contraction, which of the following pairs of elements have nearly same atomic radii ? (Numbers in the parenthesis are atomic numbers).
a) Ti (22) and Zr (40) b) Zr (40) and Nb (41) c) Zr (40) and Hf (72)
d) Zr (40) and Ta (73)

82. One mole of acidified $K_2Cr_2O_7$ on reaction with excess KI will liberate mole(s) of I_2
a) 3 b) 1 c) 7 d) 2

83. Which one of the following elements shows maximum number of different oxidation states in its compounds?
a) Eu b) La c) Gd d) Am

84. Which of the following arrangements does not represent the correct order of the property stated against it?
a) $Ni^{2+} < Co^{2+} < Fe^{2+} < Mn^{2+}$: ionic size
b) $Co^{3+} < Fe^{3+} < Cr^{3+} < Sc^{3+}$: stability in aqueous solution
c) Sc < Ti < Cr < Mn : number of oxidation states
d) $V^{2+} < Cr^{2+} < Mn^{2+} < Fe^{2+}$: paramagnetic behaviour

85. An atom has electronic configuration
$1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2$, you will place it in
a) Fifth b) Fifteenth c) Second d) Third

86. Which of the following has been arranged in order of increasing bond strength?
a) $Zn^{2+}{}_2 < Hg^{2+}{}_2 < Cd^{2+}{}_2$ b) $Cd^{2+}{}_2 < Hg^{2+}{}_2 < Zn^{2+}{}_2$ c) $Zn^{2+}{}_2 < Cd^{2+}{}_2 < Hg^{2+}{}_2$
d) $Hg^{2+}{}_2 < Cd^{2+}{}_2 < Zn^{2+}{}_2$

87. Which of the following have maximum and minimum ionic character out of MnO, MnF_2, MnO_2, Mn_2O_7?
a) MnO, Mn_2O_7 respectively b) MnF_2, Mn_2O_7 respectively
c) MnO_2, MnO respectively d) Mn_2O_7, MnO respectively

88. Which one of the following statements is correct when SO_2 is passed through acidified $K_2C_r2O_7$ solution?
a) SO_2 is reduced. b) Green $Cr_2(SO_4)_3$ is formed. c) The solution tums blue.
d) The solution is decolourised.

89. Which one of the following does not correctly represent the correct order of the property indicated against it?
a) $Ti < V < Cr < Mn$: increasing number of oxidation states.
b) $Ti^{3+} < V^{3+} < Cr^{3+} < Mn^{3+}$: increasing magnetic moment.

c) $Ti < V < Cr < Mn$: increasing melting points.

d) $Ti < V < Mn < Cr$: increasing 2nd ionization enthalpy.

90. If M is the element of actinoid series, the degree of complex formation decrease in the order

a) $M^{4+} > M^{3+} > MO_2^{2+} > MO_2^+$ b) $MO_2^+ > MO_2^{2+} > M^{3+} > M^{4+}$

c) $M^{4+} > MO_2^{2+} > M^{3+} > MO_2^+$ d) $M_2^{2+} < M_2^+ < M^{4+} > M^{3+}$

91. The catalytic activity of transition metals and their compounds in ascribed mainly to _____ .

a) Their magnetic behaviour b) Their unfilled d-orbital

c) Their ability to adopt variable oxidation states d) Their chemical reactivity.

92. The salts of Cu in +1 oxidation state are unstable because

a) Cu^+ has $3d^{10}$ configuration b) Cu^+ disproportionates easily to Cu(O) and Cu^{2+}

c) Cu^+ disproportionates easily to Cu^{2+} and Cu^{3+} d) Cu^+ is easily reduced to Cu^{2+}.

93. The aqueous solution containing which one of the following ions will be colourless? (Atomic number: $Sc = 21, Fe = 26, Ti = 22, Mn = 25$)

a) Sc^{3+} b) Fe^{2+} c) Ti^{3+} d) Mn^{2+}

94. Identify the species in which the metal atom is in +6 oxidation state.

a) MnO_4^- b) $[Cr(CN)_6]^{3-}$ c) $[NiF_6]^{2-}$ d) CrO_2Cl_2

95. Which of the following statements is not correct?

a) Copper liberates hydrogen from acids.

b)

In higher oxidation states, manganese forms stable compounds with oxygen and fluorine

c) Mn^{3+} and CO^{3+} are oxidising agents in aqueous solution

d) $Tl^{2+}$and Cr^{2+} are reduuccimg agentsSn^+aqueous solution.

96. The correct order of number of unpaired electrons is

a) $Cu^{2+} > Ni^{2+} > Cr^{3+} > Fe^{3+}$ b) $Ni^{2+} > Cu^{2+} > Fe^{3+} > Cr^{3+}$ c) $Fe^{3+} > Cr^{3+} > Ni^{2+} > Cu$

d) $Cr^{3+} > Fe^{3+} > > Ni^{2+} > Cu^{2+}$

97. Which one of the following transition element has the lowest value of enthalpy of atomization?

a) Cr b) Cu c) Zn d) Mn

98. The magnetic moment of a divalent ion in aqueous solution with atomic number 25 is

a) 5.9 B.M b) 2.9 B.M c) 6.9 B.M d) 9.9 B.M.

99. Magnetic moment of Ce^{3+} ion on the basis of 'spin only' formula will be _____ B.M

a) 1.232 b) 1.332 c) 1.332 d) 1.732

100. While extracting an element from its ore, the ore is grind and leached with dil. KCN solution to form the soluble product potassium argento-cyanide. The element is

a) lead b) chromium c) manganese d) silver

101. Which one of the following statements related to lanthanoids is incorrect?

a) Europium shows +2 oxidation state.
b) The basicity decreases as that ionic radius decreases from Pr to Lu.
c) All the lanthanons are much more reactive than aluminium.
d) Ce(+4) solutions are widely used as oxidizing agent in volumetric analysis.

102. General electronic configuration of transition metals is
a) $(n - 1)d^{1-10}ns^2$ b) $nd^{10}ns^2$ c) $(n - 1)d^{10}ns^2$ d) $(n - 1)d^{1-5}ns^2$

103. When a substance A reacts with water it produces a combustible gas B and a solution of substance C in water. When another substance D reacts with this solution of C, it also produces the same gas B on warming but D can also produce gas B on reaction with dilute sulphuric acid at room temperature. A imparts a deep golden yellow colour to a smokeless flame of Bunsen burner. A, B, C and D, respectively are _____ .
a) $Na, H_2, NaOH, Zn$ b) K, H_2, KOH, Al c) $CaH_2, Ca(OH)_2, Sn$
d) $CaC_2, C_2H_2, Ca(OH)_2, Fe$

104. Four successive members of the first row transition elements are listed below with their atomic numbers. Which one of them is expected to have the highest third ionisation enthalpy?
a) Vanadium (Z=23) b) Chromium (Z=24) c) Manganese(Z=25) d) Iron(Z=26)

105. Which of the following processes does not involve oxidation of iron?
a) Formation of $Fe(CO)_5$ from Fe
b) Liberation of H_2 from steam by iron at a high temperature. c) Rusting of iron sheets
d) Decolourisation of blue $CuSO_4$ solution by iron

106. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: The ability of oxygen to stabilize high oxidation states exceeds that of fluorine.
Reason: The highest oxidation number in the oxides coincides with the group number.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

107. $CuSO_4$ when reacts with KCN forms CuCN which is insoluble in water. It is soluble in excess of KCN due to the formation of the complex:
a) $K_2[Cu(CN)]_4$ b) $K_3[Cu(CN)]_4$ c) $Cu(CN)]_2$ d) $Cu[KCu(CN)_4]$

108. Which of the following transition metal ions has highest magnetic moment?
a) Cu^{2+} b) Ni^{2+} c) CO^{2+} d) Fe^{2+}

109. Photographic plates and films have an essential ingredient of :
a) silver nitrate b) silver bromide c) sodium chloride d) oleic add

110. For Zn^{2+}, Ni^{2+}, Cu^{2+} and Cr^{2+} which of the following statements is correct?

a) Only Zn^{2+} is colourless and Ni^{2+}, Cu^{2+} and Cr^{2+} are coloured.

b) All the ions are coloured c) All the ions are colourless.

d) Zn^{2+} and Cu^{2+} are colourless while Ni^{2+} and Cr^{2+} are coloured

111. Among the following series of transition metal ions, the one in which all metal ions have $3d^2$ electronic configuration is : (Atomic number Ti = 22,Y = 23,Cr = 24,Mn = 25)
a) Ti^{3+}, v^{2+}, Cr^{3+}, Mn^{4+} b) Ti^{+}, V^{4+}, Cr^{6+}, Mn^{7+} c) Ti^{4+}, v^{3+}, Cr^{2+}, Mn^{3+}
d) Ti^{2+}, v^{3+}, Cr^{4+}, Mn^{5+}

112. The electronic configuration of Eu (Atomic No. 63), Gd (Atomic No. 64) and Tb (Atomic No. 65) are _____ .
a) $[Xe]4f6\ s'6s^2,\ v.\ [Xe]4f^7 5\ d'6s^2 and [Xe]4f^8 5\ d6s^2$
b) $[Xe]4f^7 6s^2, [Xe]4f^7 5\ d'6s^2 and [Xe]4f^9 6s^2$
c) $[Xe]4f'6s^2, [Xe]4f^8 6s^2 and [Xe]4f^8 5\ d6s^2$
d) $[Xe]4^6 5d6s^2, [Xe]4f^7 5\ d^6 6s^2 and [Xe]4f^9 6s^2$

113. The correct order of decreasing second ionisation enthalpy of Ti(22), V(23), Cr(24) and Mn(25) is _____ .
a) $Mn > Cr > Ti > V$ b) $Ti > V > Cr > Mn$ c) $Cr > Mn > V > Ti$
d) $V > Mn \geq Cr > Ti$

114. More number of oxidation states are exhibited by the actinides than by the lanthanides. The main reason for this is :
a)
more energy difference between 5f and 6d-orbitals than that between 4f and 5d-orbitals
b)
lesser energy difference between 5f and 6d-orbitals than that between 4f and 5d-orbitals
c) greater metallic character of the lanthanides than that of the corresponding actinides
d) more active nature of the actinides

115. Which one of the following statements is correct when SO_2 is passed through acidified $K_2Cr_2O_7$ solution?
a) SO_2 is reduced. b) Green $Cr_2(SO_4)_3$ is formed. c) The solution turds blue.
d) The solution is decolourised

116. By pasing $H_3\ S$ gas in acidified $KMnO_4$ solution, wé get _____ .

a) S b) $K_2\ S$ c) MnO_2 d) K_2SO_3

117. On addition of small amount of $KMnO_4$ to concentrated H_2SO_4, a green oily compound is obtained which is highly explosive in nature. Identify the compound from the following.
a) Mn_2O_7 b) MnO_2 c) $MnSO_4$ d) Mn_2O_3

118. Which of the following is not an amphoteric ion?
a) Al^{3+} b) Cr^{3+} c) Fe^{2+} d) Zn^{2+}

119. Which of the following ions has electronic configuration $[Ar]3\ d^6$?
(At. nos. $Mn = 25, Fe = 26, Co = 27, Ni = 28$)

a) N_1^{3+} b) Mn^{3+} c) Fe^{3+} d) Co^{3+}

120. When $KMnO_4$ solution is added to oxalic acid solution , the decolourisation is slow in the beginning but becomes instantaneous after some time because
a) CO_2 is formed as the product b) reaction is exothermic
c) MnO^{4+}catalyses the reaction d) Mn^{2+} acts as auto catalyst.

121. The equation $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_2 + 2H_2O$ represents
a) reduction b) disproportionation c) oxidation in acidic medium
d) reduction in acidic medium.

122. In context with the transition elements, which of the following statements is incorrect?
a)
In addition to the normal oxidation states, the zero oxidation state is also shown by these elements in complexes
b)
In the highest oxidation states, the transition metals show basic character and form cationic complexes
c)
In the highest oxidation states of the first five transition elements (Sc to Mn), all the 4s and 3d electrons are used for bonding
d)
Once the d^5 configuration is exceeded, the tendency 1'0 involve all the 3d-electrons in bonding decreases

123. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Ce^{4+} is good analytical reagent.
Reason: Ce^{4+} has the tendency to change to Ce^{3+}.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

124. The oxidation state of Cr in $K_2Cr_2O_7$ is:
a) +5 b) +3 c) +6 d) +7

125. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: In acidic medium, $K_2Cr_2O_7$ exists as CrO_4^{2-} - (orange) while in basic medium it is converted to CrO_4^{2-} - (yellow).
Reason: $K_2Cr_2O_7$ is hygroscopic in nature and changes colour on reaction with water.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

126. Which of the following statements for the reaction, is correct?
$Na_2CrO_4 + H_2SO_4 \longrightarrow$
a) It is a redox reaction in which green solution of $[Cr(H_2O)_6]^{+3}$is produced
b) One of the product in reaction has trigonal planar structure.
c) Dimeric bridged tetrahedral metal ion is produced.
d) Dark blue colour is obtained in reaction

127. Select the correct option, among Sc(III), Ti(IV), Pd(II) and Cu(II) ions
a) all are paramagnetic b) all are diamagnetic
c) Sc(III), Ti(IV) are paramagnetic and Pd(rII), Cu(II) are diamagnetic
d) Sc(III), Ti(IV) are diamagnetic and Pd(II), Cu(II) are paramagnetic.

128. The melting points of Cu, Ag and Au follow the order
a) Cu > Ag > Au b) Cu > Au > Ag c) Au > Ag >Cu d) Ag > Au > Cu

129. In which of the following pairs are both the ions coloured in aqueous solution? (Atomic number Sc = 21,Ti = 22,Ni = 28,Cu = 29, Co = 27)
a) Ni^{2+}, Ti^{3+} b) Sc^{3+}, Ti^{3+} c) Sc^{3+}, CO^{2+} d) Ni^{2+}, Cu^{+}

130. $KMnO_4$ acts as an oxidising agent in acidic medium. The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphide ions in acidic solution is
a) $\frac{2}{5}$ b) $\frac{3}{5}$ c) $\frac{4}{5}$ d) $\frac{1}{5}$

131. The most common lanthanoid is
a) lanthanum b) cerium c) samarium d) plutonium

132. Transition metals make the most efficient catalysts because of their ability to
a) adopt multiple oxidation states and to form complexes b) form coloured ions
c) show paramagnetism due to unpaired electrons d) form a large number of oxides

133. Due to lanthanoid contraction which of the following properties is not expected to be similar in the same vertical columns of second and third row transition elements?
a) Atomic radii b) Ionisation energies c) Magnetic moments d) Lattice energies

134. Which of the following ions will exhibit colour in aqueous solutions?
a) La^{3+} (Z = 57) b) Ti^{3+} (Z = 22) c) Lu^{3+} (Z = 71) d) Sc^{3+}(Z = 21)

135. The number of unpaired electrons in gaseous species of Mn^{3+}, Cr^{3+} and V^{3+} respectively are _____ and the most stable species is_____
a) 4,3 and 2; V^{3+} b) 3,3 and 2; Cr^{3+} c) 4,3 and 2; Cr^{3+} d) 3,3 and 3; Mn^{3+}

136. Which of the following are basic oxides?
Mn_2O_7, V_2O_3, V_2O_5, CrO, Cr_2O_3

a) Mn_2O_7 and V_2O_3 b) V_2O_3 and CrO c) CrO and Cr_2O_3 d) V_2O_5 and V_2O_3

137. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: Cr^{2+} is reducing and Mn^{3+} is oxidising.

Reason: Cr^{2+} and Mn^{3+} have d^4 configuration.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false.

138. Which of the following shows maximum number of oxidation states?

a) Cr b) Fe c) Mn d) V

139. In the silver plating of copper, $K[Ag(CN)_2]$is used instead of $AgNO_3$. The reason is

a) a thin layer of Ag is formed on Cu b) more voltage is required

c) Ag^+ ions are completely removed from solution

d) less availability of Ag^+ ions, as Cu cannot displace Ag from $[Ag(CN)_2]^-$ ion

140. The reason for greater range of oxidation states in actinoids is attributed to :

a) The radioactive nature of actinoids b) Actinoid contraction

c) 5f, 6d and 7 is levels having comparable energies

d) 4f and 5d levels being close in energies

141. In which of the following compounds, transition metal has zero oxidation state?

a) $Fe(CO)_5$ b) $NH_2.NH_2$ c) $NOClO_4$ d) CrO_5

142. When $CuSO_4$ is electrolysed using platinum electrodes?

a) Copper is liberated at cathode, sulphur at anode

b) Copper is liberateri at cathode, oxygen at anode

c) Sulphur is liberated at cathode, oxygen at anode

d) Oxygen is liberated at cathode, copper at anode

143. Actinoids in general show more oxidation states than the lanthanoids. The main reason for this is

a) higher energy difference between 5f and 6d orbitals than between 4f and 5d orbitals

b) lower energy difference between 5f and 6d orbitals than between 4f and 5d orbitals

c) higher reactivity of actinoids than lanthanoids

d) actinoids are more basic than lanthanoids

144. The first ionisation energies of the elements of the first transition series (Ti to Cu)

a) increases as the atomic number increases

b) decreases as the atomic number increases

c)
do not show any change as the addition of electrons takes place in the inner (n - l)d orbitals

d) increases from Ti to Mn and then decreases from Mn to Cu.

145. When an oxide of manganese (P) is fused with KOH in the presence of an oxidising agent and dissolved in water, it gives a dark green solution of compound (Q). Compound (Q) disproportionates in neutral or acidic solution to give purple compound (R).
An alkaline solution of compound (R) oxidises potassium iodide solution to a compound (S) and compound (P) is also formed. Compounds P to 5 are

a)

P	Q	R	S
MnO_4^-	KIO_3	MnO_2	K_2Mn0_4

b)

P	Q	R	S
MnO_2	K_2MnO_4	MnO_4^-	KIO_3

c)

P	Q	R	S
MnO_2	MnO_4^-	K_2MnO_4	KIO_3

d)

P	Q	R	S
K_2MnO_4	MnO_2	MnO_4^-	KIO_3

146. For the four successive transition elements (Cr, Mn, Fe and Co), the stability of +2 oxidation state will be there in which of the following order? (Atomic number Cr = 24, Mn = 25, Fe =26, Co = 27)
a) Fe > Mn > Co > Cr b) Co > Mn > Fe > Cr c) Cr > Mn > Co > Fe
d) Mn > Fe > Cr > Co

147. The correct order of ionic radii of y^{3+}, La^{3+},Eu^{3+} and $Lu^{3+}$is
a) $Lu^{3+} < Eu^{3+} < La^{3+} < y^{3+}$ b) $La^{3+} < Eu^{3+} < Lu^{3+} < y^{3+}$ c) $y^{3+} < La^{3+} < Eu^{3+} < Lu^{3+}$
d) $y^{3+} < Lu^{3+} < Eu^{3+} < La^{3+}$

148. Which of the following elements is responsible for oxidation of water to O_2 in biological processes?
a) Fe b) Cu c) Mn d) Mo

149. There are 14 elements in actinoid series. Which of the following elements does not belong to this series?
a) U b) Np c) Tm d) Fm

150. For the four successive transition elements (Cr, Mn, Fe and Co), the stability of +2 oxidation state will be there in which of the following order?
(At. nos. $\mathrm{Cr} = 24, \mathrm{Mn} = 25, \mathrm{Fe} = 26, \mathrm{Co} = 27$)
a) $\mathrm{Mn} > \mathrm{Fe} > \mathrm{Cr} > \mathrm{Co}$ b) $\mathrm{Fe} > \mathrm{Mn} > \mathrm{Co} > \mathrm{Cr}$ c) $\mathrm{Co} > \mathrm{Mn} > \mathrm{Fe} > \mathrm{Cr}$
d) $\mathrm{Cr} > \mathrm{Mn} > \mathrm{Co} > \mathrm{Fe}$

151. What is the total number of inner transition elements in the periodic table?
a) 10 b) 14 c) 30 d) 28

152. The number of moles of $KMnO_4$ that are needed to react completely with one mole of ferrous oxalate in acidic solution is
a) 3/5 b) 2/5 c) 4/5 d) 1

153. Which of the following lanthanoid ions is diamagnetic?
$(\mathrm{At.\ nos.\ Ce} = 58, \mathrm{Sm} = 62, \mathrm{Eu} = 63, \mathrm{Yb} = 70\ )$

a) Eu^{2+} b) Yb^{2+} c) Ce^{2+} d) Sm^{2+}

154. Which one of the following is an ore of silver?
a) Argentite b) Stibnite c) Haematite d) Bauxite

155. Stainless steel contains iron and:
a) Cr + Ni b) Cr + Zn c) Zn + Pb d) Fe + Cr + Ni

156. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: $KMnO_4$ acts as an oxidising agent in acidic, basic or neutral medium.
Reason: $KMnO_4$ oxidises ferrous sulphate to ferric sulphate.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

157. Gadolinium belongs to 4f series. It's atomic number is 64. Which of the following is the correct electronic configuration of gadolinium?
a) $[Xe]4f^8\ 6s^2$ b) $[Xe]4f^9\ 5s^1$ c) $[Xe]4f^7\ 5d^1\ 6s^2$ d) $[Xe]4f^6\ 5d^2\ 65^2$

158. Which one of the following characteristics of the transition metals is associated with their catalytic activity
a) Colour of hydrated ions b) Variable oxidation states
c) High enthalpy of atomisation d) Paramagnetic behaviour

159. In which of the following pairs are both the ions coloured in aqueous solution?
(At. no.: $Sc = 21, Ti = 22, Ni = 28, Cu = 29, Co = 27$)
a) Ni^{2+}, Cu^{+} b) Ni^{2+}, Ti^{3+} c) Sc^{3+}, Ti^{3+} d) Sc^{3+}, Co^{2+}

160. Lanthanides are:
a)
14 elements in the sixth period (Atomic number = 90 to 103) that are filling 4f sub-level
b)
14 elements in the seventh period (Atomic number = 90 to 103) that are filling 5f sub-level
c) 14 elements in the sixth period (Atomic number = 58 to 71) that are filling 4f sub-level
d)
14 elements in the seventh period (Atomic number = 58 to 71) that are filling 4f sub-level

161. Fe^{3+} compounds are more stable than Fe^{2+} compounds because
a) Fe^{3+} has smaller size than Fe^{2+} b) Fe^{3+} has $3d^5$ configuration (half-filled)
c) Fe^{3+} has higher oxidation state d) Fe^{3+} is paramagnetic in nature

162. V_2O_5 reacts with alkalies as well as acids to give:
a) $VO_4^{3-}\ and\ VO^{2+}$ b) $VO_4^{3-}\ and\ VO^{2+} and\ VO_4^{+}$ c) $VO_2^{+}\ and\ VO^{2+}$ d) $VO_4^{3-}\ and\ VO_4^{+}$

163. Which of the following reactions do not result in the preparation of potassium dichromate from chromate?

(I) $4FeCr_2O_4 + 8Na_2CO_3 + 7O_2 \longrightarrow$

(II) $Na_2CrO_4 + H_2SO_4 \longrightarrow$

(III) $Na_2Cr_2O_7 + 2KCl \longrightarrow$

a) (I) and (II) b) (II) and (III) c) (I) and (III) d) (I), (II) and (III)

164. The colour of $KMnO_4$ disappears when oxalic acid is added to its solution in acidic medium. This can be explained as:

a) the pH of the solution changes on adding oxalic acid, hence $KMnO_4$ is decolourised.

b)

$KMnO_4$ oxidises oxalic acid to CO_2 and it self changes to Mn^{2+} ions which are colourless.

c) $KMnO_4$ is oxidised to potassium sulphate which is colourless.

d) on exposure to air the acidic solution of $KMnO_4$ becomes colourless.

165. The most durable metal plating on iron to protect against corrosion is :

a) nickel plating b) tin plating c) copper plating d) zinc plating

166. Interstitial compounds are

a) non-stoichiometric and are ionic in nature

b) non-stoichiometric and are covalent in nature

c) non-stoichiometric and are neither typically ionic nor covalent in nature

d) stoichiometric and are neither ionic nor covalent in nature.

167. In the following transition metals, the maximum number of oxidation states are exhibited by

a) chromium (Z = 24) b) manganese (Z = 25) c) iron (Z = 26) d) titanium (Z = 22)

168. Which of the following statements about the interestital compound is incorrect?

a) They are much harder than the pure metal.

b) They have higher melting points than the pure mental.

c) They retain metallic conductivity. d) They are chemically reactive.

169. A violet compound of manganese (P) decomposes on heating to liberate oxygen and compounds (Q) and (R) of manganese are formed. Compound (R) reacts with KOH in the presence of potassium nitrate to give compound (Q). On heating compound (R) with conc. H_2SO_4 and NaCl, chlorine gas is liberated and a compound (5) of manganese along with other products is formed. Compounds P to S are

a)

P	Q	R	S
$KMnO_4$	K_2MnO_4	$MnCl_2$	MnO_2

b)

P	Q	R	S
K_2MnO_4	MnO_2	$KMnO_4$	$MnCl_2$

c)

P	Q	R	S
$KMnO_4$	K_2MnO_4	MnO_2	$MnCl_2$

d)

P	Q	R	S
K_2MnO_4	$KMnO_4$	MnO	$MnCl_2$

170. Following order is observed. in oxidising power of certain ions:

$VO_2^+ < Cr_2O_7^{-2} < MnO_4^-$

The reason for this increasing order of oxidising power is

a) increasing stability of the lower species to which they are reduced

b) increasing stability of the higher species to which they are oxidised

c) increasing stability of the higher species to which they are reduced

d) increasing stability of the lower species to which they are oxidised.

171. When $(NH_4)_2Cr_2O_7$ is heated, the gas evolved is :

a) N_2 b) NO_2 c) O_2 d) N_2O

172. Among the lanthanides, the one obtained by synthetic method is :

a) Pr b) Gd c) Lu d) Pm

173. Which of the following exhibits only +3 oxidation state?

a) U b) Th c) Ac d) Pa

174. Complete the following reactions.

(i) $MnO_4^- + 2H_2O + 3e^- \rightarrow \_\_\_ + 4OH^-$

(ii) $MnO_4^- + 8H^+ + 5e^- \rightarrow \_\_\_ + 4H_2O$

(iii) $MnO_4^- + e^- \rightarrow \_\_\_\_$

a) MnO_2, Mn^{2+},MnO_4^- b) Mn^{2+}, MnO_2,MnO_4^- c) MnO_4^-,Mn^{2+}, MnO_2

d) MnO_2,MnO_4^-,Mn^{2+}

175. Consider the following statements with respect to lanthanides:

1. The basic strength of hydroxides oflanthanides increases from $La(OH)_3$ to $Lu(OH)_3$.

2. The lanthanide ions Lu^{3+}, Yb^{2+} and Ce^{4+} are diamagnetic.

Which of the statement(s) given above is/are correct?

a) 1 only b) 2 only c) Both 1 and 2 d) Neither 1 nor 2

176. Lanthanoids are

a) 14 elements in the sixth periods (atomic no. 90 to 103) that are filling 4f sublevel.

b)

14 elements in the seventh period (atomic number = 90 to103) that are filling 5f sublevel

c)

l4 elements in the sixth period (atomic number = 58 to 71) that are filling the 4f sublevel.

d)

14 elements in the seventh period (atomic number = 50 to 71) that are filling 4f sublevel.

177. Which of the following has more unpaired d-electrons?

a) Zn+ b) Fe2+ c) N3+ d) Cu+

178. Transition elements form binary compounds with halogens. Which of the following elements will form MF_3 type compounds?

a) Cr b) Cu c) Ni d) All of these.

179. Magnetic moment 2.84 B.M. is given by (At. nos. Ni=28, Ti=22, Cr=24, Co=27)

a) Cr^{2+} b) Co^{2+} c) Ni^{2+} d) Ti^{3+}

180. Which one of the following ions is the most stable in aqueous solution?
(At. No. $\mathrm{Ti} = 22,\ \mathrm{V} = 23, \mathrm{Cr} = 24, \mathrm{Mn} = 25$)
a) V^{3+} b) Ti^{3+} c) Mn^{3+} d) Cr^{3+}

181. Why is HCl not used to make the medium acidic in oxidation reactions of $KMnO_4$ in acidic medium?
a) Both HCl and $KMnO_4$ act as oxidising agents
b) $KMnO_4$ oxidises HCl into Cl_2 which is also an oxidising agent.
c) $KMnO_4$ is a weaker oxidising agent than HCl
d) KMnO acts as a reducing agent in the presence of HCl.

182. Which group contains coloured ions out of the following?
1. Cu^+
2. Ti^{4+}
3. CO^{2+}
4. Fe^{2+}
a) 1,2,3,4 b) 3,4 c) 2,3 d) 1,2

183. Cerium (Z = 58) is an important member of the lanthanoids. Which of the following statements about cerium is incorrect?
a) The common oxidation states of cerium are +3 and +4.
b) The +3 oxidation state of cerium is more stable than +4 oxidation state.
c) The +4 oxidation state of cerium is not known in solutions.
d) Cerium (IV) acts as an oxidising agent.

184. Which of the statements is not true?
a) On passing H_2S through acidified $K_2Cr_2O_7$ solution, a milky colour is observed.
b) $Na_2Cr_2O_7$ is preferred over $K_2Cr_2O_7$ in volumetric analysis.
c) $K_2Cr_2O_7$, solution is acidic medium is orange
d) $K_2Cr_2O_7$, solution becomes yellow on increasing the pH beyond 7.

185. The lanthanide contraction is responsible for the fact that
a) Zr and Yt have about the same radius b) Zr and Nb have similar oxidation states
c) Zr and Hf have about the same radius d) Zr and Zn have the same oxidation state

186. Match the metal ions given in Column I with the spin magnetic moments of the ions given in Column II and assign the correct code:

Column-I	Column-II
A. CO^{3+}	$(i)\sqrt{8}B.M.$
B. Cr^{3+}	$(ii)\sqrt{35}B.M.$
C. Fe^{3+}	$(iii)\sqrt{3}B.M.$
D. Ni^{2+}	$(iv)\sqrt{24}B.M.$
	$(v)\sqrt{15}B.M.$

a) A B C D (a)(iv)(v)(ii)(i)
b) A B C D (b)(i)(ii)(iii)(iv)
c) A B C D (c)(iv)(i)(ii)(iii)
d) A B C D (d)(iii)(v)(i)(ii)

187. Which of the following may be considered to be an organometallic compound?

a) Nickel tetracarbonyl b) Chlorophyll c) $K_3[Fe(C_2O_4)_3]$ d) $[Co(en_3]Cl_3$

188. Which of the following reactions is not correct?
a) $MnO_4^- + 8H^+ + 5Fe_2+ \rightarrow 5Fe^{3+} + Mn^{2+} + 4H_2O$
b) $2MnO_2 + 4KOH + O_2 \rightarrow 4KMnO_4 + 2H_2O$
c) $2Na_2CrO_4 + 2H^+ \rightarrow Na_2Cr2O_7 + 2Na^+ + H_2O$
d) $K_2Cr_2O_7 + 7H_2SO_4 + 6KI \rightarrow 4K_2SO_4 + Cr_2(SO_4)_3 + 3I_2 + 7H_2O$

189. Which one is malachite from the following?
a) $Cu(OH)_2$ b) Fe_3O_4 c) $CuCO_3 \cdot Cu(OH)_2$ d) $CuFeS_2$

190. In neutral or faintly alkaline medium, thiosulphate is quantitatively oxidized by $KMnO_4$ to
a) SO_3^{2-} b) SO_4^{2-} c) SO_2 d) SO_5^{2-}

191. The correct order of ionic radii of Ce, La, Pm and Yb in +3 oxidation state is
a) $La^{3+} < Pm^{3+} < Ce^{3+} < Yb^{3+}$ b) $Yb^{3+} < Pm^{3+} < Ce^{3+} < La^{3+}$
c) $La^{3+} < Ce^{3+} < Pm^{3+} < Yb^{3+}$ d) $Yb^{3+} < Ce^{3+} < Pm^{3+} < La^{3+}$

192. Metallic radii of some transition elements are given below. Which of these elements will have highest density?

Element	**Fe**	**Co**	**Ni**	**Cu**
Metallic radii/pm	126	125	125	128

a) Fe b) Ni c) Co d) Cu

193. Consider the following statements
I. $La(OH)_3$ is least basic among hydroxides of lanthanides.
II. Zr^{4+} and Hf^{4+} possess almost the same ionic radii.
III. Ce^{4+} can act as an oxidising agent.
Which of the above is/are true?
a) I and III b) II and III c) II only d) II only

194. Four successive members of the first series of the transition metals are listed below. For which one of them the standard potential value $(E^{o}_{M}2 + /M)$ has a positive sign?
a) Co (Z = 27) b) Ni (Z = 28) c) Cu (Z = 29) d) Fe (Z = 26)

195. In acidic medium, $KMnO_4$ oxidises $FeSO_4$ solution. Which of the following statements is correct?
a) 10 mL of 1 N $KMnO_4$ solution oxidises 10 mL of 5 N $FeSO_4$ solution.
b) 10 mL of 1 M $KMnO_4$ solution oxidises 10 mL of 5 M $FeSO_4$ solution.
c) 10 mL of 1 M $KMnO_4$ solution oxidises 10 mL of 1 M $FeSO_4$ solution.
d) 10 mL of 1 N $KMnO_4$ solution oxidises 10 mL of 0.1 M $FeSO_4$ solution.

196. The magnetic moment is associated with its spin angular momentum and orbital angular momentum. Spin only magnetic moment value of Cr^{3+} ion is
a) 2.87 B.M. b) 3.87 B.M. c) 3.47 B.M. d) 3.57 B.M.

197. Match the column I with column II and mark the appropriate choice

Column I		**Column II**	
(A)	Mischmetal	(i)	Alloy of Cu and Sn

Column I		Column II	
(B)	Ziegler catalyst	(ii)	Alloy of lanthanoid metals
(C)	Brass	(iii)	$TiCl_4$ + $Al(CH_3)_3$
(D)	Bronze	(iv)	Alloy of Cu and Zn

a) (A) → (i), (B)→ (iii), (C)→(ii), (D)→ (iv)
b) (A)→ (ii), (B) → (iii), (C) →(iv), (D) → (i)
c) (A) →(iv), (B) → (i), (C) → (iii), (D) → (ii)
d) (A)→ (iii), (B) → (ii), (C)→ (i), (D) → (iv)

198. Pick out the correct statement with respect to $[Mn(CN)_6]^{3-}$
a) It is sp^3d^2 hybridised and octahedral b) It is sp^3d^2 hybridised and tetrahedral
c) It is d^2sp^3 hybridised and octahedral d) It is dsp^2 hybridised and square planar

199. Cuprous compounds such as CuCl, CuCN and CuSCN are the only salts stable in H_2O due to :
a) high hydration energy of Cu^+ ions b) their inherent tendency not to disproportionate
c) diamagnetic nature d) insolubility in water

200. All Cu(II) halides are known except the iodide. The reason for it is that
a) iodide is a bulky ion b) Cu^{2+} oxidizes iodide to iodine
c) $Cu^{2+}_{(aq)}$ has much more negative hydration enthalpy d) Cu^{2+} ion has smaller size

201. Complete the following reactions.
(i) $Cr_2O_7^{2-} + 3SO_2 + 2H^+ \rightarrow 2Cr^{3+} + \_\_\_\_\_ + H_2O$
(ii)
$2MnO_4^- + 5SO_3^{-2} + 6H^+ \rightarrow 2Mn^{2+} + \rightarrow 2Mn^{2+} + \_\_\_\_\_ + 3H_2O$
(iii)$Cr_2O_7^{2-} + 6Fe^{2+} + 14H^+ \rightarrow 2Cr^{3+} + \_\_\_\_\_ + 7H_2O$
a) $3SO_4^{2-}, SO_2^{2-}, Fe^{3+}$ b) $3SO_4^{2-}, 5SO_4^{2-}, 6Fe^{3+}$ c) $3SO_4^{2-}, SO_2, K^+$ d) S,SO_2, Fe^{3+}

202. Which is the non-lanthanide element?
a) La b) Lu c) Pr d) Pm

203. Name the gas that can readily decolourise acidified $KMnO_4$ solution.
a) CO_2 b) SO_2 c) NO_2 d) P_2O_5

204. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	$FeSO_4 \cdot 7H_2O$	(i)	Green
(B)	$NiCl_2 \cdot 4H_2O$	(ii)	Light pink
(C)	$MnCl_2 \cdot 4H_2O$	(iii)	Pale green
(D)	$CoCl_2 \cdot 6H_2O$	(iv)	Pink
(E)	Cu_2Cl_2	(v)	Colourless

a) (A)→(iii), (B)→(iv), (C)→(i), (D)→(ii), (E)→(v)
b) (A)→(ii), (B)→(iii), (C)→(iv), (D)→(i), (E)→(v)
c) (A)→(v), (B)→(ii), (C)→(iii), (D)→(iv), (E)→(i)
d) (A)→(iii), (B)→(i), (C)→(ii), (D)→(iv), (E)→(v)

205. Copper sulphate dissolves in excess of KCN to give

a) $Cu(CN)_2$ b) $CuCN,$ c) $[Cu(CN)_4]^3$ d) $[Cu(CN)_4]^{2-}$

206. Yellow coloured aqueous solution of sodium chromate changes to orange when acidified with sulphuric acid because

a) H^+ ions convert chromate ions to dichromate ions

b) H^+ ions react with sodium chromate to give sodium ions which turn solution orange

c) Cr^{3+} ions are liberated in the solution which turn the solution orange

d)

sodium hydroxide is formed during the reaction which imparts orange colour to the solution

207. The reaction of aqueous $KMnO_4$ with H_2O_2 in acidic conditions gives:

a) Mn^{4+} and O_2 b) Mn^{2+} and O_2 c) Mn^{2+} and O_3 d) Mn^{4+} and $Mn\ O_2$

208. Which of the following metals corrodes readily in moist air

a) Gold b) Silver c) Nickel d) Iron

209. In the dichromate anion ($Cr_2O^{2-}_7$),

a) all Cr - O bonds are equivalent b) 6 Cr - O bonds are equivalent

c) 3 Cr - O bonds are equivalent d) no bonds in $Cr_2O^{2-}_7$ are equivalent.

210. Complete the given reactions.

(A) $2MnO_4^- + H_2O + I^- \rightarrow 2(i) + 2OH^- + IO_3^-$

(B) $MnO_4^- + 5Fe^{2+} + 8H^+ \rightarrow \overline{(ii)} + 5(iii) + 4H_2O$

a)			b)			c)			d)		
(i)	**(ii)**	**(iii)**	(i)	(ii)	(iii)	**(i)**	**(ii)**	**(iii)**	**(i)**	**(ii)**	**(iii)**
MnO_2	Mn^{2+}	$Fe3^+$	Mn^{2+}	MnO_2	$Fe3^+$	MnO_2	MnO_4^{2-}	$Fe(OH)_3$	MnO_4^{2-}	Mn^{2+}	Fe_2O_3

211. Identify the incorrect statement.

a) The oxidation states of chromium in $C_rO_4^{2-}$ and $C_{r_2}O_7^{2-}$ are not the same.

b) $Cr^{2+}\ (d^4)$ is a stronger reducing agent than $Fe^{2+}\ (d^6)$ in water.

c)

The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states and to form complexes.

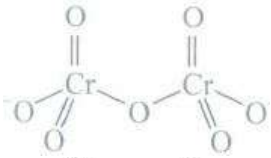
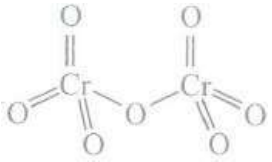
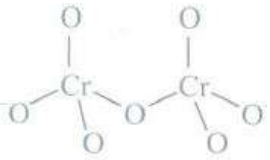
d)

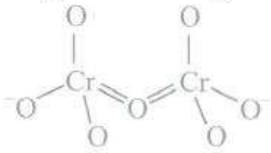
Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals.

212. Which of the following oxidation state is common for allianthanoids?

a) +2 b) +3 c) +4 d) +5

213. Identify the correct structure of dichromate ion.

a)  b)  c) 

d) 

214. Which of the following pairs of ions have the same electronic configuration?
a) Cu^{2+},Cr^{2} b) Fe^{3+},Mn^{2+} c) $C0^{3+}$, Ni^{3+} d) Sc^{3+},Cr^{3+}

215. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Magnetic moment of Mn^{2+} is less than that of Cr^{2+}.
Reason: Higher the atomic number smaller is the magnetic moment.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

216. Arrange the following in increasing value of, magnetic moments.
(i) $[Fe(CN)_6]^{4-}$
(ii) $[Fe(CN)_6]^{13-}$
(iii) $[Cr(NH_3)_6]^{13+}$
(iv) $[Ni(H_2O)_4]^{2+}$
a) (i) < (ii) < (iii) < (iv) b) (i) < (ii) < (iv) < (iii) c) (ii) < (iii) < (i) < (iv)
d) (iii) < (i) < (ii) < (iv)

217. Which of the following lanthanide is commonly used?
a) Lanthanum b) Nobelium c) Thorium d) Cerium

218. The trend of basicity of lanthanoid hydroxides
a) increases across the lanthanoid series b) decreases across the lanthanoid series
c) first increases and then decreases d) first decreases and then increases

219. The pair of compounds that can exist together is :
a) $FeCl_3$.$SnCl_2$ b) $HgCl_2$.$SnCl_2$ c) $FeCl_2$.$SnCl_2$ d) $FeCl_3$,KI

220. Which of the following ions will exhibit colour in aqueous solutions?
a) $La^{3+}(Z=57)$ b) $Ti^{3+}(Z=22)$ c) $Lu^{3+}(Z=71)$ d) $Se^{3+}(Z=21)$

221. Magnetic moment 2.83 BM is given by which of the following ions?
(At. nos. $Ti=22, Cr=24, Mn=25, Ni=28$)
a) Ti^{3+} b) Ni^{2+} c) Cr^{3+} d) Mn^{2+}

222. The basic character of the transition metal monoxides follow the order (Atomic number Ti = 22,Y = 23,Cr = 24, Fe = 26)

a) TiO > FeO > VO > CrO b) TiO > VO > CrO > FeO c) VO > CrO > TiO > FeO
d) CrO > VO > FeO > TiO

223. Magnetic moment 2.84 B.M. is given by : Atomic number Ni = 28, Ti = 22, Cr = 24, Co = 27)
a) Ni^{+2} b) Ti^{+3} c) Cr^{3+} d) Co^{+2}

224. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	Ni in the presence of hydrogen	(i)	Ziegler Natta catalyst
(B)	CU_2Cl_2	(ii)	Contact process
(C)	V_2O_5	(iii)	Vegetable oil to ghee
(D)	Finely divided iron	(iv)	Sandmeyer reaction
(E)	$TiCl_4 + Al(CH_3)_3$	(v)	Haber's process

a) (A)→(iv), (B)→(ii), (C)→(iii), (D)→(i), (E)→(v)
b) (A)→(ii), (B)→(v), (C)→(i), (D)→(iii), (E)→(iv)
c) (A)→(v), (B)→(iii), (C)→(iv), (D)→(ii), (E)→(i)
d) (A)→(iii), (B)→(iv), (C)→(ii), (D)→(v), (E)→(i)

225. The second and third row elements of transition metals resemble each other much more than they resemble the first row because of
a)
lanthanoid contraction which results in almost same radii of second and third row metals
b) diagonal relationship between second and third row elements
c) similar ionisation enthalpy of second and third row elements
d) similar oxidation states of second and third row metals.

226. Assuming complete ionisation, same moles of which of the following compounds will require the least amount of acidified $KMnO_4$ for complete oxidation?
a) $FeSO_3$ b) FeC_2O_4 c) $Fe(NO_2)_2$ d) $FeSO_4$

227. $CuSO_4$ is paramagnetic while $ZnSO_4$ is diamagnetic because:
a) Cu^{2+} ion has $3d^9$ configuration while Zn^{2+} ion has $3dl^{10}$ configuration
b) Cu^{2+} ion has $3d^5$configuration while Zn^{2+} ion has $3d^6$ configuration
c) Cu^{2+} has half filled orbitals while Zn^{2+} has fully filled orbitals
d) $CuSO_4$ is blue in colour while $ZnSO_4$ is white

228. Lanthanoid contraction is due to increase in
a) atomic number b) effective nuclear charge c) atomic radius
d) valence electrons.

229. Sc(Z=21) is a transition element but Z n(Z=30) is not because _____.
a) Both Sc^{3+} and Zn^{2+} ions are colourless and form white compounds.
b) In case Sc, 3 d orbitals are partially filled but in Zn these are filled.
c) Last electron is assumed to be added to 4s level in case of Zn.
d) Both Sc and Zn do not exhibit variable oxidation states.

230. The common oxidation states of Ti are :
a) +2, +3 b) +3, +4 c) 3,- 4 d) +2, +3, +4

231. The number of moles of $KMnO_4$ reduced by one mole of KI in alkaline medium is _____ .
a) One b) Two c) Five d) One-fifth

232. Which of the following is not correctly matched with the given example?
a) An element of first transition series which has highest second ionisation enthalpy-Cu.
b) An element of first transition series with highest third ionisation enthalpy-Zn.
c) An element of first transition series with lowest enthalpy of atomisation-Zn
d) Last element of third transition series-Cd.

233. Arrange the oxides of manganese according to increasing acidic strength.
a) $MnO < Mn_3O_4 < Mn_2O_3 < MnO_2 < Mn_2O_7$
b) $Mn_2O_7 < MnO_2 < Mn_2O_3 < Mn_3O_4 < MnO$
c) $MnO_2 < Mn_2O_7 < Mn_3O_4 < Mn_2O_3 < MnO$
d) $Mn_3O_4 < Mn_2O_3 < Mn_2O_7 < MnO_2 < MnO$

234. $KMnO_4$ acts as an oxidising agent in alkaline medium. When alkaline $KMnO_4$ is treated with KI, iodide ion is oxidised to
a) I_2 b) IO^- c) IO_3^- d) IO_4^-

235. The correct order of $E^o_{M^2/M}$ values with negative sign for the four successive elements Cr, Mn, Fe and Co is
a) Fe> Mn > Cr > Co b) Cr> Mn > Fe > Co c) Mn> Cr > Fe > Co
d) Cr> Fe > Mn > Co

236. Match List I (substances) with List II (processes) employed in the manufacture of the substances and select the correct option?

List I Substances	**List II Processes**
(A) Sulphuric acid	(i) Haber's Process
(B) Steel	(ii) Bassemer's Process
(C) Sodium	(iii) Leblanc Process hydroxide
(D) Ammonia	(iv) Contact Process

a) A-(i), B-(iv), C-(ii), D-(iii) b) A-(i), B-(ii), C-(iii), D- (iv) c) A-(iv), B-(iii), C-(ii), D-(i)
d) A-(iv), B-(ii), C-(iii), D-(i)

237. Amongst TiF_6^{2-}, CoF_6^{3-} , Cu_2Cl_2 and NiCli-, which are the colourless species? (atomic number of Ti = 22, Co = 27, Cu = 29, Ni = 28).

a) TiF_6^{2-}, *and* $NiCI_4^{2-}$ b) TiF_6^{2-}, *and* Cu_2CI_2 c) Cu_2CI_2 *and* $NiCI_4^{2-}$
d) TiF_6^{2-} *and* CoF_6^{3-}

238. Which of the following does not give oxygen on heating?
a) $KClO_3$ b) $Zn(ClO_3)_2$ c) $K_2Cr_2O_7$ d) $(NH_4)_2Cr_2O_7$

239. Which of the following pairs has the same size?
a) Fe^{2+}, Ni^{2+} b) Zr^{4+}, Ti^{4+} c) Zr^{4+}, Hf^{4+} d) Zn^{2+}, Hf^{4+}

240. Which of the following does not represent the correct order of the properties indicated?
a) $Ni^{2+} > Cr^{2+} > Fe^{2+} > Mn^{2+}(size)$ b) $Sc > Ti > Cr > Mn(size)$
c) $Mn^{2+} > Ni^{2+} > Co^{2+} > Fe^{2+}$ (unpaired electron)
d) $Fe^{2+} > Co^{2+} > Ni^{2+} > Cu^{2+}$ (unpaired electron)

241. Acidified $K_2Cr_2O_7$ solution turns green when Na_2SO_3 is added to it. This is due to the formation of?
a) $Cr_2(SO_4)_3$ b) CrO_4^2 c) $Cr_2(SO_3)_3$ d) $CrSO_4$

242. Which of the following statements is not correct?
a) $La(OH)_3$ is less basic than $Li(OH)_3$
b) In lanthanide series, ionic radius of Ln^{3+} ion decreases
c) La is actually an element of transition series rather lanthanide
d) Atomic radius of Zr and Hf are same because of lanthanide contraction

243. Which of the following compounds is used as the starting material for the preparation of potassium dichromate?
a) $K_ZSO_4.Cr_Z(SO_4)_324H_2O$ (Chrome alum) b) $PbCrO_4$ (Chromite yellow)
c) $FeCr_2O_4$ (Chromite) d) $PbCrO_4.PbO$ (Chrome red)

244. Highest oxidation state of manganese in fluorides is +4 (MnF_4) but highest oxidation state in oxides is +7 (Mn_2O_7) because
a) fluorine is more electronegative than oxygen b) fluorine does not possess d-orbitals
c) fluorine stabilises lower oxidation state
d)
in covalent compounds, fluorine can form single bond only while oxygen forms double bond

245. Which of the following compounds is not coloured?
a) $Na_2[CuCl_4]$ b) $Na_2[CdCl_4]$ c) $K_4[Fe(CN)_{16}]$ d) $K_3[Fe(CN)_6]$

246. The actinoids showing +7 oxidation state are
a) U, Np b) Pu, Am c) Np, Pu d) Am, Cm

247. Zn gives H_2 gas with H_2SO_4 and HCl but not with HNO_3 because _____ .
a) Zn act as oxidating agent when react with HNO_3
b) HNO_3 is weaker acid than H_2SO_4 and HCl.
c) In electrochemical series Zn is above hydrogen
d) NO_3 is reduced in preference to hydronium ion

248. Lanthanides and actinides resemble in

a) electronic configuration b) oxidation state c) ionization energy

d) formation of complexes

249. Bell-metal is an alloy of :

a) Cu + Pb b) Cu + Sn c) Cu + Zn d) Cu + Ni

250. A solution of $KMnO_4$ is reduced to various products depending upon its pH. At pH < 7 it is reduced to a colourless solution (A), at pH = 7 it forms a brown precipitate (B) and at pH > 7 it gives a green solution (C). (A), (B) and (C) are:

a)

(A)	(B)	(C)
Mn^{2+}	MnO_2	MnO_4^{2-}

b)

(A)	(B)	(C)
MnO_2	Mn^{2+}	MnO_4^{2-}

c)

(A)	(B)	(C)
Mn^{2+}	MnO_4^{2-}	MnO_2

d)

(A)	(B)	(C)
MnO_4^{2-}	Mn^{2+}	MnO_2

251. In an acidified aqueous solution of Mn^{2+}, Ni^{2+},Cu^{2+} and Hg^{2+}ions, H_2S gas was passed. Precipitates are

a) MnS and CuS b) NiS and HgS c) MnS and NiS d) CuS and HgS

252. Cinnabar is an ore of :

a) Hg b) Cu c) Pb d) Zn

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Time : 1 Mins **P BLOCK ELEMENTS 2 1** **Marks : 1797**

1. Among the following the correct order of acidity is _____ .
   a) $HClO_3 < HClO_4 < HClO_2 < HClO$
   b) $HCl < HClO_2 < HClO_3 < HClO_4$
   c) $HClO_2 < HClO < HClO_3 < HClO_4$
   d) $HClO_4 < HClO_2 < HClO < HClO_3$
2. Which is not a method of preparing carbon monoxide on a commercial scale?
   a) $C_{(s)} + H_2O_{(g)} \xrightarrow[\Delta]{473-1273k} CO_{(g)} + H_{2(g)}$ b) $2C_{(s)} + O_{2(g)} + 4N_{2(g)} \xrightarrow{1273K} 2CO_{(g)} + 4N_{2(g)}$
   c) $2C_{(s)} + O_{2(g)} \longrightarrow 2CO_{(g)}$ d) $HCOOH \xrightarrow[conc.\ H_2SO_4]{373K} H_2O + CO$
3. Quartz is extensively used as a piezoelectric material, it contains _____
   a) Pb b) Si c) Ti d) Sn
4. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Borax-bead	(i)	Alum
(B)	Inorganic benzene	(ii)	Diborane
(C)	Antiseptic	(iii)	Metaborate
(D)	Bridged hydrogens	(iv)	Borazine

   a) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (iv) b) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii)
   c) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶ (ii) d) (A) ⟶ (ii), (B) ⟶ (iii) (C) ⟶ (iv) (D) ⟶ (i)
5. Which of the following compound does not _____ .
   a) NCl_5 b) AsF_5 c) $SbCl_5$ d) PF_5
6. Oxidation states of P in $H_4P_2O_5$, $H_4P_2O_6$, $H_4P_2O_7$ are respectively.
   a) +3, +5, +4 b) +5, +3, +4 c) +5, +4, +3 d) +3, +4, +5
7. Which of these is not a monomer for a high molecular mass silicone polymer?
   a) Me_2SiCl_2 b) Me_3SiCl c) $PhSiCl_3$ d) $MeSiCl_3$
8. Which of the following is used in the preparation of chlorine?
   a) Both MnO_2 and $KMnO_4$ b) Only $KMnO_4$ c) Only MnO_4 d) Either MnO_4 or $KMnO_4$
9. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	Galena	(i)	Abrasive
(B)	Diamond	(ii)	Metal carbonyls
(C)	Carbon monoxide	(iii)	Hydrides of Si
(D)	Silanes	(iv)	An ore of lead

a) (A) → (iv), (B) → (ii), (C) → (i), (D) → (iii) b) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)
c) (A) → (ii), (B) → (i), (C) → (iii), (D) → (iv) d) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)

10. In which of the following compounds, nitrogen exhibits highest oxidation state?
a) N_2H_4 b) NH_3 c) N_3H d) NH_2OH

11. $NaBH_4 + I_2 \rightarrow X + Y + Z$

$$BF_3 + NaH \xrightarrow{450K} X + P$$

$BF_3 + LiAlH_4 \rightarrow X + Q + R$

X, Y, Z, P, Q and R in the reactions a

a)

X	Y	Z	P	Q	R
$Na_4B_4O_7$	NaI	HI	HF	LiF	AlF_3

b)

X	Y	Z	P	Q	R
B_2H_6	NaI	H_2	NaF	LiF	AlF_3

c)

X	Y	Z	P	Q	R
B_2H_6	BH_3	NaI	$B_3N_3H_6$	Al_2F_6	AlF_3

d)

X	Y	Z	P	Q	R
BH_3	B_2H_6	H_2	$B_3N_3H_6$	LiF	AlF_3

12. Mark the example which is not correct.
a) Non-combustible heavy liquid used as fire extinguisher - CCl_4
b) Blocks used to shield radioactive materials - Lead
c) Element which has property of leaving mark on paper - Graphite
d) gas in solid form used as a refrigerant - Carbon monoxide

13. First ionisation enthalpy of Al is lower than that of Mg. This is because:
a) the size of Al is bigger than Mg
b) ionisation enthalpy decrease in a period from left to right
c) it is easier to remove electron from unpaired $3p^1$ than from paired $3s^2$
d) aluminium is a passive metal while magnesium is active metal.

14. Match the compounds given in column I with the hybridisation and shape given in column II and mark the correct option.

Column-I	Column-II
1. XeF_6	(i) Distorted octahederal
2. XeO_3	(ii) Square planar
3. $XeOF_4$	(iii) Pyramidal
4. XeF_4	(iv) Square pyramidal

a) 1 2 3 4 b) 1 2 3 4 c) 1 2 3 4 d) 1 2 3 4
(a)(i)(iii)(iv)(ii) (b)(i)(ii)(iv)(iii) (c)(iv)(iii)(i)(ii) (d)(iv)(i)(ii)(iii)

15. Which of the following phosphorus is the most reactive?
a) Scarlet phosphorus b) White phosphorus c) Red phosphorus d) Violet phosphorus

16. PCl_3 reacts with water to form.
a) PH_3 b) H_3PO_3, HCI c) $POCl_3$ d) H_3PO_4

17. The correct order of acidity of oxoacids of halogens is
a) $HClO < HClO_2 < HClO_3 < HClO_4$ b) $HClO_4 < HClO_3 < HClO_2 < HClO$
c) $HClO < HClO_4 < HClO_3 < HClO_2$ d) $HClO_4 < HClO_2 < HClO_3 < HClO$

18. Match the column I with column II and mark the appropriate choice.

Column I	Column II
(A) ClF_3	(i) Pentagonal bipyramidal
(B) IF_5	(ii) Square Pyramidal
(C) IF_7	(iii) Bent T-shaped
(D) BrF_3	(iv) Square planar

a) (A) ⟶ (iii); (B) ⟶ (i); (C) ⟶ (iv); (D) ⟶ (ii) b) (A) ⟶ (i); (B) ⟶ (ii); (C) ⟶ (iii); (D) ⟶ (iv)
c) (A) ⟶ (ii); (B) ⟶ (ii); (C) ⟶ (i); (D) ⟶ (iii) d) (A) ⟶ (iii); (B) ⟶ (ii); (C) ⟶ (i); (D) ⟶ (iii)

19. Which of the following statements about H_3BO_3 is not correct?
a) It is a strong tribasic acid b) It is prepared by acidifying an aqueous solution of borax
c) It has a layer structure in which planar BO_3 units are joined by hydrogen bonds
d) It does not act as proton donor but acts as a Lewis acid by accepting hydroxyl ion

20. Assertion: $HClO_4$ is a stronger acid than $HClO_3$.
Reason: Oxidation state of chlorine in $HClO_4$ is +7 and in $HClO_3$ is +5.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

21. The gases respectively absorbed by alkaline pyrogallol and oil of cinnamon are _____ .
a) O_3, CH_4 b) O_2, O_3 c) SO_2, CH_4 d) N_2O, O_3

22. Electropositive character for the elements of group 13 follows the order
a) B > Al > Ga > In > Tl b) B < Al < Ga < In < Tl c) B < Al> Ga < In > Tl
d) B < Al > Ga > In > Tl

23. Catenation i.e., linking of similar atoms depends on size and electronic configuration of atoms. The tendency of catenation in Group 14 elements follows the order
a) C > Si > Ge > Sn b) C >> Si > Ge ≈ Sn c) Si > C> Sn > Ge d) Ge> Sn > Si > C

24. The electronegativity difference between N and F is greater than that between Nand H yet the dipole moment of NH_3(1.5 D) is larger than that of NF_3 (0.2 D). This is because:
a)
in NH_3 the atomic dipole and bond dipole are in the opposite directions whereas in NF_3 these are in the same direction.
b) in NH_3 as well as in NF_3 the atomic dipole and bond dipole are in the same direction.
c)
in NH_3 the atomic dipole and bond dipole are in the same direction where as in NF_3 these are in opposite directions.
d) in NH_3 as well as in NF_3 the atomic dipole and bond dipole are in opposite directions.

25. When three parts of conc. HCl and one part of conc. HNO_3 is mixed, a compound 'X' is formed. The correct option related to 'X' is
a) 'X' is known as aqua-regia b) 'X' is used for dissolving gold
c) 'X' is used for decomposition of salts of weaker acids d) both (a) and (b).

26. Which of the following properties correctly explain SiO_2?

a) Linear, basic b) Tetrahedral, acidic c) Tetrahedral, basic d) Linear, acidic

27. On addition of conc. H_2SO_4 to a chloride salt, colourless fumes are evolved but in case of iodide salt, violet fumes come out. This is because
a) H_2SO_4 reduces HI to I_2 b) HI is of violet colour c) HI gets oxidised to I_2
d) HI changes to HIO_3.

28. Group 13 elements show:
a) only +1 oxidation state b) only +3 oxidation state c) +1 and +3 oxidation states
d) +1, +2 and +3 oxidation states

29. Chemically borax is
a) sodium metaborate b) sodium orthoborate c) sodium tetraborate decahydrate
d) sodium hexaborate

30. CO_2 is not a poisonous gas but there is increase in concentration of CO_2 in the atmosphere due to burning of fossil fuels and decomposition of limestone. The increase in concentration of CO_2 may lead to
a) increase in photosynthesis in plants b) higher concentration of CO_2 in water
c) increase in greenhouse effect, thus raising the temperature
d) increase in formation of metal carbonates.

31. Which among the following statements is incorrect?
a) XeF_4 and SbF_5 combine to form salt. b) He and Ne do not form clathrates.
c) He has highest boiling point in its group
d) He diffuses through rubber and polyvinyl chloride.

32. Holme's signal uses chemical compound
a) calcium carbide b) calcium phosphide c) calcium carbide and calcium phosphide
d) calcium carbide and aluminium carbide

33. The structure and hybridisation of $Si(CH_3)_4$ is
a) octahedral, sp^3d b) tetrahedral, sp^3 c) bent, sp d) trigonal, sP^3

34. Compound with the geometry square pyramidal and sp^3d^2 hybridisation is
a) $XeOF_2$ b) $XeOF_4$ c) XeO_4 d) XeO_2F_2

35. Borax is not used
a) as a styptic to stop bleeding b) in making enamel and pottery glazes
c) as a flux in soldering d) in making optical glasses

36. Compound (X) on reduction with LiAlH4 gives a hydride (Y) containing 21.72% hydrogen along with other products. The compound (Y) reacts with air explosively resulting in boron trioxide. Compounds X and Yare respectively
a) BCl_3,B_2H b) B_2H_6,BCl_3 c) BF_3,Al_2O_6 d) B_2H_6,BF_3

37. Which of the following is not true regarding the nature of halides of boron?
a) Boron trihalides are covalent
b) Boron trihalides are planar triangular with sp^2 hybridisation
c) Boron trihalides act as Lewis acids. d) Boron trihalides cannot be hydrolysed easily

38. A metal M reacts with sodium hydroxide to give a white precipitate X which is soluble in excess of NaOH to give Y. Compound X is soluble in HCl to form a compound Z. Identify M, X, Y and Z.

a)

M	X	Y	Z
Si	SiO_2	Na_2SiO_3	$SiCl_4$

b)

M	X	Y	Z
Al	$Al(OH)_3$	$NaAlO_2$	$AlCl_3$

c)

M	X	Y	Z
Mg	$Mg(OH)_3$	$NaMgO_3$	$MgCl_2$

d)

M	X	Y	Z
Ca	$Ca(OH)_2$	Na_2CO_3	$NaHCO_3$

39. The oxidation state of sulphur in the anions SO^{2-}_3, $S2O^{2-}_4$ and $S2O^{2-}_6$ follows the order

a) $S2O^{2-}_6 < S2O^{2-}_4 < SO^{2-}_3$ b) $S2O^{2-}_4 < SO^{2-}_3 < S2O^{2-}_6$ c) $SO^{2-}_3 < S2O^{2-}_4 < S2O^{2-}_6$

d) $S2O^{2-}_4 < S2O^{2-}_6 < SO^{2-}_3$

40. Group 16 elements have lower value of first ionisation enthalpy as compared to group 15 elements because

a) half filled p-orbitals in group 15 elements are more stable

b) group 16 elements have smaller size than group 15 elements

c) group 16 elements contain double bond while group 15 elements have triple bond

d) group 16 elements have more number of electrons in p-orbitals

41. The basic character of hydrides of the V group elements decreases in the order:

a) $NH_3 > PH_3 > AsH_3 > SbH_3$ b) $SbH_3 > AsH_3 > PH_3 > NH_3$ c) $SbH_3 > PH_3 > AsH_3 > NH_3$

d) $NH_3 > SbH_3 > PH_3 > AsH_3$

42. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	Used as lubricant	(i)	Carbon dioxide
(B)	Oxide with three-dimensional structure	(ii)	Graphite
(C)	Used in solar cells	(iii)	Silica
(D)	Anhydride of carbonic acid	(iv)	Silicon

a) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i) b) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii)

c) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iv) d) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i)

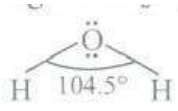
43. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	Coal gas	(i)	$CO+H_2$
(B)	Synthesis gas	(ii)	CH_4
(C)	Producer gas	(iii)	$H_2 + CH_4 + CO$
(D)	Natural gas	(iv)	$CO+N_2$

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv) b) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (ii)

c) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i) d) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (iv)

44. Bond angle in H_2O (104.5°) is higher than the bond angle of H_2S (92.1°). The difference is due to:



a) O is diatomic and S is tetra-atomic b) difference in electronegativity of S and O
c) difference in oxidation states of S and O
d) difference in shapes of hybrid orbitals of S and O.

45. Among the following oxide the lowest acidic is :
a) As_4O_6 b) A_s6O_{10} c) P_4O_6 d) P_4O_{10}

46. White phosphorous reacts with limited chlorine and the product is hydrolysed in the presence of water. What would be the mass of HCl obtained by the hydrolysis of the product formed by the reaction of 62 g of white phosphorus with chlorine in the presence of water?
a) 200 g b) 400 g c) 219 g d) 100 g

47. The variation of the boiling point of the hydrogen halides is in the order HF > HI > HBr > HCl.
a) There is strong hydrogen bonding between HF molecules.
b) The bond energy of HF molecules is greater than in other hydrogen halides.
c)
The effect of nuclear shielding is much reduced in fluorine which polarizes the HF molecule.
d) The electronegativity of fluorine is much higher than for other elements in the group.

48. Assertion: Fluorine combines with sulphur to form SF_6 but no other halogen forms hexahalide with sulphur.
Reason: The reactivity of halogens increases as the atomic number increases.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false

49. Which of the following oxoacid of sulphur has -O-O- linkage?
a) $H_2\ S_2O_7$, pyrosulphuric acid b) H_2SO_3 , sulphurous acid
c) H_2SO_4 , sulphuric acid d) $H_2SO_2O_8$, peroxodisulphuric acid

50. Assertion: Sn in +2 oxidation state is a reducing agent while Pb in +4 state is an oxidising agent.
Reason: Inert pair effect is due to participation of s electrons in bond formation
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

51. Boron is unable to form BF_6^{3-} ions due to
a) non-availability of d-orbitals b) small size of boron atom c) non-metallic nature
d) less reactivity towards halogens.

52. Assertion: In vapour state sulphur is paramagnetic in nature.
Reason: In vapour state sulphur exists as S_2 molecule.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

53. In qualitative analysis when H_2S is passed through an aqueous solution of salt acidified with dil. HCl, a black precipitate is obtained. On boiling the precipitate with dil. HNO_3, it forms a solution of blue colour. Addition of excess of aqueous solution of ammonia to this solution gives
a) deep blue precipitate of $Cu(OH)_2$ b) deep blue solution of $[Cu(NH_3)_4]^{2+}$
c) deep blue solution of $Cu(NO_3)_2$ d) deep blue solution of $Cu(OH)_2 .Cu(NO_3)_2$

54. The most stable form of carbon at high temperature is X. The C - C bond length in diamond is Y while C - C bond length in graphite is Z. What are X, Y and Z respectively?
a) Graphite, 1.42 Å, 1.54 Å b) Coke, 1.54 Å, 1.84 Å c) Diamond, 1.54 Å, 1.42 Å
d) Fullerene, 1.54 Å, 1.54 Å

55. Which of the following has the highest dipole moment?
a) SbH_3 b) AsH_3 c) NH_3 d) PH_3

56. Each or the following is true for white and red phosphorous except that they:
a) consist of the same kind of atoms b) can be converted into one another
c) are both soluble in CS_2 d) can be oxidized by heating in air

57. In which pair of ions both the species contain S - S bond?
a) $S_4O_6^{2-}, S_2O_3^{2-}$ b) $S_2O_7^{2-}, S_2O_8^{2-}$ c) $S_4O_6^{2-}, S_2O_7^{2-}$ d) $S_4O_7^{2-}, S_2O_3^{2-}$

58. Complete the given equations:
(i) $Cu + 8HNO_3 \rightarrow 3Cu(NO_3)_2$ + ...w.... + $4H_2O$
(ii) $4Zn + IOHNO_3 \rightarrow 4Zn(NO_3)_2 + 5H_2O$ + ...X.
(iii) I_2+ $10HNO_3 \rightarrow$ ...Y ....+ $10NO_2 + 4H_2O$

a)

W	X	Y
$2NO_2$	NO	$5HIO_3$

b)

W	X	Y
2NO	N_2O	$2HIO_3$

c)

W	X	Y
N_2	NO_2	HI

d)

W	X	Y
N_2O	NO_2	3HI

59. Match the compounds given in Column I with the hybridization and shape given in column II and mark the correct option.

Column I	Column II
(A) XeF_6	(i) Distorted ocachdral
(B) XeO_3	(ii) Square planar
(C) $XeOF_4$	(iii) Pyramidal
(D) XeF_4	(iv)Square pyramidal

Code: A B C D
a) (iv) (iii) (i) (ii) b) (iv) (i) (ii) (iii) c) (i) (iii) (iv) (ii) d) (i) (ii) (iv) (iii)

60. If chlorine is passed through a solution of hydrogen sulphide in water, the solution turns turbid due to the formation of
a) free chlorine b) free sulphur c) nascent oxygen d) nascent hydrogen.

61. Strong reducing behaviour of H_3PO_2 is due to _____ .
a) Presence of one -OH group and two P-H bonds
b) High electron gain enthalpy of phosphorus c) High oxidation state of phosphorus
d) Presence of two -OH groups and one P-H bond.

62. Match the column I with column II and mark the appropriate choice.

Column I	Column II
(A) XeF_4	(i) sp^3d^2
(B) XeF_6	(ii) sp^3d^3
(C) $XeOF_2$	(iii) sp^3d
(D) XeO_3	(iv) sp^3

a) (A) ⟶ (i); (B) ⟶ (ii); (C) ⟶ (iii); (D) ⟶ (iv) b) (A) ⟶ (iv); (B) ⟶ (iii); (C) ⟶ (ii); (D) ⟶ (i)
c) (A) ⟶ (iii); (B) ⟶ (iv); (C) ⟶ (i); (D) ⟶ (ii) d) (A) ⟶ (ii); (B) ⟶ (iii); (C) ⟶ (iv); (D) ⟶ (i)

63. Group 13 elements show +1 and +3 oxidation states. Relative stability of +3 oxidation state maybe given as:
a) $Tl^{3+} > In^{3+} > Ga^{3+} > Al^{3+} > B^{3+}$ b) $B^{3+} > Al^{3+} > Ga^{3+} > In^{3+} > Tl^{3+}$
c) $Al^{3+} > Ga^{3+} > Tl^{3+} > In^{3+} > B^{3+}$ d) $Al^{3+} > B^{3+} > Ga^{3+} > Tl^{3+} > In^{3+}$

64. Which of the following statements is not valid for oxoacids of phosphorus?
a) Orthophosphoric acid is used in the manufacture of triple superphosphate.
b) Hypophosphorous acid is a diprotic acid.
c) Alloxoacids contain tetrahedral four coordinated phosphorus
d) All oxoacids contain at least one P=O unit and one P-OH group.

65. Which of the following oxides is anhydride of nitrous acid?
a) N_2O_3 b) NO_2 c) NO d) N_2O_4

66. On reaction with Cl_2, phosphorus forms two types of halides 'A' and 'B'. Halide 'A' is yellowish-white powder but halide 'B' is colourless oily liquid. What would be the hydrolysis products of if and 'B' respectively?
a) H_3PO_4, H_3PO_3 b) $HOPO_3$, H_2PO_2 c) H_3PO_3, H_3PO_4 d) HPO_3, H_3PO_3

67. Which of the following is not correct about xenon hexafluoride?
a) It has oxidation state of +6. b) The hybridisation involved in XeF_6 is sp^3d^3
c) The shape of XeF_6 is distorted octahedral and can be represented as
d) On hydrolysis it gives Xe, HF and O_2

68. Which of the following compounds will not give ammonia on heating?
a) $(NH_4)_2SO_4$ b) NH_2CONH_2 c) NH_4NO_2 d) NH_4Cl

69. A gas (X) is obtained when copper reacts with dilute HNO_3. The gas thus formed reacts with oxygen to give brown fumes of (Y). (Y) when dissolved in water gives an important acid (Z) and the gas (X). X, Y and Z respectively are
a) NO; NO_2; HNO_3 b) $N0_2$; NO; HNO_3 c) N_2O; NO; HNO_2 d) NO; N_2O; HNO_3

70. The reason behind the lower atomic radius of Ga as compared to Al is
a) increased ionisation enthalpy of Ga as compared to Al b) anomalous behaviour of Ga
c) poor screening effect of d-electrons for the outer electrons from increased nuclear charge
d) increased force of attraction of increased nuclear charge on electrons

71. Which of the following compound does not exist?
a) NCl_5 b) AsF_5 c) $SbCl_5$ d) PF_5

72. Which of the following will be formed, if we heat an aqueous solution of $AlCl_3$ to dryness?
a) Solid $AlCl_3$ b) Dimer Al_2Cl_6 c) $Al(OH)_3$ d) Al_2O_3

73. Which of the following is not a use of graphite?

a) For electrodes in batteries.

b) Crucibles made from graphite are used for its inertness to dilute acids and alkalies

c) For adsorbing poisonous gases. d) Lubricant at high temperature.

74. Match the interhalogen compounds of column-I with the geometry in column II and assign the correct code.

Column-I	Column-II
1. XX'	(i) T-shape
2. XX'_3	(ii) Pentagonal bipyramidal
3. XX'_5	(iii) Linear
4. XX'_7	(iv) Square-pyramidal
	(iv) Tetrahedral

a) b) c) d)

1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4

(a)(iii)(i)(iv)(ii) (b)(v)(iv)(iii)(ii) (c)(iv)(iii)(ii)(i) (d)(iii)(iv)(i)(ii)

75. Which of the following pairs of compounds is isoelectronic and isostructural?

a) $BeCl_2$, XeF_2 b) TeI_2, XeF_2 c) IBr_2^-, XeF_2 d) IF_3, XeF_2

76. Which one has the lowest boiling point?

a) NH_3 b) PH_3 c) AsH_3 d) SbH_3

77. The hybridisation state of the central atom and shape of the molecules is given below. Mark the incorrect combination.

a) SO_3 - sp^2 hybridisation, planar triangular b) SO_2 - sp^2 hybridisation, V-shaped

c) H_2SO_4 - sp^2 hybridisation, V-shaped d) O_3 - sp^2 hybridisation, angular

78. Which one is not a property of ozone?

a) it acts as an oxidising agent in dry state. b) oxidation of KI into KIO_2.

c) PbS is oxidised to $PbSO_4$ d) Hg is oxidised to Hg_2O

79. Maximum covalency of nitrogen is _____

a) 3 b) 5 c) 4 d) 6

80. Identify the incorrect statement, regarding the molecule XeO_4:

a) XeO_4 molecule is square planar b) there are four $p\pi$ - $d\pi$ bonds

c) There are four Sp^3 -p, σ bonds. d) XeO_4 molecule is tetrahedral.

81. Which of the following statements is false?

a) Radon is oblained from the decay of radium b) Helium is inert gas

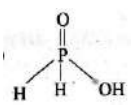
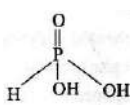
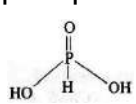
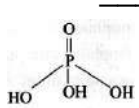
c) Xenon is the most reactive among the rare gases

d) The most abundant rare gas found in the atmosphere is helium

82. Oganesson has been synthetically produced by collision of

a) Ra and Ca b) Cf and Ca c) Cf and Cu d) Ra and He

83. The structural formula of hypophosphorous acid is _____ .

a)  b)  c)  d) 

84. Fill in the blanks:

(i) $Ca_3P_2 + 6HCl \rightarrow 3CaCl_2 + ...p .....$

(ii) $P_4 + 3NaOH + 3H_2O \rightarrow ....q.... + 3NaH_2PO_2$

(iii) $PH_4I + KOH \rightarrow KI + H_2O + ...r... .$

p, q and r respectively are

a) (a) PH_3, H_3PO_3, PI_3 b) (b) PH_3, PH_3, PH_3 c) (c) PCl_3, H_3PO_4, PH_3

d) (d) PCl, PH_3, P_4O_6

85. Basicity of orthophosphoric acid is _____ .

a) 2 b) 3 c) 4 d) 5

86. Ammonia is used in detection of Cu^{2+} ion because

a) aqueous solution of NH_3 reacts with Cu^{2+} ion to form deep blue coloured complex

b) NH_3 reacts with Cu^{2+} ion to give blue precipitate of CuO

c) aqueous solution of NH_3 reacts with Cu^{2+} ion to form white coloured complex

d) NH_3 reacts with Cu^{2+} ion to give green precipitate

87. Assertion: Compounds formed between non-metals are largely covalent in character.

Reason: Non-metals readily form anions

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

88. $Na_2B_4O_7 \cdot 10H_2O \xrightarrow{\triangle} X \xrightarrow{\triangle} Y + Z$

X, Y and Z in the reaction are

a) X = $Na_2B_4O_7$, Y = $NaBO_2$, Z = B_2O_3 b) X = $Na_2B_4O_7$,Y = B_2O_3, Z = H_3BO_3

c) X = B_2O_3, Y = $NaBO_2$, Z = $B(OH)_3$ d) X = $NaBO_2$, Y = B_2O_3, Z = $B(OH)_3$

89. Nitrogen can form only one chloride with chlorine which is NCl_3 whereas P can form PCl_3 and PCl_5. This is

a) due to absence of d-orbitals in nitrogen b) due to difference in size of N and P

c) due to higher reactivity of P towards Cl than N

d) due to presence of multiple bonding in nitrogen.

90. The structure of white phosphorus is

a) The structure of white phosphorus is b) pyramidal c) tetrahedral d) trigonal planar.

91. Oleum is _____ .

a) Castor oil b) Oil of vitriol c) Fuming H_2SO_4 d) None of these

92. Consider the following oxides:

1. OF_2
2. Cl_2O
3. Br_2O

The correct sequence of X - O - X bond angle is

a) 1> 2 > 3 b) 3> 2 >1 c) 2>1>3 d) 1 > 3 >2

93. Which of the following ions is the most stable?

a) Sn^{2+} b) Ge^{2+} c) Si^{2+} d) Pb^{2+}

94. Which of the following oxides of nitrogen is paramagnetic?

a) NO_2 b) N_2O_3 c) N_2O d) N_2O_5

95. The formation of the oxide ion, $O^{2-}_{(g)}$ from oxygen atom requires first an exothermic and then an endothermic step as shown below:
$O_{(g)} + e^- \longrightarrow O^-_{(g)}$ Δ_f, H^o = -141 kJ mol^{-1}
$O^-_{(g)} + e^- \longrightarrow O^{2-}_{(g)}$; Δ_f, H^o = + 780 kJ mol^{-1}
Thus, process of formation of O^{2-} in gas phase is unfavourable even though O^{2-} is isoelectronic with neon. It is due to the fact that:
a) O ion has comparatively, smaller size than oxygen atom
b) Oxygen is more electronegative
c) addition of electron in oxygen results in larger size of the ion.
d) electron repulsion outweighs the stability gained by achieving noble gas configuration

96. Bleaching powder is obtained by the action of chlorine gas and:
a) dilute solution of $Ca(OH)_2$ b) Concentrated solution of $Ca(OH)_2$ c) dry CaO
d) dry slaked lime.

97. Which is the strongest acid in the following?
a) $HClO_4$ b) H_2SO_3 c) H_2SO_4 d) $HClO_3$

98. Which of the following acids cannot be stored in glass?
a) HF b) HCl c) H_2SO_4 d) HI

99. Which one of the following statements about the zeolite is false?
a) They are used as cation exchangers
b) Some of the SiO_4 units are replaced by AlO_4^{5-} and AlO_6^{9-} ions in zeolite
c) They have open structure which enables them to take up small molecules.
d) Zeolites are aluminosilicates having three dimensional structures.

100. In which of the following sulphur is present in +5 oxidation state?
a) Dithionic acid b) Sulphurous acid c) Sulphuric acid d) Disulphuric acid

101. Which is the correct arrangement of the compounds based on their bond strength?
a) HF> HCl > HBr > HI b) HI > HBr > HCl > HF c) HCl> HF > HBr > HI
d) HF > HBr > HCl > HI

102. Number of electrons shared in the formation of nitrogen molecule is _____ .
a) 6 b) 10 c) 2 d) 8

103. In the preparation of compounds of Xe, Bartlett had taken O_2^+ PtF_6^- as a base compound. This is because
a) both O_2 and Xe have same size b) both O_2 and Xe have same electron gain enthalpy
c) both O_2 and Xe have almost same ionisation enthalpy d) both Xe and O_2 are gases

104. The property of halogens which is not correctly matched is
a) F> Cl> Br > I (Ionisation energy) b) F> Cl > Br > I (Electronegativity)
c) I> Br > Cl > F (Density) d) F > Cl > Br > I (Electron affinity)

105. Nitrogen forms N_2 , but phosphorus is converted into P_4 from P, the reason is _____ .

a) Triple bond is present between phosphorus atom b) $P_\pi - P_\pi$ bonding is strong
c) $P_\pi - P_\pi$ bonding is weak d) Multiple bond is formed easily

106. Bond dissociation enthalpy of E-H (E= element) bonds is given below. Which of the compounds will act as strongest reducing agent?

Compound	NH_3	PH_3	AsH_3	SbH_3
Δ_{diss}(E-H)/kJ mol^{-1}	389	322	297	255

a) NH_3 b) PH_3 c) AsH_3 d) SbH_3

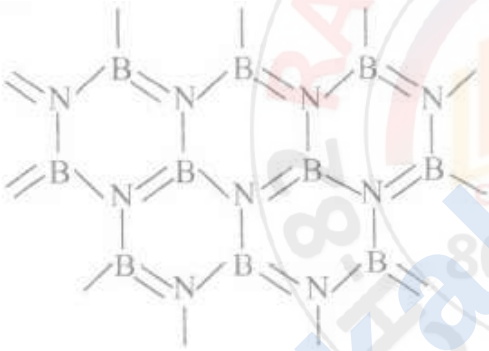
107. Which of the following group-14 elements is a radioactive element?
a) Flerovium b) Germanium c) Nihonium d) Gallium

108. Which is the best description of the behaviour of bromine in the reaction given below?
$H_2O + Br_2 \rightarrow HOBr + HBr$
a) Proton acceptor only b) Both oxidized and reduced c) Oxidized only
d) Reduced only

109. Which oxide of nitrogen is obtained on heating ammonium nitrate at 250°C?
a) Nitric oxide b) Nitrous oxide c) Nitrogen dioxide d) Dinitrogen tetraoxide

110. The correct order of increasing electron affinity of halogens is
a) I < Br < Cl b) Br < I < Cl c) Cl < Br < I d) I< Cl < Br

111. Boron nitride can be represented by the given structure.



The structure of BN is similar to
a) graphite b) diamond c) benzene d) pyridine.

112. Assertion: Acidic character of group 16 hydrides increases from H_2O to H_2Te.
Reason: Thermal stablility of hydrides decreases down the group.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

113. The Stability of 1+ oxidation state among Al, Ga. In and Tl increase in the sequence:
a) Ga b) Al c) T1 d) In

114. The decreasing order of power of boron halides to act as Lewis acids is
a) BF_3> BCl_3> BBr_3 b) BBr_3> BCl_3 > BF_3 c) BCl_3 > BF_3> BBr_3 d) BCl_3 > BBr_3> BF_3

115. A black powder when heated with conc. HCl gives a greenish yellow gas. The gas acts as an oxidising and a bleaching agent. When it is passed over slaked lime, a white powder is formed which is a ready source of gas. The black powder and white powder respectively are
a) $KClO_3$ and $NaClO_3$ b) MnO_2 and $Ca(OCl)_2$ c) MnO_2 and $KClO_3$ d) $MnCl_4$ and $COCl_2$

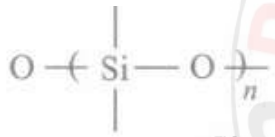
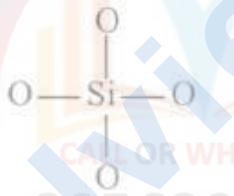
116. Which of the following oxides is acidic in nature?
a) B_2O_3 b) Al_2O_3 c) Ga_2O_3 d) In_2O_3

117. Which of the following statements is not correct about XeF_2?
a) It can be obtained by direct reaction between F_2 and Xe at high pressure.
b) XeF_2 undergoes alkaline hydrolysis to give O_2 andXe.
c) XeF_2 is a powerful reducing agent.
d) XeF_2 contains two bond pairs and three lone pairs.

118. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Thiosulphuric acid	(i)	H_2SO_5
(B)	Caro's acid	(ii)	$H_2S_2O_6$
(C)	Marshall's acid	(iii)	$H_2S_2O_3$
(D)	Dithionic acid	(iv)	$H_2S_2O_5$

a) (A) → (i); (B) → (ii); (C) → (iii); (D) → (iv)
b) (A) → (iv); (B) → (iii); (C) → (ii); (D) → (i)
c) (A) → (iii); (B) → (i); (C) → (iv); (D) → (ii)
d) (A) → (ii); (B) → (iii); (C) → (i); (D) → (iv)

119. Which of the following bonds is shown in silicones?
a)  b)  c) d)

120. Among the following which is the strongest oxidising agent?
a) Br_2 b) I_2 c) Cl_2 d) F_2

121. Assertion: Atomic radius of Ga is larger than that of aluminium.
Reason: Atomic radius always increases down the group.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

122. H_3PO_2 is the molecular formula of an acid of phosphorous. Its name and basicity respectively are _____ .
a) Phosphorous acid and 2 b) Hypophosphorous acid and 2
c) Hypophosphorous acid and one d) Hypophosphoric acid and two

123. $SiCl_4 \xrightarrow[H_2O]{} X \xrightarrow[Heat]{} Y \xrightarrow[NaOH]{} Z$
X, Y and Z in the above reaction are

a)

X	Y	Z
$Si0_2$	Si	NaSi

b)

X	Y	Z
$Si(OH)_4$	SiO_2	Na_2SiO_3

c)

X	Y	Z
$Si(OH)_4$	Si	SiO_2

d)

X	Y	Z
SiO_2	$SiCl_4$	Na_2SioO_3

124. The tendency of group 14 elements to show +2 oxidation state increases in the order of

a) C < Si < Sn < Pb < Ge b) C < Si < Ge < Sn < Pb c) Ge < Sn < Pb < C < Si

d) Pb < Sn < Ge < C < Si

125. Phosphine is prepared by the action of

a) P and H_2SO_4 b) P and NaOH c) P and H_2S d) P and HNO_3

126. Fill in the blanks.

The high reactivity of fluorine is due to its _____ dissociation energy. Its shows only _____oxidation state. It has electron affinity than chlorine. Among all hydrogen halides boiling point is highest for _____.

a) low, -I, lower, HF b) high, +1, higher, HF c) low, +1, lower, HCl d) high, -I, higher, HF

127. Which of the following is an isoelectronic pair?

a) ICl_2, ClO_2 b) BrO_2^- , BrF_2^+ c) ClO_2 , BrF d) CN^-, O_3

128. Assertion: The heavier p-block elements do not form strong π bonds.

Reason : The heavier elements of p-block form dπ - pπ or dπ - dπ bonds.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

129. Which of the following is the most basic oxide?

a) Sb_2O_3 b) Bi_2O_3 c) SeO_2 d) Al_2O_3

130. In the case of alkali metals, the covalent character decreases in the order:

a) $MCl > MI > MBr > MF$ b) $MF > MCl > MBr > MI$

c) $MF > MCl > MI > MBr$ d) $MI > MBr > MCl > MF$

131. Which of the following metals does not show inert pair effect?

a) Thallium b) Gallium c) Indium d) Aluminium

132. Dry ice is

a) solid NH_3 b) solid SO_2 c) solid CO_2 d) solid N_2

133. Which of the following statements is not correct?

a) Oxygen molecule is paramagnetic with two unpaired electrons.

b) Sulphur shows maximum covalency of four.

c) Ozone can be easily detected by mercury.

d) Both sulphurous and sulphuric acid are dibasic in nature.

134. Which one of the following oxides is expected to exhibit paramagnetic behaviour?

a) CO_2 b) SiO_2 c) SO_2 d) ClO_2

135. Which one of the following molecules contains no π bond?

a) SO_2 b) NO_2 c) CO_2 d) H_2O

136. Which property of CO_2 makes it of biological and geo-chemical importance?

a) Its acidic nature. b) Its colourless and odourless nature c) Its low solubility in water.

d) Its high compressibility.

137. Ionisation enthalpy (Δ_iH_1 kJ mol^{-1}) for the elements of Group 13 follows the order

a) B > Al > Ga > In > T b) B < Al < Ga < In < Tl c) B < Al > Ga < In > Tl
d) B > Al < Ga > In < Tl

138. Why all P - F bonds in PFs are not equivalent?

a)
PF_5 has sp^3d hybridisation, out of five P - F bonds three are equatorial which have different lengths.

b)
PF_5 has Sp^3 hybridisation, out of five P - F bonds two are equatorial which have different lengths.

c)
Out of five P - F bonds two are axial and three equatorial. All five bonds have different bond lengths.

d)
PFs is made up of two types of bonds namely covalent and coordinate, hence are not equivalent.

139. Correct order of 1st ionization potential among following elements Be, B, C, N, O is :
a) B < Be < C < O < N b) B < Be < C < N < O c) Be < B < C < N < O
d) Be < B < C < O < N

140. Assertion: CO_2 is a gas at room temperature while SiO_2 is a crystalline solid.
Reason: SiO_2 is a network of silicon and oxygen atoms joined by multiple bonds.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

141. The element of group 17 whose half life is in milliseconds only is
a) Ts b) Te c) At d) Og

142. Which of the following factors would favour the formation of ammonia?
a) High pressure b) Low temperature c) High volume d) Low pressure

143. In the preparation of HNO_3, we get NO gas by catalytic oxidation of ammonia. The moles of NO produced by the oxidation of two moles of NH_3 will be _____
a) 2 b) 3 c) 4 d) 6

144. The element which exists in liquid state for a wide range of temperature and can be used for measuring high temperature is
a) B b) Al c) Ga d) In

145. Repeated use of which one of the following fertilisers would increase the acidity of the soil?
a) Urea b) Superphosphate of lime c) Ammonium sulphate d) Potassium nitrate

146. Anhydrous $AlCl_3$ fumes in air. What is the reason for it?
a) It is hygroscopic in nature b) It gives out chlorine when exposed to air
c) It is hydrolysed in moist air giving out fumes of HCl
d) It loses water when exposed to moist air.

147. Mark the correct statements about halogens.

a) Electron affinity of halogens is in the order F> Cl > Br > I.

b) HF is the strongest hydrohalic acid. c) F_2 has lower bond dissociation energy than Cl_2.

d) All halogens show variable oxidation states.

148. The shapes and hybridisation of BF_3 and BH_4^- respectively are

a) BF_3 - Trigonal, sp^2 hybridisation ; BH_4^- -Square planar, Sp^3 hybridisation

b) BF_3 - Triangular, Sp^3 hybridisation ; BH_4^- - Hexagonal, sp^3 d hybridisation

c) BF_3 - Trigonal, sp^2 hybridisation ; BH_4^- - Tetrahedral, Sp^3 hybridisation

d) BF_3- Tetrahedral, Sp^3 hybridisation ; BH_4^- - Tetrahedral, sp^3 hybridisation

149. Assertion: Fullerenes are the only pure form of carbon.
Reason: It contains twenty, five-membered rings and twelve, six-membered rings

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

150. $HgCl_2$ and I_2 both when dissolved in water containing I^- ions, the pair of species formed is:

a) HgI_2, I_3^- b) $Hg1_2$, I^- c) HgI_4^{2-}, I_3^- d) Hg_21_2, I^-

151. Sugarcane on reaction with nitric acid gives:

a) CO_2 and SO_2 b) $(COOH)_2$ c) 2HCOOH (two moles) d) no reaction

152. In the manufacture of bromine from sea water, the mother liquor containing bromides is treated with:

a) carbon dioxide b) chlorine c) iodine d) sulphur dioxide

153. Which of the following structure is similar to graphite?

a) B b) B_4C c) B_2H_6 d) BN

154. Which of the following acids forms three series of salts?

a) H_3PO_2 b) H_3BO_3 c) H_3PO_4 d) H_3PO_3

155. Which among the following is paramagnetic?

a) Cl_2O b) ClO_2 c) Cl_2O_7 d) Cl_2O_6

156. The acid which has a peroxy linkage is _____ .

a) Sulphurous acid b) Pyrosulphuric acid c) Dithionic acid d) Caro's acid

157. Nitrogen is relatively inactive element because:

a) its atom has a stable electronic configuration b) it has low atomic radius

c) its electronegativity is fairly high d) dissociation energy of its molecule is fairly high.

158. Lassaigne's test is used to detect.

a) Nitrogen b) Sulphur c) Chlorine d) All of the above

159. Sulphur trioxide is not directly dissolved in water to form sulphuric acid because

a) SO_3 does not react with water to form acid

b) SO_3 gets oxidised to H_2SO_3 when dissolved in water

c) it results in the formation of dense fog of sulphuric acid which is difficult to condense

d) sulphur trioxide is insoluble in water due to its covalent nature.

160. Which of the following is not a use of noble gases?

a) Argon is widely used for filling incandescent electric bulbs.

b) Neon is used in safety devices for protecting electrical instruments.

c) Radon is used in radiotherapy of cancer.

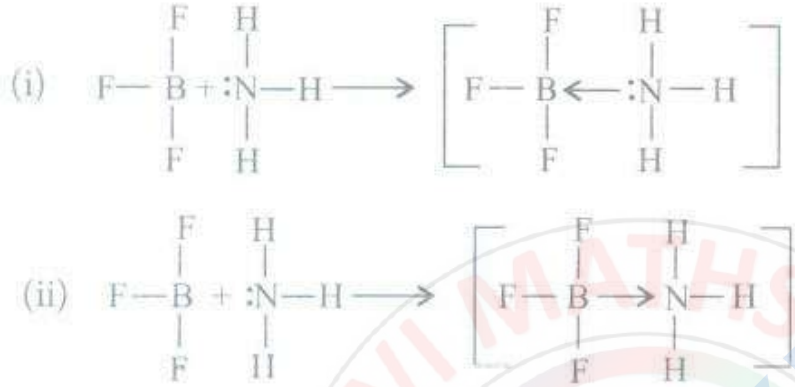
d) Helium is filled in tubes of cycles and scooters tyres.

161. Nitrogen is used to fill electric bulbs because

a) it is lighter than air b) it makes the bulb to glow c) it does not support combustion

d) it is non-toxic.

162. Which of the following is a correct representation of the reaction when BF_3 reacts with ammonia?



a) (i) is incorrect and (ii) is correct b) (i) is correct and (ii) is incorrect

c) Both (i) and (ii) are correct d) Both (i) and (ii) are incorrect

163. Glass reacts with HF to produce

a) SiF_4 b) H_2SiF_6 c) H_2SiO_3 d) Na_3AlF_6

164. Oxyacids of phosphorous and the starting materials for their preparation are given below.

Oxyacid	**Materials for preparation**
(A) H_3PO_2	(i) Red P+alkali
(B) H_3PO_3	(ii) $P_4O_{10}+H_2O$
(C) H_3PO_4	(iii) $P_2O_3+H_2O$
(D) $H_4P_2O_6$	(iv) White P+alkali

Choose the correct answer from the codes given below:

a) (A)-(iv); (B)-(iii); (C)-(ii); (D)-(i) b) (A)-(i); (B)-(iii); (C)-(ii); (D)-(iv)

c) (A)-(iv); (B)-(iii); (C)-(i); (D)-(ii) d) (A)-(ii); (B)-(iii); (C)-(i); (D)-(iv)

165. In the structure of diborane

a)

all hydrogen atoms lie in one plane and boron atoms lie in a plane perpendicular to this plane

b)

2 boron atoms and 4 terminal hydrogen atoms lie in the same plane and 2 bridging hydrogen atoms lie in the perpendicular plane

c)

4 bridging hydrogen atoms and boron atoms lie in one plane and two terminal hydrogen atoms lie in a plane perpendicular to this plane

d) all the atoms are in the same plane

166. Which would quickly absorb oxygen?
a) Alkaline solution of pyrogallol b) Cone. H_2SO_4 c) Lime water
d) Alkaline solution of $CuSO_4$

167. Which of the following elements can be involved in pπ-dπ bonding?
a) Carbon b) Nitrogen c) Phosphorus d) Boron

168. Which of the following statements in not valid for oxoacids of phosphorus?
a) Orthophosphoric acid is used in the manufacture of triple superphosphate.
b) Hwophosphorous acid is a diprotic acid.
c) All oxoacids contain tetrahedral four coordinated phosphorus
d) All oxoacids contain atleast one P = O and one P - OH group.

169. The correct order of increasing bond angles in the following species are:
a) $Cl_2O < ClO_2 < ClO_2^-$ b) $ClO_2 < Cl_2O < ClO_2^-$
c) $Cl_2O < ClO_2^- < ClO_2$ d) $ClO_2^- < Cl_2O < ClO_2$

170. What is the correct relationship between the pH of isomolar solutions of sodium oxide, Na_2O (pH_1), sodium sulphide, Na_2S (pH_2), sodium selenide, Na_2Se (pH_3) and sodium telluride Na_2Te(pH_4)?
a) $pH_1 > pH_2 > pH_3 > pH_4$ b) $pH_1 > pH_2 \approx pH_3 > pH_4$ c) pH_1 2 < $pH_3 < pH_4$
d) $pH_1 < pH_2 < pH_3 \approx pH_4$

171. Which of the following does not show electrical conduction?
a) Potassium b) GraPhite c) Diamond d) Sodium

172. The comparatively high boiling point of hydrogen fluoride is due to
a) high reactivity of fluorine b) small size of hydrogen atom
c) formation of hydrogen bonds d) small size of fluorine

173. Which of the following elements has maximum electron affinity?
a) CL b) Br c) I d) F

174. Which of the following has the greatest electron affinity
a) I b) Br c) F d) Cl

175. In which of the following the inert pair effect is most prominent?
a) C b) Ge c) Si d) Pb

176. An inorganic compound 'A' shows the following reactions:
(i) It is white solid, exists as dimer and fumes in wet air
(ii) It sublimes at 180°C and forms monomer if heated to 400 °C.
(iii) Its aqueous solution turns blue litmus to red and gives a white precipitate with $AgNO_3$ solution, which is soluble in NH_4OH.
(iv). Addition of NH_4OH and NaOH separately to the solution of 'A' gives a gelatinous precipitate which in however soluble in excess of NaOH.
a) $Al(OH)_3$ b) Al_6Cl_6 c) Al_2O_3 d) $Al_2(SO_4)_3$

177. A type of zeolite used to convert alcohols directly into gasoline is
a) zeolite A b) zeolite L c) zeolite Beta d) ZSM-5

178. Which of the following statements is not correct for SO_2 gas

a) It acts as bleaching agent in moist conditions.

b) Its dilute solution is used as disinfectant. c) Its molecules have linear geometry.

d) Acidified $KMnO_4$ is decolourised when SO_2 is passed through it.

179. Match the column I with column II and mark the appropriate choice.

Column I	Column II
(A) $(CN)_2$	(i) Hydrogen bonding
(B) IF_7	(ii) Deacon's process
(C) Cl_2	(iii) Pseudohalogen
(D) HF	(iv) sp^3d^3 hybridisation

a) (A) ⟶ (iv); (B) ⟶ (i); (C) ⟶ (iii); (D) ⟶ (ii) b) (A) ⟶ (ii); (B) ⟶ (iii); (C) ⟶ (iv); (D) ⟶ (i)

c) (A) ⟶ (iii); (B) ⟶ (iv); (C) ⟶ (ii); (D) ⟶ (i) d) (A) ⟶ (i); (B) ⟶ (ii); (C) ⟶ (iv); (D) ⟶ (iii)

180. Lassaigne's test for the detection of nitrogen fails in _____ .

a) $NH_2CONHNH_2 \cdot HCl$ b) $NH_2NH_2 \cdot HCl$ c) NH_2CONH

d) $C_6H_5NHNH_3 \cdot HCl$

181. PH_4I + NaOH forms:

a) PH_3 b) NH_3 c) P_4O_6 d) P_4O_{10}

182. The oxyacid of sulphur that contains a lone pair of electrons on sulphur is

a) sulphurous acid b) sulphuric acid c) peroxodisulphuric acid d) pyrosulphuric acid.

183. When orthophosphoric acid is heated to 600°C the product formed is _____ .

a) PH_3 b) P_2O_5 c) H_3PO_3 d) HPO_3

184. Which is the correct statement for the given acids?

a) Phosphinic acid is a diprotic acid while phosphonic acid is a monoprotic acid

b) Phosphinic acid is a monoprotic acid while phosphonic acid is a disprotic acid

c) Both are triprotic acids d) Both are diprotic acids

185. Pure nitrogen is prepared in the laboratory by heating a mixture of _____ .

a) $NH_4OH + NaCl$ b) $NH_4NO_3 + NaCl$ c) $NH_4Cl + NaOH$

d) $NH_4CI + NaNO_2$

186. In the reaction

$2X + B_2H_6 \longrightarrow [BH_2(X_2)]^+[BH_4]^-$

'X cannot be

a) NH_3 b) CH_3NH c) $(CH)_3)_2NH$ d) $(CH_3)_3N$

187. Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules?

a) $Br_2 > I_2 > F_2 > Cl_2$ b) $F_2 > Cl_2 > Br_2 > I_2$ c) $I_2 > Br_2 > Cl_2 > F_2$ d) $Cl_2 > Br_2 > F_2 > I_2$

188. Which of the following is a nitric and anhydride?

a) NO b) NO_2 c) N_2O_5 d) N_2O_5

189. Which of the following compounds is formed in borax bead test?

a) Metaborate b) Tetraborate c) Triborate d) Orthoborate

190. What happens when diborane reacts with Lewis bases?

a) It forms boron trihydride (BH_3) due to cleavage

b) It undergoes cleavage to give borane adduct BH_3L (where, L = Lewis base).

c) It oxidises to give B_2O_3. d) It does not react with Lewis bases.

191. Which of the following oxides is most acidic?
a) As_2O_5 b) P_2O_5 c) N_2O_5 d) Sb_2O_5

192. Anhydrous $AlCl_3$ is prepared by
a) reaction of HCl and Al metal b) reaction of dry HCl gas and heated Al metal
c) passing Cone HNO_3 gas over heated Al metal d) reaction of Al_2O_3 with dil. HCl.

193. Which of the following is not true about structure of carbon dioxide?
a) In CO_2, carbon is sp - hybridised.
b) C forms two sigma bonds one with each oxygen atom and two pπ - pπ bonds.
c) CO_2 is a linear covalent compound. d) It is a polar molecule.

194. Glass and cement are two important examples of
a) man-made silicates b) silicones c) zeolites d) organic polymers

195. Which of the following compound has a 3-centre bond?
a) Diborane b) CO_2 c) Boron tntluoride d) Ammonia

196. Alum is not used
a) in the purification of water b) as an insecticide c) as a mordant in dyeing
d) in tanning of leather.

197. In which of the following molecules are all the bond not equal?
a) NF_3 b) CF_3 c) BF_3 d) AlF_3

198. Buckminsterfullerene is
a) graphite b) diamond c) C-60 d) quartz

199. Which of the following is a Lewis acid?
a) $AlCl_3$ b) $MgCl_2$ c) $CaCl_2$ d) $BaCl_2$

200. The oxidation state of nitrogen is highest in:
a) N_3H b) NH_3 c) NH_2OH d) N_2H_4

201. About 20km above the earth, there is an ozone layer. Which one of the following statements about ozone and ozone layer is true?
a) Ozone is a triatomic linear molecule b) It is harmful as it stops useful radiation
c) It is beneficial to us as it stops UV-radiation
d) Conversion of O_3 to O_2 is an endothermic reaction

202. Interhalogen compounds are more reactive than the individual halogens because
a) they are prepared by direct combination of halogens
b) X-X' bond is weaker than X-X or X' -X' bonds
c) they are thermally more stable than halogens
d) there is a large difference in their electronegativity

203. Which of the following would have a permanent dipole moment?
a) SiF_4 b) SF_4 c) XeF_4 d) BF_3

204. Which one of the following arrangement does not give the correct picture of trends indicated against it?

a) $F_2 > Cl_2 > Br_2 > I_2$: Oxidizing power
b) $F_2 > Cl_2 > Br_2 > I_2$: Electron gain enthalpy
c) $F_2 > Cl_2 > Br_2 > I_2$: Bond dissociation energy
d) $F_2 > Cl_2 > Br_2 > I_2$: Electronegativity.

205. Aluminium exhibits +3 oxidation state. As we move down the group, +1 oxidation state gets more stable. This is a consequence of:
a) increasing size of the atom b) inert pair effect c) electron deficient nature
d) p π - pπ bonding.

206. Which one of the following compounds is a peroxide?
a) KO_2 b) BaO_2 c) MnO_2 d) NO_2

207. Identify X and Y in the following reaction.

$$BCl_3 + 3NH_4Cl \xrightarrow[140^0]{C_6H_5Cl} X \xrightarrow{NaBH_4} Y$$

a) X = $NaBO_2$, Y = B_2O_3 b) X = $NazB_4O_7$, Y = H_3BO_3 c) X = BN, Y = $[NH_4]^+[BCl_4]^-$
d) X = $B_3N_3H_3Cl_3$, Y = $B_3N_3H_6$

208. Each of the following is true for white and red phosphorus except that they
a) are both soluble in CS_2 b) can be oxidized by heating in air
c) consist of the same kind of atoms d) can be converted into one another.

209. When white phosphorus is heated at 473 K under high pressure, what will happen?
a) α - Black phosphorus is formed. b) β - Black phosphorus is formed.
c) Red phosphorus is formed. d) No change would be observed.

210. In graphite, C atom is in ..... state
a) sp^3 b) sp c) sp^2 d) None of these.

211. Assertion: Fluorine oxidises water to oxygen whereas chlorine and bromine react with water to form corresponding hydrohalic and hypohalous acids.
Reason: The reactivity of halogens increases down the group.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

212. In SiO^4 , the tetrahedral molecule, two oxygen atoms are shared in
a) sheet silicates b) double-chain silicates c) chain silicates
d) three-dimensional silicates

213. Assertion: White phosphorus is more reactive than red phosphorus.
Reason: It readily catches fire in air to give dense white fumes of P_4O_{10}.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

214. Glass is a _____ .
a) Liquid b) Solid c) Supercooled liquid d) Transparent organic polymer

215. Match the following

Oxide	Nature
(A) Co	(i) Basic
(B) BaO	(ii) Neutral
$(C)Al_2O_3$	(iii) Acidic
$(D)Cl_2O_7$	(iv) Amphoteric

a) (A)(B)(C)(D) (a)(iv)(iii)(ii) (ii) b) (A)(B)(C)(D) (b)(i) (ii) (iii)(iv) c) (A)(B)(C)(D) (c)(ii) (i) (iv)(iii) d) (A)(B)(C)(D) (d)(iii)(iv)(i) (ii)

216. Which of the following is not true about structure of diamond and graphite?

a)
In diamond, each carbon is sp^3 hybridised while in graphite each carbon is Sp^2 hybridised.

b)
In diamond, carbon atoms are closely packed in crystal lattice while graphite has layer structure.

c) Diamond is a hard substance while graphite is a soft substance

d)
Graphite is thermodynamically very less stable as compared to diamond and is amorphous form of carbon.

217. Arrange the following hydrides of group 16 elements in order of increasing stability.

a) $H_2S < H_2O < H_2Te > H_2Se$ b) $H_2O < H_2Te < H_2Se < H_2S$ c) $H_2O < H_2S < H_2Se < H_2Te$

d) $H_2Te < H_2Se < H_2S < H_2O$

218. Match the list of noble gas compounds in column I with their shapes in column II and mark the appropriate choice.

Column I	Column II
(A) XeF_4	(i) Distorted octahedral
(B) XeF_6	(ii) Tetrahedral
(C) XeO_3	(iii) Square planar
(D) XeO_4	(iv) Trigonal pyramidal

a) (A) ⟶ (iv); (B) ⟶ (iii); (C) ⟶ (ii); (D) ⟶ (i) b) (A) ⟶ (i); (B) ⟶ (ii); (C) ⟶ (iii); (D) ⟶ (iv)
c) (A) ⟶ (ii); (B) ⟶ (iii); (C) ⟶ (iv); (D) ⟶ (i) d) (A) ⟶ (iii); (B) ⟶ (i); (C) ⟶ (iv); (D) ⟶ (ii)

219. Aluminium is extracted from alumina (Al_2O_3) by electrolysis of a molten mixture of:

a) $Al_2O_3 + HF + NaAlF_4$ b) $Al_2O_3 + CaF_2 + NaAlF_4$ c) $Al_2O_3 + NaAlF_4 + CaF_2$
d) $Al_2O_3 + KF + NaAlF_4$

220. How many P-O- P bonds appear in cyclotrimetaphosphoric acid?

a) Four b) Three c) Two d) One

221. Which of the following elements is extracted commercially by the electrolysis of an aqueous solution of its compound?

a) Cl b) Br c) Al d) Na

222. In the clathrates of xenon with water the nature of bonding in Xe and H_2O molecule is

a) covalent b) hydrogen bonding c) coordinate d) dipole-induced dipole

223. Polyanion formation is maximum in _____ .

a) Nitrogen b) Oxygen c) Sulphur d) Boron

224. Which of the following hydroxides is acidic?
a) $Al(OH)_3$ b) $Ga(OH)_3$ c) $Tl(OH)_3$ d) $B(OH)_3$

225. A one litre flask is full of brown bromine vapours. The intensity of brown colour of vapours will not decrease appreciably on adding to the flask some.
a) Pieces of marble b) Animal charcoal powder c) Carbon tetrachloride
d) Carbon disulphide

226. Percentage of lead in lead pencil is
a) zero b) 20 c) 80 d) 70

227. Which of the following does not show similarity between boron and aluminium?
a) Both form oxides of type M_2O_3 when heated with oxygen at high temperature
b) Both dissolve in alkalies and evolve hydrogen
c) Hydroxides of both the elements are basic in nature
d) Both form nitrides of MN type when heated with N_2

228. Nitrogen because is relatively inactive element.
a) Its atom has a stable electronic configuration b) It has low atomic radius
c) Its electronegativity is fairly high d) Dissociation energy of its molecule is fairly high

229. The species, having bond angles:
a) PH_3 b) ClF_3 c) NCl_3 d) BCl_3

230. Which of the following does not give oxygen on heating?
a) $K_2Cr_2O_7$ b) $(NH_4)_2Cr_2O_7$ c) $KClO_3$ d) $Zn(ClO_3)_2$

231. Atomicity of phosphorus is
a) one b) two c) three d) four.

232. Nitrogen combines with metals to form
a) nitrites b) nitrates c) nitrosyl chloride d) nitrides

233. A metal X reacts with aqueous NaOH solution to form Yand a highly inflammable gas. Solution Y is heated and CO_2 is poured through it. Z precipitates out and Na_2CO_3 is formed. Z on heating gives Al_2O_3. Identify X, Y and Z.

a)

X	Y	Z
Al	$NaAlO_2$	$Al(OH)_3$

b)

X	Y	Z
Al_2O_3	$NaAlO_2$	Al_2CO_3

c)

X	Y	Z
Al_2O_3	$[Na_2AlO_2]^+OH^-$	$Al(OH)_3$

d)

X	Y	Z
Al	$Al(OH)_3$	Al_2O_3

234. Al_2O_3 can be converted to anhydrous $AlCl_3$ by heating:
a) Al_2O_3 with NaCl in solid state b) a mixture of A_2O_3 and carbon in dry Cl_2 gas
c) Al_2O_3 with Cl_2 gas d) Al_2O_3 with HCl gas

235. An aqueous solution of boric acid is found to be weakly acidic in nature. This acidic character arises due to the following reasons.
a) It is a protic acid which donates protons in aqueous solution

b)
It is a Lewis acid which abstracts OH^- from water and leaves H^+ to make the solution acidic

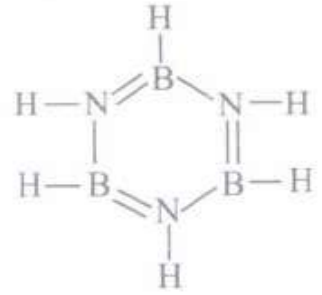
c) It gives metaboric acid when dissolved in water.

d) It is prepared by reaction of borax with sulphuric acid hence it behaves as an acid.

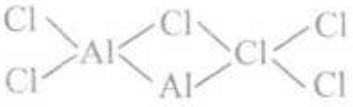
236. Aqueous solution of ammonia consists of _____ .

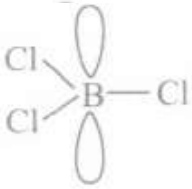
a) H^+ b) OH^+ c) NH_4^+ d) $NH_4^+ and OH^-$

237. Which of the following compounds is not matched correctly with its structure?

a)  – Borazine

b) – Diborane

c)  – Aluminium chloride

d)  – Boron trichloride

238. The geometry of a complex species can be understood from the knowledge of type of hybridisation of orbitals of central atom. The hybridisation of orbitals of central atom in $[B(OH)_4]^-$ and the geometry of the complex are respectively:

a) Sp^3, tetrahedral b) Sp^3, square planar c) sp^3d^2, octahedral d) dsp^2, square planar

239. Which one of the following orders correctly represents the increasing acid strengths of the given acids?

a) $HOClO < HOCl < HOClO_3 < HOClO_2$

b) $HOClO_2 < HOCl_3 < HOClO < HOCl$

c) $HOClO_3 < HOClO_2 < HOClO < HOCl$

d) $HOCl < HOClO < HOClO_2 < HOClO_3$

240. Assertion: In trigonal bipyramidal structure two axial bonds are longer than the equatorial bonds.

Reason: Axial bonds suffer more repulsion as compared to equatorial bonds.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false

241. Fill in the blanks by choosing an appropriate option.__(i)____ is a synthetic radioactive element of group 15 having electronic configuration -.__(ii)____

a)

(i)	(ii)
$_{115}Mc$	$[Rn]5f^{14}6d^{10}7s^27P^3$

b)

(i)	(ii)
$_{115}Mc$	$[Xe]5f^{14}6d^{10}7s^27P^3$

c)

(i)	(ii)
$_{116}LV$	$[Rn]5f^{14}6d^{10}7s^27P^4$

d)

(i)	(ii)
$_{114}Fl$	$[Rn]5f^{14}6d^{10}7s^27P^2$

242. Assertion: In diborane, each B atom is Sp^3 hybridised.
Reason : In diborane, the terminal 2-centre-2-electron B-H bonds are called banana bonds
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

243. Which one of the following oxides of chlorine is obtained by passing dry chlorine over silver chlorate at $90^\circ C$?
a) Cl_2O b) ClO_3 c) ClO_2 d) ClO_4

244. On heating $KClO_3$, we get
a) $KClO_2 + O_2$ b) $KCl + O_2$ c) $KCl + O_3$ d) $KCl + O_2 + O_3$

245. Prussian blue is formed when _____ .
a) Ferrous sulphate reacts with $FeCl_3$ b) Ferric sulphate reacts with $Na_4[Fe(CN)_6]$
c) Ferrous ammonium sulphate reacts with $FeCl_3$ d) Ammonium sulphate reacts with $FeCl_3$

246. Which of the following statements is true?
a) Silicon exhibits 4 coordination number in its compounds
b) Bond energy of F_2 is less than Cl_2
c) Mn (III) oxidation state is more stable than Mn(II) in aqueous state.
d) Elements of 15th group show only +3 and +5 oxidation states.

247. The symbol of element with atomic number 113, is:
a) Nh b) Ni c) No d) Nb

248. The variation of the boiling point of the hydrogen halides is in the order HF > HI > HBr > HCl. What explains the higher boiling point of hydrogen fluoride?
a) The electronegativity of flourine is much higher than for other elements in the group
b) There is strong hydrogen bonding between HF molecules
c) The bond energy of HF molecules is greater than in other hydrogen halides.
d)
The effect of nuclear shielding is much reduced in flourine which polarises the HF molecule.

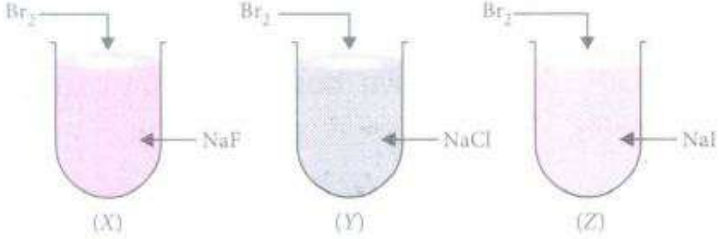
249. Which of the following is a tetrabasic acid?
a) Hypophosphorous acid b) Metaphosphoric acid c) Pyrophosphoric acid
d) Orthophosphoric acid

250. Match List-I (substances) with List-II (processes) employed in the manufacture of the substances and select the correct option

List-I Substances	**List-II Processes**
1.Sulphuric acid	(i) Haber's process
2.Steel	(ii) Bessemer's process
3.Sodium hydroxide	(iii) Leblanc process
4.Ammonia	(iv) Contact process

a)	b)	c)	d)
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(a)(iv)(ii)(iii)(i)	(b)(i)(iv)(ii)(iv)	(c)(i)(ii)(iii)(iv)	(d)(iv)(iii)(ii)(i)

251. What is the correct observation when Br_2 is treated with NaF, NaCl and NaI taken in three test-tubes labelled as (X), (Y) and (Z)?



a) F_2 is liberated in (X) and Cl_2 in (Y). b) Only I_2 is liberated in (Z).
c) Only Cl_2 is liberated in (Y). d) Only F_2 is liberated in (X).

252. The correct order of N-compounds in its decreasing order of oxidation states is :
a) HNO_3, NH_4Cl, NO, N_2 b) HNO_3, NO, NH_4Cl, N_2 c) HNO_3, NO, N_2, NH_4Cl
d) NH_4Cl, N_2, NO, HNO_3

253. When copper is heated with cone. HNO_3 it produces:
a) $Cu(NO_3)_2$, NO and NO_2 b) $Cu(NO_3)_2$ and N_2O c) $Cu(NO_3)_2$ and NO_2
d) $Cu(NO_3)_2$ and NO

254. Assertion: In p-block elements, a lot of variation in properties of elements in a group is observed.
Reason: Difference in inner core of electronic configuration greatly influences the physical and chemical properties of elements
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

255. In XeF_2, XeF_4 and XeF_6 the number of lone pairs on Xe is respectively:
a) 2, 3, 1 b) 1, 2, 3 c) 4, 1, 2 d) 3, 2, 1

256. In graphite, the layers of carbon atoms are held by
a) van der Waals forces b) ionic bonds c) covalent bonds d) coordinate bonds

257. Among K, Ca, Fe and Zn, the element which can form more than one binary compound with chlorine is:
a) Fe b) Zn c) K d) Ca

258. Thermite is a mixture of iron oxide and
a) aluminium powder b) zinc powder c) iron turnings d) copper turnings

259. Nitrogen dioxide and sulphur dioxide have some properties in common. Which property is shown by one these compounds, but not by the other?
a) Is a reducing agent b) Is soluble in water c) Is used as a food-preservative
d) Forms 'acid-rain'

260. Under hydrolytic conditions, the compounds used for preparation of linear polymer and for chain termination, respectively, are:
a) $CH_3SiCl_3$and $Si(CH_3)_4$ b) $(CH_3hSiCl_2$ and $(CH_3)_3SiCl$ c) $(CH_3)_2SiCl_2$ and CH_3SiCl_3
d) $SiCl_4$ and $(CH_3)_3hSiCl$

261. Which of the following is not an ore of aluminium?
a) Bauxite b) Cryolite c) Kernite d) Corundum

262. Which of the following pairs of ions are isoelectronic and isostructural?
a) CO_3^{2-}, NO_3^- b) ClO_3^-, CO_3^{2-} c) SO_3^{2-}, NO_3^- d) ClO_3^-, SO_3^{2-}

263. Which of the following oxides can act as a reducing agent?
a) CO b) CO_2 c) SnO_2 d) PbO_2

264. Maximum ability of catenation is shown by
a) silicon b) lead c) germanium d) carbon

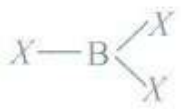
265. A solution of KBr is treated with each of the following. Which one would liberate bromine?
a) Hydrogen iodide b) Sulphur dioxide c) Chlorine d) Iodine

266. It is possible to obtain oxygen from air by fractional distillation because _____ .
a) Oxygen is in a different group of the periodic table from nitrogen
b) Oxygen is more reactive than nitrogen c) Oxygen has higher boiling point than nitrogen
d) Oxygen has a lower density than nitrogen

267. On heating, lead nitrate forms oxides of nitrogen and lead. The oxides formed are _____
a) N_2O, PbO b) NO_2, PbO c) NO, PbO d) NO, PbO_2

268. Dry SO_2 does not bleach dry flowers because
a) nascent hydrogen responsible for bleaching is produced only in presence of moisture
b) water is the actual reducing agent responsible for bleaching
c) water is stronger acid than SO_2 d) the OH^- ions produced by water cause bleaching.

269. In BX_3, B - X distance is shorter than what is expected theoretically because (X = F, Cl, Br, I)



a) Sp^3 hybridisation of B is responsible for shorter B - X distance
b) B - X has a double bond character due to back bonding.
c) Dimerisation takes place in BX_3 which is responsible for shorter B - X distance
d) Due to large size of X, B- X distance decreases

270. The hybridisation of sulphur in sulphur tetrafluoride is
a) sp^3d^3 b) sp^3 c) sp^3d d) sp^3d^2

271. What are X and Y in the reaction?

$$3B_2H_6 + 6X \rightarrow 3[BH_2(X)_2]^+[BH_4]^- \xrightarrow[heat]{} Y + 12H_2$$

a) X = NH_3, Y = $B_3N_3H_6$ b) X = CO, Y = BH_3CO c) X = NaH, Y = NaF
d) X = NF_3, Y = B_3N_3

272. Which of the following compounds are formed when BCl_3 is treated with water?
a) H_3BO_3 b) B_2H_6 c) B_2O_3 d) HBO_2

273. Which of the following statements are incorrect?
a) SO_3 is a stronger oxidising agent and more acidic than SO_2
b) Selenium forms only two oxoacids i.e., selenous acid (H_2SeO_3) and selenic acid (H_2SeO_4)

c)

The acidic strength and oxidising power of oxoacids is greater in +6 oxidation state than in +4 oxidation state.

The thermal stability of oxides of group 16 elements decreases in the order:

d) $SO_2 > SeO_2 > TeO_2 > PoO_2$

274. Which of the following species has four lone pairs of electrons?

a) I b) O c) Cl^- d) He

275. How many bridging oxygen atoms are present in P_4O_{10}?

a) 6 b) 4 c) 2 d) 5

276. Which of the following is the correct statement about silicones?

a) They are made up of $SiO^{4-}{}_4$units b) They are polymers made up of R_2SiO units

c) They are water soluble compounds d) They are hydrophilic in nature

277. Consider the following sequence of conversion

$$\underbrace{2NO + O_2}_{(X)} \rightleftharpoons \underset{(Y)}{2NO_2} \underset{\text{heat}}{\overset{\text{cool}}{\rightleftharpoons}} \underset{(Z)}{N_2O_4}$$

X, Y and Z can be described as

a)

X	Y	Z
Colourless	Brown, paramagnetic	Colourless, paramagnetic

b)

X	Y	Z
Brown	Colourless, paramagnetic	Brown, paramagnetic

c)

X	Y	Z
Colourless	Colourless, paramagnetic	Brown, paramagnetic

d)

X	Y	Z
Brown	Brown, paramagnetic	Brown, paramagnetic

278. Assertion : In CO_2 molecule, C-atom undergoes Sp^2 hybridisation.

Reason: CO_2 molecule has net dipole moment.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

279. In group 13, electronegativity first decreases from B to Al and then increases marginally down the group. This is because of

a) non-metallic nature of B b) discrepancies in atomic size of elements

c) ability of B and Al to form $p\pi - p\pi$ multiple bonds

d) irregular trend in electronegativity throughout the periodic table.

280. Hot conc. H_2SO_4 acts as moderately strong oxidising agent. It oxidises both metals and non-metals. Which of the following elements is oxidised byconc. H_2SO_4 into two gaseous products?

a) Cu b) S c) C d) Zn

281. In diborane,

a) four bridged hydrogen atoms and two terminal hydrogen atoms are present

b) two bridged hydrogen atoms and four terminal hydrogen atoms are present

c) three bridged hydrogen atoms and three terminal hydrogen atoms are present

d) there are no bridged hydrogen atoms in diborane, only hydrogen bonds are present

282. Assertion: O_3 acts as a powerful oxidising agent.
Reason: O_3 oxidises lead sulphide to lead sulphate and iodide ions to iodine.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

283. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	H_2SO_3	(i)	+6, dibasic
(B)	H_2SO_5	(ii)	+5, dibasic
(C)	$H_2S_2O_6$	(iii)	+6, monobasic
(D)	H_2SO_4	(iv)	+4, dibasic

a) (A) $\rightarrow$ (i); (B) $\rightarrow$ (ii); (C) $\rightarrow$ (iii); (D) $\rightarrow$ (iv)
b) (A) $\rightarrow$ (ii); (B) $\rightarrow$ (iii); (C) $\rightarrow$ (i); (D) $\rightarrow$ (iv)
c) (A) $\rightarrow$ (iii);(B) $\rightarrow$ (iv); (C) $\rightarrow$ (ii); (D) $\rightarrow$ (i)
d) (A) $\rightarrow$ (iv); (B) $\rightarrow$ (iii); (C) $\rightarrow$ (ii); (D) $\rightarrow$ (i)

284. In a cyclotrimetaphosphoric acid molecule, how many single and double bonds are present?
a) 3 double bonds; 9 single bonds b) 6 double bonds; 6 single bonds
c) 3 double bonds; 12 single bonds d) Zero double bonds; 12 single bonds

285. Assertion: The covalence of nitrogen in N_2O_5 is 5.
Reason : Nitrogen can expand its covalence beyond 4
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion,
c) If assertion is true but reason is false. d) If both assertion and reason are false.

286. It is because of inability of ns^2 electrons of the valence shell to participate in bonding that
a) Sn^{2+} is oxidising while pb^{4+} is reducing
b) Sn^{2+} and Pb^{2+} are both oxidising and reducing
c) Sn^{4+} is reducing while Pb^{4+} is oxidising d) Sn^{2+} is reducing while pb^{4+} is oxiding

287. Which of the following bonds will be most polar?
a) N -Cl b) O-F c) N-F d) N-N

288. Bleaching powder reacts with a few drops of cone HCl to give _____ .
a) Chlorine b) Hypochlorous acid c) Calcium oxide d) Oxygen

289. The product obtained as a result of a reaction of nitrogen with CaC_2 is _____ .
a) $Ca(CN)_2$ b) $CaCN$ c) $CaCN_3$ d) Ca_2CN

290. Match the uses of the metal aluminium given in column I with its properties given in column II and mark the appropriate choice

Column I		Column II	
(A)	Transmission cables	(i)	High malleability

Column I		Column II	
(B)	Aircraft body	(ii)	High electrical conductivity
(C)	Packing industry	(iii)	industry conductivity
(D)	Utensils	(iv)	Light and tough alloys

a) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (iv) b) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)
c) (A) ⟶ (ii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (iii) d) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii)

291. Which of the following is not correct about carbon monoxide?
a) It is produced due to incomplete combustion b) It form carboxyhaemoglobin
c) It reduce oxygen carrying ability of blood
d) The carboxyhaemoglobin (haemoglobin bouncl to CO) is less stable than oxyhaemoglobin

292. Oxygen will directly react with each of the following elements except
a) P b) Cl c) Na d) S

293. The members of group 14 form tetrahalides of the type MX_4 Which of the following halides cannot be readily hydrolysed by water?

a) CX_4 b) SiX_4 c) GeX_4 d) SnX_4

294. Which is not the use of orthoboric acid?
a) As an antiseptic and eye wash. b) In glass industry. c) In glazes for pottery
d) In borax - bead test.

295. Which of the following bonds has the highest energy?
a) S-S b) O-O c) Se-Se d) Te-Te

296. $PH_4I + NaOH$ forms _____ .
a) PH_3 b) NH_3 c) P_4O_6 d) P_4O_{10}

297. An alkali metal hydride (NaH) reacts with diborane in 'A' to give a tetrahedral compound 'B' which is extensively used as reducing agent in organic synthesis. The compounds 'A' and 'B' respectively are
a) CH_3COCH_3 and $B_3N_3H_6$ b) $(C_2H_5)_2O$ and $NaBH_4$ c) C_2H_6 and C_2H_5Na
d) C_6H_6 and $NaBH_4$

298. An amorphous solid (X) burns in air to form a gas (Y) which turns lime water milky. This gas decolourises aqueous solution of acidified $KMnO_4$ Gas (Y) reacts with oxygen to give another gas (Z) which is responsible for acid rain. X, Y and Z are

a)

X	Y	Z
C	CO	CO_2

b)

X	Y	Z
S	SO_2	SO_3

c)

X	Y	Z
P	P_2O_3	P_2O_5

d)

X	Y	Z
S	SO_3	H_2SO_4

299. Assertion: Ozone layer in the upper region of atmosphere protects earth from UV radiations of sun.
Reason: Ozone is a powerful oxidising agent as compared to oxygen.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

300. Which of the following is correct representation of reaction of acidified permanganate solution with sulphur dioxide?
a) $2MnO^-_4+5SO_2+2H_2O\longrightarrow 5SO_4^{2-}+2Mn^{2+}+4H^+$ b) $2MnO^-_4+SO_2+2H_2O\longrightarrow S+Mn^{2+}+4H^+$
c) $2MnO^-_4+5SO_2+2H_2O\longrightarrow 4SO^{2-}_3+S+2Mn^{2+}+4H^+$
d) $3MnO^-_4+2SO_2+2H_2O\longrightarrow 2S+3Mn^{2+}+4H^+$

301. The tendency of BF_3, BCl_3 and BBr_3 to behave as Lewis acid decrease in the sequence
a) $BCl_3 > BF_3 > BBr_3$ b) $BBr_3 > BCl_3 > BF_3$
c) $BBr_3 > BF_3 > BCl_3$ d) $BF_3 > BCl_3 > BBr_3$

302. Which of the following is used as protective shields in nuclear industries?
a) ^{27}Al b) ^{10}B c) $^{16}0$ d) ^{l4}C

303. Sulphur trioxide can be obtained by which of the following reaction?
a) $CaSO_4$+ C $\xrightarrow{\triangle}$ b) $Fe_2(SO_4)_3\xrightarrow{\triangle}$ c) S + $H_2SO_4\xrightarrow{\triangle}$ d) H_2SO_4 + $PCl_5\xrightarrow{\triangle}$

304. An example of a double salt is
a) bleaching powder b) $K_4[Fe(CN)_6]$ c) hypo d) potash alum

305. Assertion: Sulphuric acid reacts with sodium chloride in the following way:
$2NaCl+H_2SO_4 \longrightarrow 2HCl+Na_2SO_4$
Reason: Sulphuric acid because of its low volatility can be used to manufacture more volatile acids from their corresponding salts.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

306. Assertion: Zeolites are the three-dimensional network silicates.
Reason: Negative charge on zeolite structure is neutralised by positively charged Al^{3+}ions.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertio
c) If assertion is true but reason is false d) If both assertion and reason are false

307. Complete the following reactions:
(i) SiO_2 + 2NaOH $\longrightarrow$ X + H_2O
(ii) SiO_2 + 4HF $\longrightarrow$ Y + $2H_2O$
(iii) Si + $2CH_3Cl \xrightarrow[570\ K]{Cu\ powder}$ Z

a)

X	Y	Z
Na_2SiO_3	SiF_4	$(CH_3)_2SiCl_2$

b)

X	Y	Z
H_2SiO_3	SiF_2	CH_3SiCl_3

c)

X	Y	Z
Na_2SiO_3	H_2SiO_3	$(CH_3)_3SiCl$

d)

X	Y	Z
Na_2SiO_3	H_2SiF_4	$(CH_3)_2SiCl_2$

308. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Laughing gas	(i)	Hydrazoic acid

(B)	Anhydride of HNO_3	(ii)	Nitrous oxide
(C)	Anhydride of HPO_3	(iii)	Nitrogen pentoxide
(D)	Acid hydride of nitrogen	(iv)	Phosphorus pentoxide

a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)
b) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)
c) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)
d) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

309. Match the column I and column II and mark the appropriate choice.

Column I		**Column II**	
(A)	H_3PO_2	(i)	+3 O.S. of P
(B)	$H_3P_3O_9$	(ii)	Cyclic oxoacid
(C)	$H_4P_2O_6$	(iii)	Monobasic acid
(D)	H_3PO_3	(iv)	One P - P bond

a) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)
b) (A) → (ii), (B) → (iv), (C) → (iii), (D) → (i)
c) (A) → (iii), (B) → (ii), (C) → (iv), (D) → (i)
d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

310. Which of the following oxides will be the least acidic?
a) As_4O_6 b) As_4O_{10} c) P_4O_{10} d) P_4O_6

311. Which of the statements given below is incorrect?
a) O_3 molecule is bent. b) ONF is isoelectronic with O_2N. c) OF_2 is an oxide of fluorine.
d) Cl_2O_7 is an anhydride of perchloric acid.

312. When chlorine is passed over dry slaked lime at room temperature, the main reaction product is :
a) $Ca(ClO)_2$ b) $CaCl_2$ c) $CaOC_2$ d) $Ca(OCl)_2$

313. Fill in the blanks by choosing the appropriate option. Conc. H_2SO_4 chars paper, wood and sugar by removing (i) from them. It is also known as ii. It is manufactured by (iii) process. It is a strong (iv) and (v) acid.

a)

(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**
H_2O	oil of vitriol	Contact	oxidising	dibasic

b)

(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**
O_2	oil of vitriol	Oleum	dehydrating	monobasic

c)

(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**
H_2O	oil of olay	Solvay	dehydrating	dibasic

d)

(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**
SO_2	oil of winter green	Contact	oxidising	monobasic

314. Elements of group-15 form compounds in +5 oxidation state. However, bismuth forms only one well characterised compound in +5 oxidation state. The compound is
a) Bi_2O_5 b) BiF_5 c) $BiCl_5$ d) Bi_2S_5

315. In solid state PCl_5 is a _____

a) covalent solid b) octahedral structure

c) ionic solid with $[PCl_6]$ octahedral and $[PCl_4]^-$ tetrahedral

d) ionic solid with $[PCl_4]^+$ tetrahedral and $[PCl_6]^-$ octahedral

316. Carbon monoxide acts as a donor and reacts with certain metals to give metal carbonyls. This is due to

a) presence of one sigma and two pi bonds between C and O(:C = O:)

b) presence of a lone pair on carbon atom in CO molecule

c) presence of lone pair on oxygen atom in CO molecule d) poisonous nature of CO

317. Identify the incorrect statement.

a) Graphite is thermodynamically most stable allotrope of carbon.

b)
Other forms of elemental carbon like coke, carbon black, charcoal are impure forms of graphite.

c) All allotropes of carbon have thermodynamically different stability.

d) Charcoal and coke are obtained by heating wood in absence of air.

318. Which of the following hydrides is least stable to hydrolysis?

a) CH_4 b) SiH_4 c) SnH_4 d) PbH_4

319. In the manufacture of bromine from sea water the mother liquor containing bromide is treated with _____ .

a) Carbon dioxide b) Chlorine c) Iodine d) Sulphur dioxide

320. Complete the following reactions by filling the appropriate choice.

(A) $6XeF_4 + 12H_2O \rightarrow 4Xe + 2XeO_3 +$ _____(i)_____ + _____(ii)_____

(B) $XeF_6 + 3H_2O \rightarrow$ _____(iii)_____ +6HF

a)

(i)	(ii)	(iii)
F_2	H_2O	$XeOF_4$

b)

(i)	(ii)	(iii)
24HF	$3O_2$	XeO_3

c)

(i)	(ii)	(iii)
2HF	$2H_2O$	XeO

d)

(i)	(ii)	(iii)
HF	H_2O	Xe_2O_3

321. Elements of which of the following groups will form anions most readily?

a) Oxygen family b) Nitrogen family c) Halogens d) Alkali metals

322. Aluminium oxide is not reduced by chemical reactions due to

a) its highly stable nature b) its highly unstable nature c) its amphoteric nature

d) its highly explosive nature.

323. White phosphorus is soluble in CS_2 whereas red phosphorus is insoluble in CS_2.

a) α- Black phosphorus is formed. b) β-Black phosphorus is formed

c) Red phosphorus is formed. d) No change would be observed.

324. Water gas is produced by

a) passing steam through a red hot coke bed b) saturating hydrogen with moisture

c) mixing oxygen and hydrogen in the ratio of 1:2

d) heating a mixture of CO_2 and CH_4, in petroleum refineries

325. The oxidation state of central atom in the anion of compound NaH_2PO_2 will be

a) +3 b) +5 c) +1 d) -3

326. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	Borax	(i)	Na_3AlF_6
(B)	Inorganic benzene	(ii)	$Na_2B_4O_7 \cdot 10H_2O$
(C)	Cryolite	(iii)	$Al_2O_3 \cdot 2H_2O$
(D)	Bauxite	(iv)	$B_3N_3H_6$

a) (A) ⟶ (ii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (iii) b) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv)
c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶ (iv) d) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iv)

327. The stability of dihalides of Si, Ge, Sn and Pb increases steadily in the sequence
a) $PbX_2 << snX_2 << GeX_2 << SiX_2$ b) $GeX_2 << SiX_2 << snX_2 << PbX_2$
c) $SiX_2 << GeX_2 << PbX_2 << snX_2$ d) $SiX_2 << GeX_2 << snX_2 << PbX_2$.

328. PCl_3 reacts with water to form:
a) PH_3 b) H_3PO_3, HCl c) $POCl_3$ d) H_3PO_4

329. Silicon is an important constituent of
a) sand b) atmosphere c) plants d) water bodies

330. Reaction of sodium thiosulphate with iodine gives:
a) tetrathionate ion b) sulphide ion c) sulphate ion d) sulphite ion

331. On heating a mixture of NH_4Cl and KNO_2, we get
a) NH_4NO_3 b) $KNH_4(NO_3)_2$ c) N_2 d) NO

332. Cane sugar on reaction with nitric acid gives _____ .
a) CO_2 and SO_2 b) 2HCOOH c) $(COOH)_2$ d) No reaction

333. The decreasing order of boiling points of the following hydrides is
a) $SbH_3 > AsH_3 > PH_3 > NH_3$ b) $NH_3 > SbH_3 > AsH_3 > PH_3$
c) $SbH_3 > NH_3 > AsH_3 > PH_3$ d) $PH_3 > AsH_3 > SbH_3 > NH_3$

334. Identify the wrong example from the following for the group 14 elements.
a) Element which forms most acidic dioxide- Carbon
b) Element which is affected by water - Lead
c) Commonly found in +2 oxidation state - Lead
d) Element used as semiconductor - Silicon.

335. The substance used as a smoke screen in warfare is _____ .
a) $SiCl_4$ b) PH_3 c) PCl_5 d) Acetylene

336. HCl can be prepared by
a) $NaCl + H_2SO_4 \xrightarrow{420K}$ b) $NaHSO_4 + NaCl \xrightarrow{823K}$ c) $NaNO_3 + H_2SO_4 \longrightarrow$
d) both (a) and (b)

337. Which of the following is a nitric acid anhydride?
a) NO b) NO_2 c) N_2O_5 d) N_2O_3

338. Which of the following sets has strongest tendency to form anions?
a) Ga, Ni, Tl b) Na, Mg, Al c) N, O, F d) V, Cr, Mn.

339. Assertion: Catenation tendency is weaker in nitrogen.
Reason: Nitrogen exists as diatomic gas.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

340. Which of the following statements is not correct for nitrogen?
a) Its electronegativity is very high b) d-orbitals are available for bonding
c) It is a typical non-metal d) Its molecular size is small

341. P and Q, respectively are the sodium salts of
a) hypochlorous and chloric acids b) hypochlorous and chlorous acids
c) chloric and perchloric acids d) chloric and hypochlorous acids.

342. Basicity of orthophosphoric acid is :
a) 2 b) 3 c) 4 d) 5

343. Which of the following is not tetrahedral in shape?
a) NH_4^+ b) $SiCl_4$ c) SF_4 d) SO_4^{2-}

344. Which of the following displaces Br_2 from an aqueous solution containing bromide ions?
a) I_2 b) I^-_3 c) Cl^- d) Cl

345. Noble gases do not react with other elements because _____ .
a) They are monoatomic b) They are found in abundance
c) The size of their atoms is very small
d) They are completely paired up and have stable electron shells

346. Match the inter-halogen compounds of column I with the geometry in Column II and assign the correct code.

Column I	Column II
A.XX'	(i) T-shade
B.XX'_3	(ii) Pentagonal bipyramidal
C.XX'_5	(iii) Linear
D.XX'_7	(iv) Square pyramidal
	(v)Tetrahedral

code A B C D
a) (iii) (iv) (i) (ii) b) (iii) (i) (iv) (ii) c) (v) (iv) (iii) (ii) d) (iv) (iii) (ii) (i)

347. Which is the hardest compound of boron?
a) B_2O_3 b) BN c) B_4C d) B_2H_6

348. Which of the following types of forces bind together the carbon atoms in diamond?
a) Ionic b) Covalent c) Dipolar d) van der Waals

349. $Na_2B_4O_7 + X \longrightarrow H_3BO_3$. What is X in the reaction?
a) Aqueous solution of NaOH b) Dilute nitric acid c) Cone. H_2SO_4 or HCl d) Water

350. $AlCl_3$ achieves stability by forming a dimer. In trivalent state the compound is hydrolysed in water. $AlCl_3$ in acidified aqueous solution forms:
a) $Al(OH)_3$ + HCl b) $[Al(H_2O)_6]^{3+}$ + $3Cl^-$ c) $AlCl_3 \cdot 2H_2O$ d) Al_2O_3 + HCl

351. The correct order of acid strength is:

a) $HClO_4 < HClO_3 < HClO_2 < HClO$ b) $HClO < HClO_2 < HClO_3 < HClO_4$
c) $HClO_4 < HClO < HClO_2 < HClO_3$ d) $HClO_2 < HClO_3 < HClO_4 < HClO$

352. The type of hybridization of boron in diborane is
a) sp-hybridization b) sp^2-hybridization c) sp^3-hybridization d) sp^3d^2-hybridization

353. Assertion: Interhalogen compounds are more reactive than halogens (except fluorine)
Reason: They all undergo hydrolysis giving halide ion derived from the smaller halogen and anion derived from larger halogen.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

354. Which compound has planar structure?
a) XeF_4 b) $XeOF_3$ c) XeO_2F_2 d) XeO_4

355. The bond dissociation energy of B- F in BF_3 is 646 kJ mol^{-1} whereas that of C - F in CF_4 is 515 kJ mol^{-1}. The correct reason for higher B - F bond dissociation energy as compared to that of C - F bond is:
a) stronger o bond between B and F in BF_3 as compared to that between C and F in CF_4
b)
significant pπ-pπ interaction between B and F in BF_3 whereas there is no possibility of such interaction between C and F in CF_4
c)
lower degree of pπ-pπ interaction between Band F in BF_3 than that between C and F in CF_4
d) smaller size of B-atom as compared to that of C-atom

356. In borax bead test which compound is formed?
a) Ortho-borate b) Meta-borate c) Double oxide d) Tetra-borate

357. Which of the following statements is not true?
a) HF is a stronger acid than HCl
b) Among halide ions, iodide is the most powerful reducing agent
c) Fluorine is the only halogen that does not show a variable oxidation state
d) HOCl is a stronger acid than HOBr

358. Which of the following is used to prepare Cl_2 gas at room temperature from concentrated HCl?
a) MnO_2 b) H_2S c) $KMnO_4$ d) Cr_2O_3

359. Which of the following fluorides does not exist?
a) NF_5 b) PF_5 c) AsF_5 d) SbF_5

360. On hydrolysis, diborane produces
a) $H_3BO_2 + H_2O_2$ b) $H_3BO_3 + H_2$ c) $B_2O_3 + O_2$ d) $H_3BO_3 + H_2O_2$

361. Affinity for hydrogen decreases in the group from fluorine to iodine. Which of the halogen acids should have highest bond dissociation enthalpy?
a) HF b) HCl c) HBr d) HI

362. Xenon has closed shell configuration but is known to give compounds with fluorine because

a) Xe atom has large size and lower ionisation potential as compared to other noble gases

b) Xe has unpaired electrons which can form covalent bonds

c) Xe has highest boiling point hence it can form compounds with fluorine

d) fluorine is the smallest element hence it can react with all noble gases.

363. Nitrogen shows different oxidation states ranging from:
a) -3 to +5 b) -5 to +5 c) 0 to -5 d) -3 to +3

364. P_2O_5 is heated with water to give _____ .
a) Hypophosphorous acid b) Phosphorous acid c) Hypophosphoric acid
d) Orthophosphoric acid

365. When excess of carbon dioxide is passed through lime water, the milkiness first formed disappears due to
a) the reversible reaction taking place b) formation of water soluble calcium bicarbonate

c) huge amount of heat evolved during the reaction

d) formation of water soluble complex of calcium.

366. On heating with concentrated NaOH solution in an inert atmosphere of CO_2, white phosphorus gives a gas. Which of the following statements is incorrect about the gas?
a) It is more basic than NH_3 b) It is less basic than NH_3

c) It is highly poisonous and has smell like rotten fish.

d) Its solution in water decomposes in the presence of light.

367. Which one of the following orders is not in accordance with the property stated against is?
a) $HI > HBr > HCl < HF$: Acidic property in water
b) $F_2 > Cl_2 > Br_2 > I_2$: Electronegativity
c) $F_2 > Cl_2 > Br_2 > I_2$: Bond dissociation energy
d) $F_2 > Cl_2 > Br_2 > I_2$: Oxidising power

368. A black compound of manganese reacts with a halogen acid to give greenish yellow gas. When excess of this gas reacts with NH_3 an' unstable trihalide is formed. In this process the oxidation state of nitrogen changes from
a) -3 to +3 b) -3 to 0 c) - 3 to +5 d) 0 to -3

369. Strongest hydrogen bonding is shown by _____ .
a) Water b) Ammonia c) HF d) Hydrogen sulphide

370. Assertion: Boron forms only covalent compounds.
Reason: Boron has very small size.
a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

371. An element of group 14 forms two oxides one of which is highly poisonous and neutral. Other oxide can be easily liquefied and compressed to give a solid which is used as a refrigerant under the name of drikold. The element and the oxides are
a) Si, SiO, SiO_2 b) Pb, PbO, PbO_2 c) C, CO, CO_2 d) Sn, SnO, SnO_2

372. Which of the following is most acidic?

a) N_2O_5 b) P_2O_5 c) As_2O_5 d) Sb_2C_5

373. Which one of the following which is the strongest oxidizing agent?
a) HOClO < HOCl < $HOClO_3$ < $HOClO_2$ b) $HOClO_2$ < $HOClO_3$ < HOClO < HOCl
c) $HOClO_3$ < $HOClO_2$ < HOClO < HOCl d) HOCl < HOClO < $HOClO_2$ < $HOClO_3$

374. A compound 'X is heated with C_2H_5OH and H_2SO_4, the fumes produced burn with green flame. The compound 'X is
a) H_3BO_3 b) $Na_2B_4O_7 \cdot 10H_2O$ c) K_3BO_3 d) none of these

375. The bleaching action of chlorine is due to _____ .
a) Reduction b) Hydrogenation c) Chloronation d) Oxidation

376. A translucent white waxy solid (A) reacts with excess of chlorine to give a yellowish white powder (B). (B) reacts with organic compounds containing -OH group converting them into chloro derivatives. (B) on hydrolysis gives (C) and is finally converted to phosphoric acid. (A), (B) and (C) are:
a) P_4, PCl_3, H_3PO_4 b) P_4, PCl_5 , H_3PO_3 c) P_4, PCl_5, $POCl_3$ d) P_4, PCl_3, $POCl_3$

377. Assertion: Solubility of noble gases in water decreases with increasing size of the noble gas.
Reason: Solubility of noble gases in water is due to dipole-dipole interaction.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

378. There is a large number of carbon compounds due to
a) tetravalency of carbon b) strong catenation property of carbon
c) allotropic property of carbon d) non-metallic character of carbon

379. What happens when a mixture of cobalt oxide and borax is heated in a flame on a loop of platinum wire?
a) A transparent white bead is formed. b) A bright pink coloured $NaBO_2$ bead is formed
c) A blue coloured $Co(BO_2)_2$ bead is formed. d) A red coloured $Co(BO_2)_2$ bead is formed.

380. Name the type of the structure of silicate in which one oxygen atom of $[SiO_4]^{4-}$ is shared?
a) Linear chain silicate b) Sheet silicate c) Pyrosilicate d) Three dimensional

381. Phosphorous acid on heating gives the following products:

$$4H_3PO_3 \xrightarrow{\Delta} 3H_3PO_4 + PH_3$$

The above reaction is an example of
a) oxidation b) thermal decomposition c) disproportionation d) reduction.

382. Repeated use of which one of the following fertilizers would increase the acidity of the soil?
a) Ammonium sulphate b) Superphosphate of lime c) Urea d) Potassium nitrate

383. Boric acid is the trival name for
a) orthoboric acid b) metaboric acid c) pyroboric acid d) none of these

384. Which of the following shows nitrogen in its increasing order of oxidation number?
a) $NO < N_2O < NO_2 < NO_3^-, NH_4^+$
b) $NH_4^+ < N_2O < NO_2 < NO_3^- < NO$

c) $NH_4^+ < N_2O < NO < NO_2 < NO_3^-$
d) $NH_4^+ < NO_2 < N_2O < NO_2 < NO_3^-$

385. Boric acid has a polymeric layer structure in which planar BO_3 units are joined by:
a) covalent bonds b) two centre - two electron bonds c) coordinate bonds
d) hydrogen bonds.

386. Nitrogen forms stable N_2 molecule but phosphorus is converted to P_4 from P_2 because
a) $p\pi$ - $p\pi$ bonding is strong in phosphorus b) $p\pi$ - $p\pi$ bonding is weak in phosphorus
c) triple bond is present in phosphorus d) single P - P bond is weaker than N -N bond.

387. The most commonly used reducing agent is
a) $AlCl_3$ b) $PbCl_2$ c) $SnCl_4$ d) $SnCl_2$

388. Why is sulphur dioxide considered as an air pollutant?
a) It increases the temperature of the atmosphere.
b) It is used as insecticidewhich causes air pollution.
c) It causes acid rain due to formation of sulphuric acid on combining with O_2 and H_2O .
d) It is a strong oxidising agent hence oxidises the other components of air.

389. Which one of the following is not the characteristic property of carbon?
a) It exhibits catenation. b) It forms compounds with multiple bonds.
c) Its melting point and boiling point are exceptionally high.
d) It shows semi-metallic character.

390. A brown ring is formed in the ring test for NO_3^- ion. It is due to the formation of
a) $[Fe(H_2O)_5(NO)]^{2+}$ b) $FeSO_4 \cdot NO_2$ c) $[Fe(H_2O)_4(NO)_2]^{2+}$ d) $FeSO_4.HNO_3$

391. Oxidation of thiosulphate by iodine gives _____ .
a) Tetrathionate ion b) Sulphide ion c) Sulphate ion d) Sulphite ion

392. Assertion: Although aluminium is above hydrogen in electrochemical series, it is stable in air and water.
Reason: The thin protective layer of oxide (Al_2O_3) on the surface protects the aluminium
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

393. Borax-bead test is responded by
a) divalent metals b) heavy metals c) light metals
d) metals which form coloured metaborates

394. Which of the following statements about the zeolites is false?
a) They are used as cation exchangers
b) They have open structure which enables them to take up small molecular
c) Zeolites are aluminosilicates having three dimensional network
d) Some of the SiO_4^{4-} units are replaced by AlO_4^{5-} and AlO_6^{9-} ions in zeolites

395. The first member of the p-block elements differs from the remaining members of their corresponding groups due to

a) small size and absence of d-orbitals b) diagonal relationship with other elements
c) difference in ability to form double and triple bonds d) high ionisation enthalpy.

396. Which of the following statements is wrong?
a) Single N-N bond is stronger than the single P-P bond.
b)
PH_3 can act as a ligand in the formation of coordination compound with transition elements.
c) NO_2 is paramagnetic in nature. d) Covalency of nitrogen in N_2O_5 is four.

397. All members of group 14 when heated in oxygen form oxides. Which of the following is the correct trend of oxides?
a) Dioxides CO_2, SiO_2 and GeO_2 are acidic while SnO_2 and PbO_2 are amphoteric.
b) CO, GeO, SnO and PbO are amphoteric.
c) Monoxides react with haemoglobin to form toxic compounds
d) All oxides burn with blue flame.

398. Regarding F^- and Cl^- which of the following statement(s) is/are correct?
I. Cl^- can give up an electron more easily than F^-.
II. Cl^- is a better reducing agent than F^-.
III. Cl^- is smaller in size than F^-.
IV. F^- can be oxidised more readily than Cl^-.
a) I and II b) I, II and IV c) III and IV d) Only I

399. Sulphur molecule is
a) diatomic b) triatomic c) tetratomic d) octa-atomic.

400. Which of the following increasing order is not correct as mentioned in the property with it?
a) $HClO < HClO_2 < HClO_3 < HClO_4$ (thermal stability)
b) $HClO_4 < HClO_3 < HClO_2 < HClO$ (oxidising power) c) $F^- < cl^- < Br^- < I^-$ (reducing nature)
d) $HIO_4 < ICl < I_2 < HI$ (oxidation number of iodine)

401. Identify the correct statements from the following
1. $CO_2(g)$ is used as refrigerant for ice-cream and frozen food
2. The structure of C_{60} contains twelve six carbon rings and twenty five carbon rings.
3. ZSM-5, a type of zeolite, is used to convert alcohols into gasoline.
4. CO is colorless and odouless gas.
a) (3) and (4) only b) (1) and (2) and (3) only c) (1) and (3) only d) (2) and (3) only

402. Which of the following statement is not correct for nitrogen?
a) Its electronegativity is very high. b) d-orbitals are available for bonding.
c) It is a typical non-metal. d) Its molecular size is small

403. Reduction potentials of some ions are given below. Arrange them in decreasing order of oxidising power.

Iron	**ClO_4^-**	**IO_4^-**	**BrO_4^-**
Reduction potential E^0/V	E^0=1.19V	E^0=1.65V	E^0=1.74V

a) $ClO_4^- > IO_4^- > BrO_4^-$ b) $IO_4^- > BrO_4^- > ClO_4^-$ c) $BrO_4^- > IO_4^- > ClO_4^-$ d) $BrO_4^- > ClO_4^- > IO_4^-$

404. Which statements is wrong?

a) Feldspars are not aluminosilicates b) Beryl is an example of cyclic silicate
c) Mg_2SiO_4 is orthosilicate d) Basic structure unit in silicates is the SiO_4 tetrahedran

405. Cement, the important building material is a mixture of oxides of several elements. Besides calcium, iron and sulphur, oxides of elements of which of the group(s) are present in the mixture?
a) Group 2 b) Groups 2,13 and 14 c) Groups 2 and 13 d) Groups 2 and 14

406. The angular shape of ozone molecule (O_3) consists of:
a) 1σ and 1π bond b) 2σ and 1π bond c) 1σ and 2π bonds d) 2σ and 2π bonds

407. Choose the correct statements from the following?
a) Rhombic sulphur is blue in colour.
b) Rhombic sulphur is soluble in water but insoluble in organic solvents
c) Rhombic and monoclinic sulphur have S_6 molecules
d) In Cyclo-S_6 molecule, the ring adopts chair form.

408. In the following reactions sequence $(A) + N_2 \xrightarrow{\Delta} (B) \xrightarrow{+H_2O} (C) + (D)$ white ppt. (C) is formed and gas (D) is evolved. White ppt. (C) dissolves in NaOH solution, while gas (D) gives white fumes in HCl. Thus, (A) is
a) B b) Al c) Ga d) C

409. Which of the following does not depict properties of fullerenes?
a) Fullerenes are made by heating graphite. b) Fullerenes are pure forms of carbon.
c) Fullerenes have open cage structure like ice d) C60 is called Buckminsterfullerene.

410. Which is used in the laboratory for fast drying of neutral gases?
a) P_2O_s b) Anhyd.$CaCl_2$ c) Activated charcoal d) Na_3PO_4

411. Silicon has a strong tendency to form polymers like silicones. The chain length of silicone polymer can be controlled by adding
a) $MeSiCl_3$ b) Me_2SiCl_2 c) Me_3SiCl d) Me_4Si

412. Among the following molecules (i) XeO_3 (ii) $XeOF_4$ (iii) XeF_6 those having same number of lone pairs on Xe are
a) (i) and (ii) only b) (i) and (iii) only c) (ii) and (iii) only d) (i), (ii) and (iii)

413. Match the column I with column II and mark the appropriate choice.

Column I	Column II
(A) H_2SO_4	(i) Highest electron gain enthalpy
(B) CCl_3NO_2	(ii) Chalcogen
(C) Cl_2	(iii) Tear gas
(D) Sulphur	(iv) Storage batteries

a) (A) ⟶ (iv), (B) ⟶ (iii) (C) ⟶ (i), (D) ⟶ (ii) b) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii)
c) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii) d) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (iv)

414. An aqueous solution of sodium carbonate absorbs NO and NO_2 to give _____ .
a) $CO_2 + NaNO_3$ b) $CO_2 + NaNO_2$ c) $NaNO_2 + CO$
d) $NaNO_3 + CO$

415. The straight chain polymer is formed by

a) hydrolsis of CH_3SiCl_3 followed by condensation polyrnerisation
b) hydrolysis of $(CH_3)_4Si$ by addition polymerisation
c) hydrolysis of $(CH_3)_2SiCl_2$ followed by condensation polymerisation
d) hydrolysis of $(CH_3)_3SiCl$ followed by condensation polymerisation

416. A compound X, of boron reacts with NH_3 on heating to give another compound Y which is called inorganic benzene. The compound X can be prepared by treating BF3 with lithium aluminium hydride. The compounds X and Yare represented by the formulas:
a) B_2H_6, $B_3N_3H_6$ b) B_2O_3, $B_3N_3H_6$ c) BF_3, $B_3N_3H_6$ d) $B_3N_3H_6$ ' B_2H_6

417. Read the passage given and answer the questions
The reactions of Cl_2 gas with cold-dilute and hot-concentrated NaOH in water give sodium salts of two (different) oxoacids of chlorine, P and Q, respectively. The Cl_2 gas reacts with SO_2 gas, in presence of charcoal, to give a product R. R reacts with white phosphorus to give a compound S. On hydrolysis, S gives an oxoacid of phosphorus, T.
R, S and T, respectively are
a) SO_2Cl_2, PCl_5 and H_3PO_4 b) SO_2Cl_2, PCl_3 and H_3PO_3 c) $SOCl_2$, PCl_3 and H_3PO_2
d) $SOCl_2$, PCl_5 and H_3PO_4

418. Fill in the blanks by choosing the appropriate option. The noble gases can form compounds with _____(i)_____ and _____(ii)_____. The mixture of _____(iii)_____ and _____(iv)_____ is used for respiration by drivers.

a)

(i)	(ii)	(iii)	(iv)
iodine	oxygen	oxygen	argon

b)

(i)	(ii)	(iii)	(iv)
fluorine	oxygen	helium	oxygen

c)

(i)	(ii)	(iii)	(iv)
xenon	platinum	argon	krypton

d)

(i)	(ii)	(iii)	(iv)
helium	oxygen	xenon	argon

419. Which of the following is not correctly matched?
a) PCl_5 - Sp^3d hybridisation b) PCl_3 - Sp^3 hybridisation c) PCl_5 (solid) - $[PtCl_4]^+$ $[PtCl_6]^-$
d) PCl_5 - brownish powder

420. Select the correct option regarding the properties of dioxygen?
a) Dioxygen never reacts with metals. b) Dioxygen is diamagnetic in nature.
c) Combination of dioxygen with other elements is highly exothermic process.
d) Dioxygen liquefies at 55 K and freezes at 90 K.

421. In which of the following arrangements the given sequence is not strictly according to the property indicated against it?
a) $HF < HCl < HBr < HI$: increasing acidic strength
b) $H_2O < H_2S < H_2Se < H_2$ Te : increasing pKa values
c) $NH_3 < PH_3 < AsH_3 < SbH_3$: increasing acidic character
d) $CO_2 < SiO_2 < SnO_2 < PbO_2$: increasing oxidising power

422. Which of the following statements is not true for halogens?
a) Allbut fluorine shows positive oxidation states. b) All are oxidizing agents.
c) All form monobasic oxyacids d) Chlorine has the highest electron-gain enthalpy.

423. Assertion: Carbon monoxide is a poisonous gas.
Reason: Carbon monoxide combines with haemoglobin to form carboxy - haemoglobin which prevents absorption of oxygen by it
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

424. Assertion: Diamond is the hardest substance on the earth.
Reason: It has high melting point
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

425. Which compound is prepared by the following reaction:
$Xe+F_2 \xrightarrow[673K]{Ni}$
a) XeF_4 b) XeF_2 c) XeF_6 d) None of these

426. BF_3 is used as a catalyst in various organic reactions because
a) it is a strong reducing agent b) it is a highly reactive compound
c) it is a weak Lewis acid d) it is a strong Lewis acid

427. Elements of which of the following groups will form anions most readily?
a) Oxygen family b) Nitrogen family c) Halogens d) Alkali metals

428. Which of the following statements is not correct about the structure of PCl_5?
a) PCIs has a trigonal bipyramidal structure.
b) Three equatorial P-CI bonds are equivalent.
c) The two axial bonds are different and longer than equatorial bonds.
d) Equatorial bond pairs suffer more repulsion than that of the axial bond pairs.

429. Which of the following is not matched correctly with its use
a) Piezoelectric material- Quartz b) Ion -exchangers - Graphite c) Filtration plants - Silica
d) Electrical insulators - Silicones

430. Assertion: Ammonia acts as a ligand.
Reason: A lone pair of electrons on nitrogen can be donated to acceptor.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

431. The exhibition of highest co-ordination number depends on the availability of vacant orbitals in the central atom. Which of the following elements is not likely to act as central atom in MF_6^{3-} ?
a) B b) Al c) Ga d) In

432. Covalency of oxygen cannot exceed 2 unlike sulphur which can show +4 or +6 because

a) oxygen atom does not have d-orbitals

b) oxygen atom has two unpaired electrons in its valence shell

c) oxygen can form a double bond with another oxygen atom

d) electrons of oxygen atom cannot be promoted to d-orbitals due to its small size.

433. A solution of potassium bromide is treated with each of the following. Which one would liberate bromine?
a) Hydrogen iodide b) Sulphur dioxide c) Chlorine d) Iodine

434. Fluorine is the best oxidising agent because it has
a) highest electron affinity b) highest reduction potential c) highest oxidation potential
d) lowest electron affinity.

435. Ammonia is a Lewis base. It forms complexes with cations. Which one of the following cations does not form complex with ammonia?
a) Ag^+ b) Cu^{2+} c) Cd^{2+} d) Pb^{2+}

436. Which of the following pairs is not correctly matched.
a) Allotropic form of sulphur which is more stable at room temperature - Rhombic

b) The hydride of group 16 which is liquid at room temperature - Water

c) The gas formed in the upper layers of atmosphere by action of UV radiations - Nitrogen

d) The catalyst used in the manufacture of H_2SO_4 by contact process - Vanadium pentoxide

437. Ingraphite, electrons are
a) localised on each C-atom b) localised on every third C-atom
c) spread out between the structure d) Both (b) and (c)

438. On heating ammonium dichromate and barium azide separately we get
a) N_2 in both cases b) N_2 with ammonium dichromate and NO with barium azide

c) N_2O with ammonium dichromate and N_2 with barium azide

d) N_2O with ammonium dichromate and NO_2 with barium azide.

439. An oxide X in its normal form is almost nonreactive due to very high X - 0 bond enthalpy. It resists the attack by halogens, hydrogen and most of acids and metals even at elevated temperatures. It is only attacked by HF and NaOH. The oxide X is
a) SiO_2 b) CO_2 c) SnO_2 d) PbO_2

440. Why do boron and aluminium halides behave as Lewis acids?
a) Both halides (MX_3) can accept electrons from a donor to complete their octet
b) Both halides (MX_3) can donate a pair of electrons
c) Both halides (MX_3) are covalent polymeric structures.
d) Both halides (MX_3) react with water to give hydroxides and HCl.

441. Boric acid is an acid because its molecule
a) contains replaceable H^+ ion b) gives up a proton

c) accepts OH^- from water releasing proton d) combines with proton from water molecule

442. Identify X in the reaction: $X + \underset{(steam)}{2H_2O} \xrightarrow{\Delta} XO_2 + 2H_2$

a) C b) Si c) Ge d) Sn

443. The basic structural unit of silicates is

a) SiO_4^{4-} b) SiO_3^{2-} c) SiO_4^{2-} d) SiO

444. What happens when silicon is heated with methyl chloride in presence of copper as a catalyst at 573 K?

a) Methyl substituted chlorosilanes are formed. b) Only Me_4Si is formed.

c) Polymerised chains of $(CH_3)_3SiCl$ are formed. d) Silicones are formed.

445. Which of the following is the wrong statement?

a) Ozone is paramagnetic gas

b) The two oxygen -oxygen bond length in ozone are identical. c) O_3 molecule is bent.

d) Ozone is violet-black in solid state.

446. Which of the following represents calcium chlorite?

a) $Ca(ClO_3)_2$ b) $Ca(ClO_2)_2$ c) $CaClO_2$ d) $Ca(ClO_4)_2$

447. Acidity of diprotic acids in aqueous solutions increases in the order

a) $H_2S < H_2Se < H_2Te$ b) $H_2Se < H_2S < H_2Te$ c) $H_2Te < H_2S < H_2Se$

d) $H_2Se < H_2Te < H_2S$

448. Which of the following elements does not show allotropy?

a) Nitrogen b) Bismuth c) Antimony d) Arsenic

449. Name of the synthetic radioactive element of group 16 having atomic number 116 is

a) Livermorium b) Tennessine c) Livernorium d) Moscovium.

450. The halogen that is most easily reduced is

a) F_2 b) Cl_2 c) Br_2 d) I_2

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Time : 1 Mins **S BLOCK ELEMENTS 1** **Marks : 461**

1. One word answers are given for the following. Mark the example which is not correct
   a) Alkali metal with lowest melting point - Cs
   b) Alkaline earth metal with highest hydration enthalpy - Ba^{2+}
   c) Alkaline earth metal which imparts brick red colour to the flame - Ca^{2+}
   d) Oxide of alkaline earth metal which is amphoteric in nature - BeO
2. Which of the following has lowest thermal stability?
   a) Li_2CO_3 b) Na_2CO_3 c) K_2CO_3 d) Rb_2CO_3
3. When alkaline earth metals dissolve in ammonia, they form coloured solution like alkali metals. Which of the following observations regarding the reaction are correct?
   (i) Dilute solutions are bright blue in colour due to solvated electrons.
   (ii) These solutions decompose to form amides and hydrogen.
   (iii) From this solution the ammoniates $[M(NH_3)_6]^{2+}$ can be recovered by evaporation.
   a) Only (i) and (ii) b) Only (i), (ii) and (iii) c) Only (ii) and (iii) d) Only (i)
4. Identify X, Y and Z

a)

X	Y	Z
Plaster of Paris($CaSO_4.1/2H_2O$)	Burnt plaster($CaSO_4$)	Quick lime(CaO)

b)

X	Y	Z
Calcium sulphate($CaSO_4$)	Plaster of Paris($CaSO_4.1/2H_2O$)	Quick lime(CaO)

c)

X	Y	Z
Quick lime(CaO)	Plaster of Paris($CaSO_4.1/2H_2O$)	Lime water($Ca(OH)_2$

d)

X	Y	Z
Plaster of Paris($CaSO_4.1/2H_2O$)	Burnt plaster($CaSO_4$)	Slaked lime($Ca(OH)_2$)

5. Assertion: For biological functions in human body, barium is not required.
   Reason: Barium is a divalent ion.
   a) If both assertion and reason are true and reason is the correct explanation of assertion
   b) If both assertion and reason are true but reason is not the correct explanation of assertion
   c) If assertion is true but reason is false d) If both assertion and reason are false
6. Some of the Group 2 metal halides are covalent and soluble in organic solvents. Among the following metal halides, the one which is soluble in ethanol is

a) $BeCl_2$ b) $MgCl_2$ c) $CaCl_2$ d) $SrCl_2$

7. Which one of the alkali metals, forms only the normal oxide, M_2O on heating in air?
   a) Rb b) K c) Li d) Na
8. Which one of the following is present as an active ingredient in bleaching powder for bleaching action?
   a) $Ca(OCl)_2$ b) CaO_2Cl c) $CaCl_2$ d) $CaOCl_2$
9. Assertion: $CaCO_3$ is prepared by passing carbon dioxide gas through slaked lime.
   Reason: Passing excess of CO_2 through slaked lime leads to the formation of quick lime.
   a) If both assertion and reason are true and reason is the correct explanation of assertion
   b) If both assertion and reason are true but reason is not the correct explanation of assertion
   c) If assertion is true but reason is false d) If both assertion and reason are false
10. Slaked lime reacts with chlorine to give:
    a) $CaCl_2$ b) CaO c) $Ca(OCl)_2$ d) $CaCO_3$
11. In the case of alkali metals, the covalent character decreases in the order:
    a) MF > MCl > MBr > MI b) MF > MCl > MI > MBr c) MI > MBr > MCl > MF
    d) MCl > MI > MBr > MF
12. Which is the correct sequence of solubility of carbonates of alkaline earth metals?
    a) $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$ b) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$
    c) $CaCO_3 > BaCO_3 > SrCO_3 > MgCO_3$ d) $BaCO_3 > CaCO_3 > SrCO_3 > MgCO_3$
13. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:
    Plaster of paris
    a) $CaSO_4.2H_2O$ b) $CasO_4.\frac{1}{2}H_2O$ c) $MaSO_4.7H_2O$ d) $MgSO_4.H_2O$
14. The alkali metals are low melting. Which of the following alkali metals is expected to melt if the room temperature rises to 30°C?
    a) Na b) K c) Rb d) Cs
15. Which of the following statements is true about $Ca(OH)_2$?
    a) It is used in the preparation of bleaching powder b) It is a light blue solid
    c) It does not possess disinfectant property d) It is used in the manufacture of cement
16. Assertion: $BeSO_4$ and $MgSO_4$ are insoluble in water.
    Reason: Be^{2+} and Mg^{2+} have low hydration enthalpies.
    a) If both assertion and reason are true and reason is the correct explanation of assertion
    b) If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false d) If both assertion and reason are false
17. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Na_2CO_3	(i)	Caustic soda
(B)	NaOH	(ii)	Glauber's salt
(C)	$Na_2CO_3.10H_2O$	(iii)	Soda ash
(D)	$Na_2SO_4.10H_2O$	(iv)	Washing soda

    a) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii) b) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii)
    c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i) d) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (ii)
18. When chlorine is passed over by slaked lime at room temperature, the main reaction product is:
    a) $Ca(ClO_2)_2$ b) $CaCl_2$ c) $CaOCl_2$ d) $Ca(OCl)_2$

19. Which of the following is not true about alkali metals?
    a) Alkali metals do not occur free in nature b) Alkali metals are good oxidising agents
    c) Alkali metal salts impart colour to the flame d) Alkali metal salts are generally ionic

20. The correct order of increasing thermal stability of
    $K_2CO_3, MgCO_3, CaCO_3$ and $BeCO_3$ is
    a) $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$
    b) $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$
    c) $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$
    d) $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$

21. Which of the following statements is false?
    a) Mg^{2+} ions form a complex with ATP b) Ca^{2+} ions are important in blood clotting
    c) Ca^{2+} ions are not important in maintaining the regular beating of the heart
    d) Mg^{2+} ions are important in the green parts of plants.

22. On heating which of the following releases CO_2 most easily?
    a) Na_2CO_3 b) $MgCO_3$ c) $CaCO_3$ d) K_2CO_3

23. An aqueous solution of sodium carbonate absorbs NO and NO_2 to give:
    a) $CO_2 + NaNO_3$ b) $CO_2 + NaNO_2$ c) $NaNO_2 + CO$ d) $NaNO_3 + CO$

24. Which of the following statements is correct?
    a) Sodium carbonate decomposes on heating
    b) Sodium bicarbonate is more soluble in water than potassium bicarbonate
    c) Sodium when heated with excess of O_2, gives peroxide.
    d) Lithium halides are highly ionic in nature

25. Assertion: Alkali metals are obtained by electrolysis of molten salt and not aqueous solution.
    Reason: The discharge potential of H^+ ions is lower than alkali metal cation hence hydrogen is discharged at cathode instead of metal.
    a) If both assertion and reason are true and reason is the correct explanation of assertion
    b) If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false d) If both assertion and reason are false

26. Crystalline sodium chloride is a bad conductor of electricity while molten NaCl and its aqueous solution conduct electricity. This is because
    a) crystalline sodium chloride contains molecules only
    b) the ions present in it are not free to move in solid state
    c) sodium chloride is a covalent crystal d) solid substances do not conduct electricity

27. Which of the following statement is false?
    a) Strontium decomposes water readily than beryllium
    b) $BaCO_3$ melts at a higher temperature than $CaCO_3$
    c) Barium hydroxide is more soluble in water than $Mg(OH)_2$
    d) Beryllium hydroxide is more basic than bariun hydroxide

28. Sulphates of Be and Mg are readily soluble in water but sulphates of Ca, Sr and Ba are insoluble. This is due to the fact
    a) the greater hydration enthalpies of Be^{2+} and Mg^{2+} overcome the lattice enthalpy
    b) high lattice enthalpy of Be^{2+} and Mg^{2+} makes them soluble in water
    c) solubility decreases from $BeSO_4$ to $BaSO_4$ due to increase in ionic size
    d) $BeSO_4$ and $MgSO_4$ are ionic in nature while other sulphates are covalent

29. When washing soda is heated :

a) CO is released b) CO + CO_2 is released c) CO_2 is released
d) water vapour is released

30. Bleaching powder reacts with a few drops of concentrated HCl to give:
a) Chlorine b) Hypochlorous acid c) Calcium oxide d) Oxygen

31. An example of a double salt is:
a) Bleaching powder b) $K_4[Fe(CN)_6]$ c) Hypo d) Potash alum

32. Which one of the following is present as an active ingredient in bleaching powder for bleaching action?
a) $CaOCl_2$ b) $Ca(OCl)_2$ c) CaO_2Cl d) $CaCl_2$

33. When plaster of Paris comes in contact with water it sets into a hard mass. The composition of the hard mass is
a) $CaSO_4 \cdot H_2O$ b) $CaSO_4.Ca(OH)_2$ c) $CaSO_4.2H_2O$ d) $CaSO_4.2Ca(OH)_2$

34. The mobilities of the alkali metal ions in aqueous solution are $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$ because
a) greater is the degree of hydration, lesser is the mobility in aqueous medium
b) larger the size of cation, greater is the mobility in aqueous medium
c) larger the size of cation, lesser is the mobility of ions in aqueous medium
d) lesser the degree of hydration, lesser is the mobility of ions in aqueous medium

35. Compared with the alkaline earth metals, the alkali metals exhibit
a) smaller ionic radii b) higher boiling points c) greater hardness
d) lower Ionisation energies

36. Enzymes that utilize AIP in phosphate transfer require an alkaline earth metal (M) as the cofactor, M is:
a) Mg b) Ca c) Sr d) Be

37. The correct order of the mobility of the alkali metal ions in aqueous solution is:
a) $Li^+ > Na^+ > K^+ > Rb^+$ b) $Na^+ > K^+ > Rb^+ > u^+$ c) $K^+ > Rb^+ > Na^+ > Li^+$
d) $Rb^+ > K^+ > Na^+ > u^+$

38. When sodium reacts with excess of oxygen, the oxidation number of oxygen changes from:
a) 0 to -1 b) 0 to -2 c) -1 to -2 d) No change

39. Dead burnt plaster is
a) $CaSO_4$ b) $CaSO_4.\frac{1}{2}H_2O$ c) $CaSO_4.H_2O$ d) $CaSO_4.2H_2O$

40. A substance which gives brick red flame and breaks down on heating to give oxygen and a brown gas is
a) magnesium nitrate b) calcium nitrate c) barium nitrate d) strontium nitrate

41. What is the biological importance of Na+ and K^+ ions in cell fluids like blood plasma?
a) They participate in transmission of nerve signals
b) They regulate the number of red and white blood corpuscles in the cell
c) They can be present in any amount in the blood since they are absorbed by the cells
d) They regulate the viscosity and colour of the blood

42. Which one of the following has minimum value of size of cation/anion ratio?
a) NaCl b) KCl c) $MgCl_2$ d) CaF_2

43. Which one of the following has minimum value of size of cation/anion ratio?
a) NaCl b) KCL c) $MgCl_2$ d) CaF_2

44. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:
Epsomite
a) $CaSO_4.2H_2O$ b) $CasO_4.\frac{1}{2}H_2O$ c) $MaSO_4.7H_2O$ d) $MgSO_4.H_2O$

45. Which of the bicarbonates does not exist in solid state?
a) $NaHCO_3$ b) $KHCO_3$ c) $Ca(HCO_3)_2$ d) $RbHCO_3$

46. Which is the characteristic flame colouration of Li?
a) Yellow b) Violet c) Blue d) Crimson red

47. The alkali metals form salt-like hydrides by the direct synthesis at elevated temperatures. The thermal stability of these hydrides decrease in which of the following orders?
a) $CsH > RbH > KH > NaH > LiH$
b) $KH > NaH > LiH > CsH > RbH$
c) $NaH > LiH > KH > RbH > CsH$
d) $LiH > NaH > KH > RbH > CsH$

48. In which of the following, the hydration energy is higher than the lattice energy?
a) $BaSO_4$ b) $MgSO_4$ c) $RaSO_4$ d) $SrSO_4$

49. Washing soda has formula
a) $Na_2CO_3 \cdot 7H_2O$ b) $Na_2CO_3 \cdot 10H_2O$ c) $Na_2CO_3 \cdot 3H_2O$ d) Na_2CO_3

50. The suspension of slaked lime in water is known as:
a) Lime water b) Quick lime c) Milk of lime d) Aqueous solution of slaked lime.

51. The stability of K_2O, K_2O_2 and KO_2 is in order $K_2O < K_2O_2 < KO_2$. This increasing stability as the size of metal ion increases is due to stabilisation of:
a) larger cation by smaller anions through lattice energy effects
b) larger cation by larger anions through lattice energy effects
c) smaller cations by smaller anions through melting point
d) smaller cations by larger anions through melting point

52. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Na	(i)	Crimson red
(B)	K	(ii)	Yellow
(C)	Sr	(iii)	Apple green
(D)	Ba	(iv)	Violet

a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv) b) (A) → (ii), (B) → (iv), (C) → (i), (D) → (iii)
c) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i) d) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

53. The normal oxide contains _____ ion, peroxide contains _____ ion and superoxide contains _____ ion.
a) O^{2-}, O_2^{2-}, O_2^- b) O^{2-}, O_2^-, O_2^{2-} c) O^-, O_2^-, O_3^- d) O^-, O^{2-}, O_2^{2-}

54. Identify the correct statement.
a) Gypsum is obtained by heating plaster of Paris
b) Plaster of Paris can be obtained by hydration gypsum
c) Plaster of Paris is obtained by partial oxidation gypsum
d) Gypsum contains a lower percentage of calcium than plaster of Paris

55. The product obtained as a result of a reaction of nitrogen with CaC_2 is:
a) $CaCN_3$ b) Ca_2CN c) $Ca(CN)_2$ d) CaCN

56. Which of the following reactions is not a part of Solvay's process for preparation of sodium carbonate?
a) $2NH_3 + H_2O + CO_2 \longrightarrow (NH_4)_2CO_3$) b) $(NH_4)_2CO_3 + H_2O + CO_2 \longrightarrow 2NH_4HCO_3$
c) $2NH_4HCO_3 \longrightarrow (NH_4)_2CO_3 + H_2O + CO_2$ d) $NH_4HCO_3 + NaCl \longrightarrow NH_4Cl + NaHCO_3$

57. Assertion: Beryllium and magnesium do not impart characteristic colour in flame.
Reason: Both Beryllium and magnesium have high I.E.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

58. The formula of soda ash is
a) $Na_2CO_3.10H_2O$ b) $Na_2CO_3.2H_2O$ c) $Na_2CO_3.H_2O$ d) Na_2CO_3

59. Assertion: The carbonate of lithium decomposes easily on heating to form lithium oxide and CO_2.
Reason: Lithium being very small in size polarises large carbonate ion leading to the formation of more stable Li_2O and CO_2.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

60. Assertion Lithium resembles magnesium diagonally placed in next group.
Reason: The size of Li^+ and Mg^{2+} are different and their electropositive character is same.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

61. The correct order of increasing thermal stability of K_2CO_3, $MgCO_3$, $CaCO_3$ and $BeCO_3$ is:
a) $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$ b) $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$
c) $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$ d) $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$

62. An element X burns in nitrogen to give a compound Y which on reaction with water gives a compound Z and a gas with a pungent smell. Z can be used during construction and white washing. When excess of CO_2 is bubbled through Z, a compound P is formed which on heating decomposes to give a colourless, odourless gas. Identify X, Y, Z and P.

a)

X	Y	Z	P
Ca	Ca_3N_2	$Ca(OH)_2$	$Ca(HCO_3)_2$

b)

X	Y	Z	P
Mg	MgO	$Mg(OH)_2$	$MgCO_3$

c)

X	Y	Z	P
Ca	Ca_3N_2	$Ca(OH)_2$	$CaCO_3$

d)

X	Y	Z	P
Ca	CaO	$Ca(OH)_2$	$Ca(HCO_3)_2$

63. When sodium is dissolved in liquid ammonia, a solution of deep blue colour is obtained. The colour of the solution is due to
a) ammoniated electron b) sodium ion c) sodium amide d) ammoniated sodium ion.

64. The pair of amphoteric oxides is:
a) BeO, ZnO b) Al_2O_3, Li_2O c) BeO, BO_3 d) BeO, MgO

65. Which of the following statements is correct regarding alkaline earth metals?
a) Alkaline earth metals are weaker reducing agents than alkali metals
b) Alkaline earth metal salts are paramagnetic in nature
c) Alkaline earth metal salts are more soluble than corresponding alkali metal salts
d) Solubility of sulphates of alkaline earth metals increases from top to bottom in the group

66. Arrange the following elements in the order of the increasing electropositive character.
Li, Na, K, Rb, Cs
a) Li > Na > K > Rb > Cs b) Li < Na < K < Rb < Cs c) Li > Na < K < Rb < Cs
d) Na > Li > K < Rb < Cs

67. First ionisation energy of alkali metals is very low but second ionisation energy is very high because?
a) alkali metals acquire noble gas configuration after losing one electron
b) a large amount of energy is required to remove electron from a cation
c) alkali metals can form only univalent ions
d) first group elements can lose only one electron

68. Which one of the alkali metals, forms only, the normal oxide, M_2O on heating in air?
a) Rb b) K c) Li d) Na

69. K_2CO_3 cannot be prepared by Solvay's process because:
a) $KHCO_3$ is less soluble than $NaHCO_3$
b) $KHCO_3$ is too soluble to be precipitated by KCl and NH_4HCO_3
c) K_2CO_3 is more soluble to be precipitated by KCl d) K_2CO_3 is less soluble than Na_2CO_3

70. Which of the following compounds has the lowest rnelting point?
a) $CaCl_2$ b) $CaBr_2$ c) CaI_2 d) CaF_2

71. In which of the following processes, fused sodium hydroxide is electrolysed at a $330^{\circ}C$ temperature for extraction of sodium?
a) Castner's process b) Down's process c) Cyanide process d) Both 'b' and 'c'

72. Solubility of the alkaline earth's metal sulphates in water decreases in the sequence:
a) $Ca > Sr > Ba > Mg$ b) $Sr > Ca > Mg > Ba$ c) $Ba > Mg > Sr > Ca$
d) $Mg > Ca > Sr > Ba$

73. Which of the following is arranged according to increasing basic strength?
a) CaO < MgO < SrO < BaO < BeO b) BaO < SrO < CaO < MgO < BeO
c) BeO < MgO < CaO < BaO < SrO d) BeO < MgO < CaO < SrO < BaO

74. Which of the following statements is not correct regarding preparation of NaOH?
a) NaOH is prepared by electrolysis of sodium chloride in Castner-Kellner cel
b) Sodium metal discharged at cathode combines with mercury to form sodium amalgam
c) Chlorine is evolved at anode d) Amalgam is heated to separate Na and Hg

75. Sodium is made by the electrolysis of a molten mixture about 40% NaCl and 60% $CaCl_2$ because:
a) Ca^{2+} can reduce NaCl to Na b) Ca^{2+} can displace Na from NaCl
c) $CaCl_3$ helps in conduction of electricity
d) This mixture has a lower melting point than NaCl

76. By adding gypsum to cement
a) setting time of cement becomes less b) setting time of cement increases
c) colour of cement becomes light d) shining surface is obtained

77. Beryllium shows diagonal relationship with aluminium. Which of the following similarity is incorrect?
a) Be_2C like Al_4C_3 yields methane on hydrolysis b) Be like Al is rendered passive by HNO_3
c) $Be(OH)_2$ like $Al(OH)_3$ is basic d) Be forms beryllates and Al forms aluminates

78. When kept open in air, the crystals of washing soda lose 9 molecules of water to form a monohydrate. $Na_2CO_3 .10H_2O \xrightarrow[to\ air]{exposed} Na_2CO_3.H_2O + 9H_2O$ This process is called
a) efflorescence b) deliquescence c) dehydration d) hydration

79. Which of the following is not true about s-block elements?
a) They have large atomic sizes b) They have lower ionisation enthalpies
c) They have variable oxidation state d) They form basic oxides

80. Which of the following statements is not true about alkali metals?
a) All alkali metals form oxo salts such as carbonates, sulphates and nitrates
b) The basic character of oxides increases down the group
c)
Carbonates and sulphates of lithium are stable and their stability decreases down the group
d) Solubility of carbonates and sulphates increases down the group

81. The metal ion, that plays an important role in muscle contraction is:
a) K^+ b) Na^+ c) Mg^{2+} d) Ca^{2+}

82. The compound A on heating gives a colorless gas and a rescue that is dissolve in water obtain B. Excess of CO_2 is bubbled through aqueous solution of B. C is formed which is recovered in the solid form. Solid C on gentle heating gives back A. The compound 'X' is?
a) $CaSI_42H_2O$ b) $CaCO_3$ c) Na_2CO_3 d) K_2CO_3

83. Nuclear attraction is often the deciding control factor for the association of neutral molecules to a given metal ion. Which one of the following represents the correct order of stability of the ions?
$[Be(H_2O)_4]^{2+}$, $[Mg(H_2O)_4]^{2+}$, $[Ca(H_2O)_4]^{2+}$ and $[Sr(H_2O)_4]^{2+}$
a) $[Be(H_2O)_4]^{2+} > [Sr(H_2O)_4]^{2+} > [Mg(H_2O)_4]^{2+} > [Ca(H_2O)_4]^{2+}$
b) $[Ca(H_2O)_4]^{2+} > [Mg(H_2O)_4]^{2+} > [Be(H_2O)_4]^{2+} > [Sr(H_2O)_4]^{2+}$
c) $[Sr(H_2O)_4]^{2+} > [Ca(H_2O)_4]^{2+} > [Mg(H_2O)_4]^{2+} > [Be(H_2O)_4]^{2+}$
d) $[Be(H_2O)_4]^{2+} > [Mg(H_2O)_4]^{2+} > [Ca(H_2O)_4]^{2+} > [Sr(H_2O)_4]^{2+}$

84. Which one of the following properties of alkali metals increases in magnitude as the atomic number rises?
a) Ionic radius b) Melting point c) Electronegativity d) First ionization energy

85. Gypsum is added to portland cement to:
a) fasten the process of setting b) slow down the process of setting
c) improve the colour of the cement d) increase the melting point of cement

86. A compound of sodium does not give CO_2 when heated but it gives CO_2 when treated with dilute acids. A crystalline compound is found to have 37.1% Na and 14.52% H_2O. Hence, compound is
a) $NaHCO_3.10H_2O$ b) $NaHCO_3.5H_2O$ c) $Na_2CO_3.10H_2O$ d) $Na_2CO_3.H_2O$

87. Calcium chloride is used as a dehydrating agent because:
a) it has a strong affinity for water b) it has water of crystalline attached to it
c) it loses water when exposed to air d) it has a high melting point.

88. A solution of a compound X in dilute HCl on treatment with a solution of $BaCl_2$ gives a white precipitate of a compound Y which is insoluble in conc. HNO_3 and conc. HCl. Compound X imparts golden yellow colour to the flame.

$$\underset{(imparts\ golden\ yellow\ colour)}{X(Solution\ in\ dilute\ HCl)} + BaCl_2 \longrightarrow \underset{White\ ppt}{Y} \xrightarrow[Conc.HCl]{Conc.HNO_3+} Insoluble$$

What are compounds X and Y?

a) X is $MgCl_2$ and Y is $BaSO_4$ b) X is $CaCl_2$ and Y is $BaSO_4$

c) X is Na_2SO_4 and Y is $BaSO_4$ d) X is $MgSO_4$ and Y is $BaSO_4$

89. Ca^{2+} is isoelectronic with

a) Na b) Mg^{2+} c) Ba^{2+} d) Ar

90. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Quick lime	(i)	CaH_2
(B)	Slaked lime	(ii)	$Ba(OH)_2$
(C)	Baryta water	(iii)	$Ca(OH)_2$
(D)	Hydrolith	(iv)	CaO

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv) b) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iv)

c) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (ii) d) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)

91. Which among the following is kinetically inert towards water?

a) Na b) Be c) Ca d) K

92. The first ionisation enthalpies of the alkaline earth metals are higher than that of alkali metals but second ionisation enthalpies are smaller, why?

a)

In alkali metals, second ionisation enthalpy involves removal of electron from noble gas electronic configuration while in alkaline earth metals, second electron is removed from ns^1 configuration.

b) Alkaline earth metals have very high melting point as compared to alkali metals

c) Electrons in s-orbital are more closely packed in alkaline earth metals than alkali metals

d) Due to smaller size alkaline earth metals do not form divalent ions very easily

93. In all oxides, peroxides and superoxides, the oxidation state of alkali metals is:

a) +1 and -1 b) +1 and +2 c) +1 only d) +1, -1 and +2

94. A metal X reacts with water to produce a highly combustible gas Y, and a solution Z. Another metal P reacts with Z to give the same gas Y.

X, Y, Z and P respectively are

a) Zn, H_2, $Zn(OH)_2$, Al b) Na, H_2, NaOH, Zn c) K, H_2, KOH, Al d) Li, H_2, LiOH, K

95. Which of the following is not a similarity of beryllium with aluminium?

a) It becomes passive when treated with cone HNO_3

b) It forms polymeric covalent hydrides c) Carbonate of Be is extremely stable

d) Salts of Be do not impart colour to the flame

96. Metals form basic hydroxides. Which of the following metal hydroxide is the least basic?

a) $Mg(OH)_2$ b) $Ca(OH)_2$ c) $Sr(OH)_2$ d) $Ba(OH)_2$

97. Which of the following metal ions play an important role in muscle contraction?

a) K^+ b) Na^+ c) Mg^{2+} d) Ca^{2+}

98. Which of the following statement is false?

a) Strontium decomposes water readily than beryllium.

b) $BaCO_3$ melts at a higher temperature than $CaCO_3$

c) Barium hydroxide is more soluble in water than $Mg(OH)_2$

d) Beryllium hydroxide is more basic than barium hydroxide.

99. The ease of adsorption of the hydrated alkali metal ions on an ion exchange resins follows the order:
a) $Li^+ < K^+ < Na^+ < Rb^+$ b) $Rb^+ < K^+ < Na^+ < Li^+$ c) $K^+ < Na^+ < Rb^+ < Li^+$
d) $Na^+ < u^+ < K^+ < Rb^+$

100. The violet flame shown by potassium in Bunsen flame is due to jumping of the electron from:
a) 1s to 4p b) 1s to 5p c) 4p to 4s d) 5p to 4s

101. Which of the following is not a use of baking soda?
a) In medicines as antacid b) As a component of baking powder
c) In removing permanent hardness of water d) In fire extinguishers

102. The compound (A) on heating gives a colourless gas and a residue that is dissolved in water to obtain (B). Excess of CO_2 is bubbled through aqueous solution of (B), (C) is formed which is recovered in the solid form. Solid (C) on gentle heating gives back (A). The compound is:
a) $CaCO_3$ b) Na_2CO_3 c) K_2CO_3 d) $CaSO_4 \cdot 2H_2O$

103. Among CaH_2, BeH_2, BaH_2, the order of ionic character is:
a) $BeH_2 < BaH_2 < CaH_2$ b) $CaH_2 < BeH_2 < BaH_2$ c) $BeH_2 < CaH_2 < BaH_2$
d) $BaH_2 < BeH_2 < CaH_2$

104. When sodium is dropped in small amount of water it catches fire. Which one of the following burns in the process?
a) Na b) H_2O c) H_2 d) NaOH

105. Which of the following is not the point of difference between Be and other alkaline earth metals?
a) It has a tendency to form covalent bonds
b) It dissolves in alkalies with evolution of hydrogen
c) Its oxides and hydroxides are amphoteric d) Its carbide gives acetylene on hydrolysis

106. Which of the following elements is extracted commercially by the electrolysis of an aqueous solution or its compound?
a) Cl b) Br c) Al d) Na

107. In the replacement reaction:
$\geq CI + MF \longrightarrow \geq CF + MI$
The reaction will be most favourable if M happens to be:
a) Na b) K c) Rb d) Li

108. Which of the following increasing orders is not correct as per the property indicated against it?
a) CsCl < RbCl < KCl < NaCl < LiCl (Lattice energy)
b) LiOH < NaOH < KOH (Solubility in water)
c) $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$ (Size of hydrated ion)
d) NaI < NaBr < NaCl < NaF (Lattice energy)

109. The decreasing order of ionization enthalpy in alkali metals is:
a) Na> Li > K > Rb b) Rb < Na < K < Li c) Li > Na > K> Rb d) K < Li < Na < Rb

110. Metal carbonates decompose on heating to give metal oxide and carbon dioxide. Which of the metal carbonates is most stable thermally?
a) $MgCO_3$ b) $CaCO_3$ c) $SrCO_3$ d) $BaCO_3$

111. Which of the following is known as fusion mixture?
a) Mixture of $Na_2CO_3 + NaHCO_3$ b) $Na_2CO_3 \cdot 10H_2O$
c) Mixture of $K_2CO_3 + Na_2CO_3$ d) $NaHCO_3$

112. In the synthesis of sodium carbonate, the recovery of ammonia is done by treating NH_4Cl with $Ca(OH)_2$. The by-product obtained in this process is
a) $CaCl_2$ b) NaCl c) NaOH d) $NaHCO_3$

113. Which of the following statements is incorrect?
a) Pure sodium metal dissolves in liquid ammonia to give blue solution.
b) NaOH reacts with glass to give sodium silicate
c) Aluminum reacts with excess NaOH to give $Al(OH)_3$.
d) $NaHCO_3$ on heating gives Na_2CO_3.

114. In the given chemical reactions,
$2P + H_2O + CO_2 \rightarrow Q \xrightarrow{H_2O+CO_2} 2R \xrightarrow{NaCl} S + NH_4Cl$ Identify S.
a) Na_2CO_3 b) NaOH c) $NaHCO_3$ d) NH_3

115. Magnesium reacts with an element (X) to form an ionic compound. If the ground state electronic configuration of (X) is $1s^2\ 2s^2\ 2p^3$, the simplest formula for this compound is:
a) Mg_2X b) MgX_2 c) Mg_2X_3 d) Mg_3X_2

116. Assertion: Lithium salts are mostly hydrated.
Reason: The hydration enthalpies of alkali metal ions decrease with increase in ionic size.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

117. Be and Al exhibit diagonal relationship. Which of the following statements about them is/are not true?
(i) Both react with HCl to liberate H_2.
(ii) They are made passive by HNO_3.
(iii) Their carbides give acetylene on treatment with water.
(iv) Their oxides are amphoteric
a) (iii) and (iv) b) (i) and (iii) c) (i) only d) (iii) only

118. Dehydration of hydrates of halides of calcium, barium and strontium i.e., $CaCl_2 \cdot 6H_2O$, $BaCl_2 \cdot 2H_2O$, $SrCl_2 \cdot 6H_2O$, can be achieved by heating. These become wet on keeping in air. Which of the following statements is correct about these halides?
a) Act as dehydrating agent b) Can absorb moisture from air
c) Tendency to form hydrate decreases from calcium to barium d) All of the above

119. The raw materials in solvay process are:
a) NaCl, NH_3, $CaCO_3$ b) NaOH, CO_2 c) NaCl, $CaCO_3$, NH_3 d) NH_3, H_2O, NaCl

120. The properties of Li are similar to those of Mg. This is because:
a) both have nearly the same size. b) both has their charge to size ratio nearly the same.
c) both have similar electronic configurations d) both are found together in nature

121. A metal M reacts with nitrogen to give nitride which on reaction with water produces ammonia gas. Metal M can be
a) Na b) K c) Li d) Rb

122. A metal M readily forms its sulphate MSO_4 which is water soluble. It forms its oxide MO which becomes inert on heating. It forms its insoluble hydroxide $M(OH)_2$ which is soluble in NaOH solution. What would be M?
a) Be b) Ba c) Ca d) Mg

123. Match the column I with column II and mark the appropriate choice:

Column I	Column II

(A)	Na^+	(i)	Chlorophyll
(B)	K^+	(ii)	Bones and teeth
(C)	Ca^{2+}	(iii)	Regulating flow of water across cell membrane
(D)	Mg^{2+}	(iv)	Activation of enzyme within cell fluids

a) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (iv) b) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)
c) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv) d) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (i)

124. Which of the following does not show the anomalous behaviour of lithium?
a) Lithium reacts with nitrogen to form a nitride
b) Lithium carbonate decomposes on heating c) Lithium nitrate gives NO_2 on heating
d) Lithium is the strongest reducing agent

125. The sequence of ionic mobility in aqueous solution is:
a) $K^+ > Na^+ > Rb^+ > Cs^+$ b) $Cs^+ > Rb^+ > K^+ > Na^+$ c) $Rb^+ > K^+ > Cs^+ > Na^+$
d) $Na^+ > K^+ > Rb^+ > Cs^+$

126. 20.0 gm of a magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 gm magnesium oxide. What will be the percentage purity of magnesium carbonate in the sample? (At. wt. of Mg = 24)
a) 96 b) 60 c) 84 d) 75

127. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:

List-I (substances)	List-II (Composition)
(a) Plaster of Paris	(i) $CaSO_4.\ 2H_2O$
(b) Epsomite	(ii) $CaSO_4.\ 1/2\ H_2O$
(c) Kieserite	(iii) $MgSO_4 \cdot\ 7H_2O$
(d) Gypsum	(iv) $MgSO_4 \cdot\ H_2O$

a)

	(a)	(b)	(c)	(d)
(a)	(iv)	(iii)	(ii)	(i)

b)

	(a)	(b)	(c)	(d)
(b)	(iii)	(iv)	(i)	(ii)

c)

	(a)	(b)	(c)	(d)
(c)	(ii)	(iii)	(iv)	(i)

d)

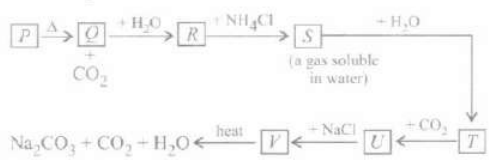
	(a)	(b)	(c)	(d)
(d)	(iv)	(ii)	(iii)	(i)

128. The increasing order of basic character of oxides MgO, SrO, K_2O, and Cs_2O is:
a) $MgO < SrO < K_2O < Cs_2O$ b) $SrO < MgO < Cs_2O < K_2O$ c) $Cs_2O < K_2O < SrO < MgO$
d) $K_2O < Cs_2O < SrO < MgO$

129. Which one is the correct statement with reference to the solubility of $MgSO_4$ in water?
a) SO_4^{2-} ions mainly contribute towards hydratior energy
b) Sizes of Mg^{2+} and SO_4^{2-} are similar
c) Hydration energy of $MgSO_4$ is higher in comparison to its lattice energy
d) Ionic potential (charge/radius ratio) of Mg^{2+}

130. When $BeCl_2$ is hydrolysed, white fumes of gas are given out. The intensity of fumes intensifies when a rod dipped in moist ammonia is brought near the mouth of the test tube. The gas which comes out during hydrolysis is
a) Cl_2 b) HCl c) NH_4OH d) NH_4Cl

131. Study the road map for preparation of washing soda and fill up the blanks.



a)

P	Q	R	S	T	U	V
$CaCO_3$	CaO	$Ca(OH)_2$	NH_3	NH_4OH	NH_4HCO_3	$NaHCO_3$

b)

P	Q	R	S	T	U	V
$CaCl_2$	CaO	$Ca(OH)_2$	HCl	HCl	$NaHCO_3$	HCl

c)

P	Q	R	S	T	U	V
$CaCl_2$	CaO	$CaCO_3$	NH_3	HCl	NH_4Cl	$NaHCO_3$

d)

P	Q	R	S	T	U	V
$CaCO_3$	CaO	$Ca(OH)_2$	HCl	Cl_2	$CaCl_2$	$NaHCO_3$

132. In Castner-Kellner cell for production of sodium hydroxide
a) Brine is electrolysed with Pt electrodes b) Brine is electrolysed using graphite electrodes
c) Molten sodium chloride is electrolysed
d) Sodium amalgam is formed at mercury cathode

133. Which one of the following properties of alkali metals increases in magnitude as the atomic number rises?
a) Ionic radius b) Melting point c) Electronegativity d) First ionisation energy

134. The reducing power of a metal depends on various factors. Suggest the factor which makes Li, the strongest reducing agent in aqueous solution
a) Sublimation enthalpy b) Ionisation enthalpy c) Hydration enthalpy
d) Electron-gain enthalpy

135. Which of the following oxides is not expected to react with sodium hydroxide?
a) CaO b) SiO_2 c) BeO d) B_2O_3

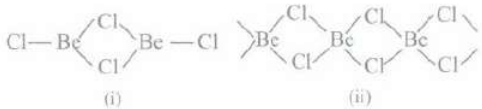
136. A solid compound 'X' on heating gives CO_2, gas and residue. The residue mixed with water forms 'Y'. residue. On passing an excess of CO_2, through 'Y' in water, a clear solution 'Z', is obtained. On boiling 'Z', compound 'X' reformed. The compound 'X' is?
a) $Ca(HCO_3)_2$ b) $CaCO_3$ c) Na_2CO_3 d) K_2CO_3

137. Lithium salts are mostly hydrated like $LiCl{\cdot}2H_2O$ due to
a) maximum ionisation enthalpy b) maximum degree of hydration of Li^+
c) maximum hygroscopic nature d) maximum chemical reactivity

138. The ease of adsoration of the hydrated alkali metal ions on an ion-exchange resins follows the:
a) $Li^+ < K^+ < Na^+ < Rb^+$ b) $Rb^+ < K^+ < Na^+ < Li^+$
c) $K^+ < Na^+ < Rb^+ < Li^+$ d) $Na^+ < Li^+ < K^+ < Rb^+$

139. Lithium is the strongest reducing agent though it has highest ionisation energy in its group. Which of the following factors is responsible for making Li the strongest reducing agent?
a) Large heat of atomisation b) Smaller size c) Large sublimation energy
d) Large amount of hydration enthalpy

140. The following two figures represent



a) (i) $BeCl_2$ is a dimer in vapour phase; (ii) $BeCl_2$ is chain structure in solid state
b) (i) $BeCl_2$ is in solid state; (ii) $BeCl_2$ is in vapour phase
c) (i) $BeCl_2$ is monomer in solid state; (ii) $BeCl_2$ is linear polymer in vapour phase
d) (i) $BeCl_2$ is linear monomer; (ii) $BeCl_2$ is three dimensional dimer

141. The average composition of portland cement is

a) CaO: 40 - 50%, SiO_2: 30 - 40% , Al_2O_3 Fe_2O_3 : 10 - 20%

b)

CaO: 50 - 60%, SiO_2 : 20 - 25%, Al_2O_3 : 5 - 10%, MgO : 2 - 3%, Fe_2O_3 : 1 - 2% and SO_3: 1-2%

c) SiO_2: 40 - 50%, CaO: 30 - 40%, Al_2O_3 : 10 - 20% d) CaO: 50%, SiO_2 : 50%

142. The function of "Sodium pump" is a biological process operating in each and every cell of all animals. Which of the following biologically important ions is also a constituent of this pump:

a) Mg^{2+} b) K^{+} c) Fe^{2+} d) Ca^{2+}

143. The decreasing order of the second ionization potential of Mg, Ca and Ba is

a) Mg > Ca > Ba b) Ca > Ba > Mg c) Ba > Mg > Ca d) Mg > Ba > Ca

144. The low solubility of LiF and that of CsI in water are respectively due to which of the properties of the alkali metal ions?

a) Higher hydration enthalpy of Li^+, higher lattice enthalpy of Cs^+

b) Smaller hydration enthalpy of Li^+, higher lattice enthalpy of Cs^+

c) Smaller lattice enthalpy of Li^+, higher hydration enthalpy of Cs^+

d) Higher lattice enthalpy of Li^+, smaller hydration enthalpy of Cs^+

145. Which of the following does not show diagonal relationship between beryllium and aluminium?

a) Both BeO and Al_2O_3 are amphoteric in nature

b) Both beryllium and aluminium form polymeric covalent hydrides

c) Both beryllium and aluminium form nitrides with nitrogen which evolve NH_3 with water

d) Both metal carbonates are highly stable

146. Which of the following atoms will have the smallest size?

a) Mg b) Na c) Be d) Li

147. The right order of the solubility of sulphates of alkaline earth metals in water is:

a) Be > Ca > Mg > Ba > Sr b) Mg > Be > Ba > Ca > Sr c) Be > Mg > Ca > Sr > Ba

d) Mg > Ca > Ba > Be > Sr

148. Assertion: The melting and boiling points of the alkali metals are low.

Reason: Alkali metals have weak metallic bonding.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

149. The alkali metals dissolve in ammonia to give a deep blue solution which is conducting in nature.

$M+(x+y)NH_3 \longrightarrow [M(NH_3)_x]^{2+} + 2[e(NH_3)_y]^-$

Which of the following is not true about the solutions of alkali metals in liquid ammonia

a) The blue colour is due to ammoniated electron b) The solution is paramagnetic

c) The blue colour changes to brown on standing

d) In concentrated solution blue colour changes to bronze and becomes diamagnetic

150. A white solid X reacts with dil. HCl to give colourless gas which is used in fire extinguishers. The solid X is

a) NaCl b) CH_3COONa c) Na_2CO_3 d) $NaHCO_3$

151. A chemical 'A' is used for the preparation of washing soda to recover ammonia. When CO2 is bubbled through an aqueous solution of 'A', the solution turns milky. It is used in white washing due to disinfectant nature. What is the chemical formula of 'A'?

a) $Ca(HCO_3)_2$ b) CaO c) $Ca(OH)_2$ d) $CaCO_3$

152. Which nitrate will decompose to give NO_2 on heating?

a) $NaNO_3$ b) KNO_3 c) $RbNO_3$ d) $LiNO_3$

153. Assertion: Alkaline earth metal oxides are quite stable to heat.
Reason: Enthalpies of formation of alkaline earth metal oxides are quite high.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

154. Which of the following elements does not form hydride by direct heating with dihydrogen?
a) Be b) Mg c) Sr d) Ba

155. Which of the following alkali metals when burnt in air forms a mixture of oxide as well as nitride?
a) K b) Na c) Li d) Cs

156. In context with beryllium, which one of the following statements is correct?
a) It is rendered passive by nitric acid. b) It forms Be_2C. c) Its salts rarely hydrolyze.
d) Its hydride is electron-deficient and polymeric.

157. Which one of the following atoms will have the smallest size?
a) Mg b) Na c) Be d) Li

158. A certain compound X imparts a golden yellow flame. When zinc powder is heated with concentrated solution of X, H_2 gas is evolved. X combines with CO_2 to give a salt Y. Y is a hydrated salt which on reaction with HCl or excess of CO_2 gives another salt Z which is an important part of baking powder. Identify X, Y and Z.

a)

X	Y	Z
HCl	NaOH	$NaHCO_3$

b)

X	Y	Z
KOH	K_2CO_3	$KHCO_3$

c)

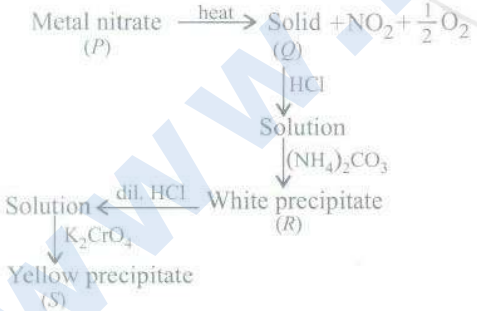
X	Y	Z
NaCl	Na_2CO_3	NaOH

d)

X	Y	Z
NaOH	Na_2CO_3	$NaHCO_3$

159. A metal salt solution forms a yellow precipitate with potassium chromate in acetic acid, a white precipitate with dilute sulphuric acid but does not give precipitate with sodium chloride or iodide. The white precipitate obtained when sodium carbonate is added to the metal salt solution will consist of:
a) lead carbonate b) basic lead carbonate c) barium carbonate d) strontium carbonate

160. What are (P), (Q), (R) and (S)?



a)

P	Q	R	S
$Be(NO_3)_2$	BeO	$BeCO_3$	$BeCrO_4$

b)

P	Q	R	S
$NaNO_3$	Na_2O	Na_2CO_3	Na_2CrO_4

c)

P	Q	R	S
$Ba(NO_3)_2$	BaO	$BaCO_3$	$BaCrO_4$

d)

P	Q	R	S
KNO_3	K_2O	K_2CO_3	K_2CrO_4

161. The difference in number of water molecules in gypsum and plaster of paris is
a) 5/2 b) 2 c) 1/2 d) 3/2

162. A white solid X on heating gives a white solid Y and an acidic gas Z. Gas Z is also given out when X reacts with an acid. The compound Y is also formed if caustic soda is left open in the atmosphere. X, Y and Z are:

a)

X	Y	Z
$NaHCO_3$	Na_2CO_3	CO_2

b)

X	Y	Z
Na_2CO_3	NaOH	CO_2

c)

X	Y	Z
Na_2CO_3	$NaHCO_3$	CO_2

d)

X	Y	Z
NaOH	$NaHCO_3$	CO_2

163. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Li	(i)	Role in biological systems
(B)	K	(ii)	Golden yellow flame
(C)	Na	(iii)	Photoelectric cell
(D)	Cs	(iv)	Carbonate decomposes on heating

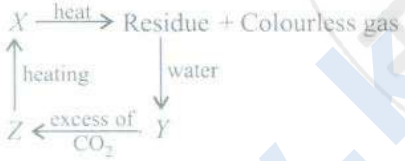
a) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii) b) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (iv)
c) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iv) d) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii)

164. Bleaching powder is obtained by the action of chlorine gas and
a) dilute solution of $Ca(OH)_2$ b) concentrated solution of $Ca(OH)_2$ c) dry CaO
d) dry slaked lime

165. A certain compound (X) when treated with copper sulphate solution yields a brown precipitate. On adding hypo solution, the precipitate turns white. The compound is:
a) K_2CO_3 b) KI c) KBr d) K_3PO_4

166. Alkali metals cannot be extracted by reduction of their oxides and other compounds because:
a) alkali metals are strong reducing agents b) alkali metals have low ionisation enthalpy
c) alkali metals have high lattice enthalpy d) alkali metals are strongly basic in nature

167. Which of the following materials conducts electricity?
a) Crystalline potassium chloride b) Fused sulphates c) Molten sodium chloride
d) Diamond

168. 

Identify X, Y and Z,

a)

X	Y	Z
$Ca(HCO_3)_2$	$CaCO_3$	$Ca(OH)_2$

b)

X	Y	Z
$CaCO_3$	$Ca(OH)_2$	$Ca(HCO_3)_2$

c)

X	Y	Z
$CaCO_3$	CaO	$Ca(OH)_2$

d)

X	Y	Z
$CaCO_3$	CaO	$Ca(HCO_3)_2$

169. Amphoteric hydroxides react with both alkalies and acids. Which of the following Group 2 metal hydroxides is soluble in sodium hydroxide?
a) $Be(OH)_2$ b) $Mg(OH)_2$ c) $Ca(OH)_2$ d) $Ba(OH)_2$

170. The formula for calcium chloride is
a) $Ca(ClO_4)_2$ b) $Ca(ClO_3)_2$ c) $CaClO_2$ d) $Ca(ClO_2)_2$

171. Which of the following metals is required as cofactor by all enzymes utilising ATP in phosphate transfer?
a) K b) Ca c) Na d) Mg

172. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Quick lime	(i)	Setting fractured bones
(B)	Plaster of Paris	(ii)	A constituent of chewing gum
(C)	Slaked lime	(iii)	Manufacture of bleaching powder
(D)	Limestone	(iv)	Manufacture of dyestuffs

a) (A) ⟶ (i), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (iii) b) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii)
c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶ (iv) d) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (i)

173. The element A burns in nitrogen to give an ionic compound B. The compound B reacts with water to give C and D. A solution of C becomes milky on bubbling carbon dioxide. What is the nature of compound (D)?
a) Acidic b) Basic c) Amphoteric d) Neutral

174. All alkali halides are soluble in water except LiF The low solubility of LiF in water is due to its (i) the low solubility of CsI is due to (ii). LiF is soluble in (ii) solvents.
a)

(i)	(ii)	(iii)
low lattice enthalpy	large hydration enthalpy	polar solvents

b)

(i)	(ii)	(iii)
high lattice enthalpy	smaller hydration enthalpy	non - polar solvents

c)

(i)	(ii)	(iii)
high hydration enthalpy	high lattice enthalpy	non - polar solvents

d)

(i)	(ii)	(iii)
smaller hydration enthalpy	high lattice enthalpy	polar solvents

175. Which of the following alkaline earth metal sulphates has hydration enthalpy higher than the lattice enthalpy?
a) $CaSO_4$ b) $BeSO_4$ c) $BaSO_4$ d) $SrSO_4$

176. Assertion: Elements of group 1 are called 'alkali metals'.
Reason: All the alkali metals react with water.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

177. Superoxides of alkali metals act as oxidising agents while normal oxides are basic in nature. The oxide which is paramagnetic in nature due to presence of unpaired electron is:
a) Na_2O_2 b) KO_2 c) Na_2O d) K_2O_2

178. Alkali metals are not found in free state due to their highly reactive nature. This is due to
a) their large size and low ionisation enthalpy
b) their large size and high ionisation enthalpy
c) their low ionisation enthalpy and high electron gain enthalpy
d) their tendency to impart colour to the flame

179. The solubility of alkali metal salts in water is due to the fact that the cations get hydrated by water molecules. The degree of hydration depends upon the size of the cation. If the trend of relative ionic radii is $Cs^+ > Rb^+ > K^+ > Na^+ > Li^+$. What is the relative degree of hydration?

a) $CS^+_{(aq)} > Rb^+_{(aq)} > K^+_{(aq)} > Na^+_{(aq)} > Li^+_{(aq)}$ b) $Li^+_{(aq)} > Na^+_{(aq)} > K^+_{(aq)} > Rb^+_{(aq)} > Cs^+_{(aq)}$
c) $Na^+_{(aq)} > K^+_{(aq)} > Rb^+_{(aq)} > C^+_{(aq)} > Li^+_{(aq)}$ d) $Cs^+_{(aq)} > Na^+_{(aq)} > Li^+(aq) > K^+_{(aq)} > Rb^+_{(aq)}$

180. In Solvay ammonia process, sodium bicarbonate is precipitated due to
a) presence of NH_3 b) reaction with CO_2 c) reaction with brine solution
d) reaction with NaOH

181. Assertion: Superoxides of alkali metals are paramagnetic.
Reason: Superoxides contain O_2 ion which has one unpaired electron.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

182. Which of the following statements is false?
a) Ca^{2+} ions are not important in maintaining the regular beating of the heart.
b) Mg^{2+} ions are important in the green parts of the plants.
c) Mg^{2+}ions form a complex with ATP. d) Ca^{2+} ions are important in blood clotting.

183. What is the formula of hydrated $BeCl_2$?
a) $BeCl_2 \cdot H_2O$ b) $BeCl_2 \cdot 2H_2O$ c) $BeCl_2 \cdot 3H_2O$ d) $BeCl_2 \cdot 4H_2O$

184. Which of the carbonates given below is unstable in air and is kept in CO_2 atmosphere to avoid decomposition?
a) $BeCO_3$ b) $MgCO_3$ c) $CaCO_3$ d) $BaCO_3$

185. Which of the following is not present in portland cement?
a) $Ca_3Al_2O_6$ b) Ca_3SiO_5 c) Ca_2SiO_4 d) $Ca_3(PO_4)_2$

186. Baking soda is
a) $NaHCO_3$ b) $NaHCO_3.6H_2O$ c) Na_2CO_3 d) $Na_2CO_3.10H_2O$

187. Two metals X and Y belong to the second group of periodic table. X forms insoluble oxide but soluble sulphate. Y forms a soluble oxide but insoluble sulphate. Hydroxide of metal X is soluble in NaOH while that of metal Y is insoluble in NaOH. What are metals X and Y?
a) X=Be, Y=Ba b) X=Mg, Y=Ca c) X=Ca, Y=Sr d) X=Ba, Y=Mg

188. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric filed?
a) Na b) K c) Rb d) Li

189. The solubility of metal halides depends on their nature, lattice enthalpy and hydration enthalpy of the individual ions. Amongst fluorides of alkali metals, the lowest solubility of LiF in water is due to
a) ionic nature of lithium fluoride b) high lattice enthalpy
c) high hydration enthalpy for lithium ion d) low ionisation enthalpy of lithium atom

190. $NH_4Cl + (A) \longrightarrow$ Microcosmic salt $\xrightarrow{\text{Heat}}$ $(B) \xrightarrow[+ MnO]{\text{Heat}} (C)$ Violet bead

(A), (B) and (C) respectively are
a) Na_3PO_4, $NaPO_3$, $(Mn)_3(PO_4)_2$ b) Na_2HPO_4, Na_3PO_4, $Mn_3(PO_4)_2$
c) Na_2HPO_4, $NaPO_3$, $Mn(PO_3)_2$ d) Na_2HPO_4, $NaPO_3$, $NaMnPO_4$

191. On reaction with dihydrogen the alkali metals
a) form hydrides which are ionic solids with high melting points
b) form hydrides which are molecular solids with low melting points

c) form hydrides which are ionic solids with low melting points
d) form hydrides which are non-stoichiometric

192. An oxide of alkaline earth metals [X] reacts with C and Cl_2 to give a compound Y. Y is found in polymeric chain structure and is electron deficient molecule. The compound Y is:
$BeO + C + Cl_2 \rightarrow Y + CO$
a) BeO b) $BeCl_2$ c) $Be(OH)_2$ d) $BeCO_3$

193. BeO is insoluble but BaO is soluble as
a)
lattice energy of BeO is higher than BaO due to small size of Be^{2+} ion and its covalent nature
b) hydration energy of BeO is lower than BaO due to small size Be^{2+} ion
c) BeO is amphoteric in nature while BaO is basic
d) BeO forms hydrated salts while BaO forms anhydrous salts

194. Which of the following is known as fusion mixture?
a) Mixture of $Na_2CO_3 + NaHCO_3$ b) $Na_2CO_3 \cdot 10H_2O$ c) Mixture of $K_2CO_3 + Na_2CO_3$
d) $NaHCO_3$

195. What happens when H_2 is passed over lithium at 1073 K?
a) Covalent lithium hydride is formed b) Coloured complex is formed
c) Ionic lithium hydride is formed d) No reaction takes place

196. Property of the alkaline earth metals that increases with their atomic number is:
a) Solubility of their hydroxides b) Solubility of their sulphates in water.
c) Ionization energy d) Electronegativity

197. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:
Kieserite
a) $CaSO_4.2H_2O$ b) $CasO_4.\frac{1}{2}H_2O$ c) $MaSO_4.7H_2O$ d) $MgSO_4.H_2O$

198. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:
Gypsum
a) $CaSO_4.2H_2O$ b) $CasO_4.\frac{1}{2}H_2O$ c) $MaSO_4.7H_2O$ d) $MgSO_4.H_2O$

199. Assertion: Lithium fluoride is most covalent in nature.
Reason: Small anion can be easily distorted.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

200. Identify W, X, Y, and Z respectively in the given reactions.
$CaCO_3 \xrightarrow{\triangle} W + X$
$W + H_2O \rightarrow Y$
$Y + Z \rightarrow NaOH + CaCO_3$
a) CaO, CO_2, $CaCO_3$, Na_2CO_3 b) CO_2, $Ca(OH)_2$, $Ca(HCO)_3$, $NaHCO_3$
c) CaO, CO_2, $Ca(OH)_2$, Na_2CO_3 d) CO_2, CaO, H_2CO_3, Na_2CO_3

201. Complete the following equations:
(i) $Na_2O_2 + 2H_2O \rightarrow \underline{(W)} + H_2O_2$
(ii) $2KO_2 + 2H_2O \rightarrow \underline{(X)} + \underline{(Y)} + O_2$
(iii) $Na_2O + CO_2 \rightarrow \underline{(Z)}$

a)

W	X	Y	Z
4Na	K_2O	H_2O	Na_2O_2

b)

W	X	Y	Z
4Na	K_2O	H_2O_2	Na_2CO_3

c)

W	X	Y	Z
4NaOH	2KOH	H_2O	Na_2O_2

d)

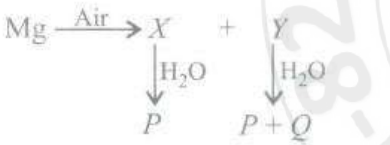
W	X	Y	Z
2NaOH	2KOH	H_2O_2	Na_2CO_3

202. The following metal ion activates many enzymes, participates in the oxidation of glucose to produce AIP and with Na, is responsible for the transmission of nerve signals.
a) Potassium b) Iron c) Copper d) Calcium

203. When a substance (A) reacts with water it produces a combustible gas (B) and a solution of substance (C) in water. When another substance (D) reacts with this solution of (C), it also produces the same gas (B) on warming but (D) can also produce gas (B) on reaction with dilute sulphuric acid at room temperature. (A) imparts a deep golden yellow colour to a smokeless flame of Bunsen burner. Then, A, B, C and D, respectively are:
a) Na, H_2, NaOH, Zn b) K, H_2, KOH, Al c) Ca, H_2, $Ca(OH)_2$, Sn
d) CaC_2, C_2H_2, $Ca(OH)_2$, Fe

204. Assertion: Be is readily attacked by acids.
Reason: Be shows diagonal relationship to Na.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

205. What happens when magnesium is burnt in air and the products X and Yare treated with water?



a)

X	Y	P	Q
MgO	$Mg(OH)_2$	$Mg(OH)_2$	N_2

b)

X	Y	P	Q
MgO	Mg_3N_2	$Mg(OH)_2$	NH_3

c)

X	Y	P	Q
$Mg(OH)_2$	MgO	$Mg(OH)_2$	N_2

d)

X	Y	P	Q
MgO	$Mg(OH)_2$	N_2	$Mg(OH)_2$

206. Match column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Li	(i)	M_2O_2
(B)	Na	(ii)	MO_2
(C)	Rb	(iii)	M_2O

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii) b) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (i)
c) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (ii) d) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (i)

207. Which of the following compounds are not arranged in correct order as indicated?
a) $SrCl_2 < CaCl_2 < MgCl_2 < BeCl_2$ (increasing order of hydrolysis)
b) $SrCl_2 < CaCl_2 < MgCl_2 < BeCl_2$ (increasing lattice energy)
c) $CaSO_4 < MgSO_4 < BeSO_4$ (increasing stability)
d) $Be(OH)_2 < Mg(OH)_2 < Ca(OH)_2$ (increasing solubility)

208. All the following substances react with water, The pair that gives the same gaseous product is:

a) K and CO_2 b) Na and Na_2O_2 c) Ca and CaH_2 d) Ba and BaO_2

209. Fill up the blanks with appropriate choices. Lithium and magnesium react slowly with water. Their hydroxides are _____ soluble in water. Carbonates of Li and Mg _____ easily on heating. Both LiCl and $MgCl_2$ are _____ in ethanol and are _____ They crystallise from their aqueous solutions as _____
a) more, do not decompose, soluble, hygroscopic, hydrates
b) less, decompose, soluble, deliquescent, hydrates
c) freely,sublime, insoluble,deliquescent,anhydrous
d) freely, decompose, soluble, hygroscopic, crystals

210. Assertion: The fluorides of alkaline earth metals are relatively less soluble than chlorides.
Reason: Fluorides have high lattice energies.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

211. Which of the following will have lowest value of K_{sp} at room temperature?
a) $Be(OH)_2$ b) $Mg(OH)_2$ c) $Ca(OH)_2$ d) $Ba(OH)_2$

212. Equimolar solutions of the following were prepared in water separately. Which one of the solutions will record the highest pH?
a) $SrCl_2$ b) $BaCl_2$ c) $MgCl_2$ d) $CaCl_2$

213. Which of the following has the largest size?
a) Na b) Na^+ c) Na^- d) Can't be Predicied

214. Which of the following oxides is most acidic in nature?
a) BaO b) BeO c) MgO d) CaO

215. The ionisation energy of alkali metals decreases from Li to Cs because
a) the atomic size increases from Li to Cs
b) the distance between nucleus and outermost orbital decreases from Li to Cs
c) electropositive character decreases down the group
d) melting point decreases from Li to Cs

216. Alkali metals react with water vigorously to form hydroxides and dihydrogen. Which of the following alkali metals reacts with water least vigorously?
a) Li b) Na c) K d) Cs

217. The metal ion, that plays an important role in muscle contraction, is
a) Be^{2+} b) Mg^{2+} c) Ca^{2+} d) Ba^{2+}

218. The E^0 for Cl^-/Cl_2 is 1.36, for I^-/I^2 is +0.53, for Ag^+/Ag is +0.79, Na^+ is -2.71 and for Li^+/Li is -3.04 V Arrange the following species in decreasing order of reducing strength. I^-, Ag, Cl^-Li, Na
a) Li > Cl > Ag > I^- > Na b) Li > Na > I^- > Ag > Cl^- c) Cl^- > Ag > I^- > Na > Li
d) Na > Li > Ag > Cl^- > I^-

RAVI MATHS TUITION CENTRE , WHATSAPP - 8056206308

Time : 1 Mins **POLYMERS 1** **Marks : 517**

1. Which of the following sets contain only addition homopolymers?
   a) Polythene, natural rubber, cellulose b) Nylon, polyester, melamine resin
   c) Teflon, bakelite, orlon d) Neoprene, PVC, polythene
2. Which of the following is not an example of addition polymer?
   a) Polythene b) Polystyrene c) Neoprene d) Nylon 6,6
3. Which one of the following statements is not true?
   a) Buna-S is a copolymer of butadiene and styrene
   b) Natural rubber is a 1, 4-polymer of isoprene
   c)
   In vulcanization, the formation of sulphur bridges between different chains make rubber harder and stronger.
   d) Natural rubber has the trans-configuration at every double bond.
4. Assertion: The monomer of neoprene is 1, 3-butadiene.
   Reason: Neoprene is highly inflammable.
   a) If both assertion and reason are true and reason is the correct explanation of assertion
   b) If both assertion and reason are true but reason is not the correct explanation of assertion
   c) If assertion is true but reason is false d) If both assertion and reason are false
5. Which of the following statements is false?
   a) Artificialsilk is derived from cellulose. b) Nylon-6, 6 is an example of elastomer.
   c) The repeat unit in natural rubber is isoprene
   d) Both starch and celluloseare polymer of glucose.
6. Assertion: Thermoplastics become hard on heating and soft on cooling.
   Reason: Thermoplastics are cross-linked polymers which are soluble in many organic solvents.
   a) If both assertion and reason are true and reason is the correct explanation of assertion
   b) If both assertion and reason are true but reason is not the correct explanation of assertion
   c) If assertion is true but reason is false d) If both assertion and reason are false
7. Synthetic polymer prepared by using caprolactam is known as
   a) terylene b) teflon c) nylon 6 d) neoprene.
8. Nylon 6, 6 is obtained by condensation polymerisation of
   a) adipic acid and ethylene glycol b) adipic acid and hexamethylenediamine
   c) terephthalic acid and ethylene glycol d) adipic acid and phenol

9. Which of the following alkenes is most reactive towards cationic polymerisation?
   a) $CH_2 = CHCH_3$ b) $CH_2 = CHCl$ c) $CH_2 = CHC6H_5$ d) $CH_2 = CHCOOCH_3$

10. Which of the following is not an example of rubber?
    a) Polychloroprene b) Buna-N c) Butadiene-styrene copolymer d) Polyacrylonitrile

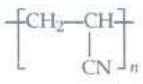
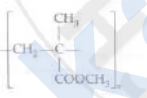
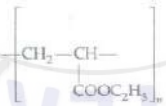
11. Heating rubber with sulphur is known as
    a) galvanisation b) bessemerisation c) vulcanisation d) sulphonation

12. Buna-N is used in making oil seals and tank linings, etc. because
    a) it is resistant to the action of lubricating oil and organic solvents
    b) it is more elastic than natural rubber c) it can be stretched twice its length
    d) it does not melt at high temperatures

13. Natural rubber or raw rubber consists of basic material latex which is a dispersion of isoprene. During the treatment this isoprene forms a high molecular weight polymer of isoprene. Natural rubber can be obtained from five hundred different species of plants.
    In the isoprene polymer all the isoprene have
    a) trans-1, 4 configuration b) cis-1, 4 configuration
    c) both cis- and trans-1, 4 configuration d) none of these

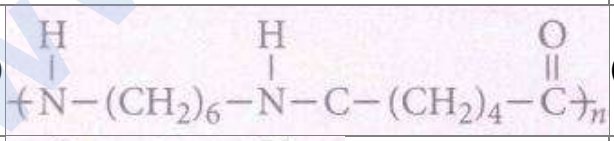
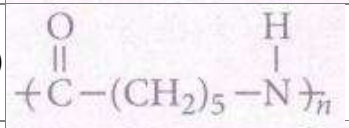
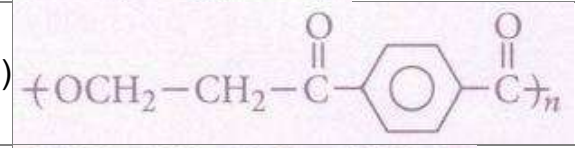
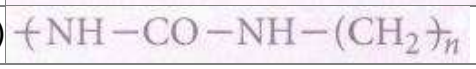
14. Which one of the following polymers is prepared by condensation polymerisation?
    a) Teflon b) Natural rubber c) Styrene d) Nylon-6, 6

15. Natural rubber has :
    a) alternate cis-and trans-configuration b) random cis- and trans-configuration
    c) all cis-configuration d) all trans-configuration

16. Acrilan is a hard, horny and a high melting. material. Which one of the following represents its structure?
    a)  b)  c)  d)

17. The S in buna-S refers to
    a) sulphur b) styrene c) sodium d) salicylate

18. Match the polymers given in column I with the monomers in column II and mark the appropriate choice:

Column I		Column II	
(A)		(i)	Ethylene glycol + terephthalic acid
(B)		(ii)	Urea + formaldehyde
(C)		(iii)	Hexamethylenediamine + adipic acid
(D)		(iv)	Caprolactam

a) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (iv) b) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii)

c) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (iv) d) (A) ⟶ (iv), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (i)

19. Which of the following sets contains only addition polymers?
a) Polyethylene, polypropylene, terylene b) Polyethylene, PVC, acrilan
c) Buna-S, nylon, polybutadiene d) Bakelite, PVC, polyethylene

20. Which of the following is a homopolymer?
a) Bakelite b) Nylon 6, 6 c) Neoprene d) Buna-S

21. High density polythene is obtained by
a)
polymerisation of ethene in a hydrocarbon solvent in the presence of Ziegler-Natta catalyst
b) polymerisation of ethene under high pressure and temperature
c) free radical polymerisation of ethene at low temperature in presence of peroxide
d) polymerisation of ethene in presence of carbon tetrachloride

22. Assertion: Low density polythene is used to make buckets, dustbins, bottles etc.
Reason: Low density polythene consists of linear molecules and has close packing.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

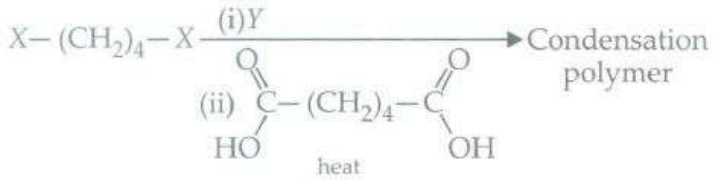
23. Composition of Ziegler- Natta catalyst is
a) $(Et_3)_3Al.TiCl_2$ b) $(Me)_3Al.TiCl_2$ c) $(Et)_3Al.TiCl_4$ d) $(Et)_3Al.PtCl_4$

24. Natural rubber or raw rubber consists of basic material latex which is a dispersion of isoprene. During the treatment this isoprene forms a high molecular weight polymer of isoprene. Natural rubber can be obtained from five hundred different species of plants.
Consider the following properties of rubber,
(i) Tensile strength of vulcanised rubber is almost ten times more than raw rubber.
(ii) Elasticity of raw rubber is very high.
Choose the correct option.
a) (i) is true (ii) is false b) (i) is false (ii) is true c) Both (i) and (ii) are true
d) Both (i) and (ii) are false

25. Assertion: Teflon is used for making oil seals, gaskets and non-stick surface coating.
Reason: Teflon is chemically inert and resistant to attack by corrosive reagents.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

26. Which one of the following is a chain growth polymer?
a) Starch b) Nucleic acid c) Polystyrene d) Protein

27. The correct functional group X and the reagent/reaction conditions Y in the following scheme are

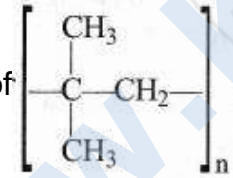


(i) X= $COOCH_3$, Y= H_2Ni/heat
(ii) X = $CONH_2$, Y = H_2/Ni/heat
(iii) X = $CONH_2$, Y = Br_2/NaOH
(iv) X = CN, Y = H_2/Ni/heat.
a) (i) and (ii) b) (i), (ii) and (iii) c) (i) and (iii) d) All of these.

28. Regarding cross-linked or network polymers, which of the following statement is incorrect?
a) Examples are bakelite and melamine
b) They are formed from bi- and tri-functional monomers
c) They contain covalent bonds between various linear polymer chains
d) They contain strong covalent bonds in their polymer chains.

29. Assertion: Strong interparticle forces exist in thermosetting polymers.
Reason: Thermosetting polymers are heavily cross linked.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

30. Novolac on heating with formaldehyde undergoes _____ to form an infusible solid mass called _____.
a) polymerisation, melamine b) vulcanisation, resin c) cross-linking, bakelite
d) condensation, polystyrene

31. Monomer of  is _____.

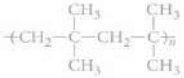
a) 2-methylpropene b) Styrene c) Propylene d) Ethene

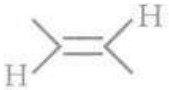
32. Bakelite is an example of
a) elastomer b) fibre c) thermoplastic d) thermosetting

33. The commercial name of polyacrylonitrile is
a) dacron b) orlon (acrilan) c) PVC d) bakelite.

34. Which of the following polymers, need atleast one diene monomer for their preparation?
a) Dacron b) Novolac c) Neoprene d) Teflon

35. Which compound form linear polymer due to H-bond?
a) H_2O b) NH_3 c) HF d) HCl

36.  is a polymer having monomer units _____ .

a) b) c)  d)

37. The biodegradable polymer is _____.
    a) Nylon-2-Nylon 6 b) Nylon-6 c) Buna-S d) Nylon-6,6

38. Which of the following is not true about high density polythene?
    a) Tough b) Hard c) Inert d) Highly branched

39. Which of the following organic compounds polymerized to form the polyester Dacron?
    a) Propylene and para HO—(C_6H_4)—OH b) Benzoicacid and ethanol
    c) Terephthalic acid and ethylene glycol d) Benzoic acid and para HO—(C_6H_4)—OH

40. Teflon and neoprene are the examples of
    a) copolymers b) monomers c) homopolymers d) condensation polymers

41. Caprolactam is used for the manufacture of :
    a) teflon b) terylene c) nylon 6, 6 d) nylon 6

42. Which among the following is a cross-linked polymer?
    a) Polyesters b) Glycogens c) Melamine- formaldehyde d) Polyvinyl chloride

43. Which factor imparts the crystalline nature to a polymer like nylon?
    a) Strong intermolecular forces like hydrogen bonding between chains
    b) van der Waals forces between the polymeric chains
    c) Close packing of the chains due to ionic bonding between the chains
    d) Three-dimensional network of chains

44. Which of the following are thermoplastic polymers?
    a) Polythene, urea-formaldehyde, polyvinyls b) Bakelite, polythene, polystyrene
    c) Polythene, polystyrene, polyvinyls d) Urea-formaldehyde, polystyrene, bakelite

45. Polyethylene is obtained from calcium carbide.
    $CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2$
    $C_2H_2 + H_2 \longrightarrow C_2H_4$
    $nC_2H_4 \longrightarrow (CH_2 - CH_2.)n$
    Therefore, the amount of polyethylene obtained for 64 kg CaC_2 is
    a) 7 kg b) 14 kg c) 21 kg d) 28 kg

46. Bakelite is prepared by the reaction between _____.
    a) urea and formaldehyde b) ethylene glycol c) phenol and fonnaldehyde
    d) tetramethylene glycol

47. Choose the correct statements from the following
    a) Nylon 2-nylon 6 is a polyamide copolymer of alanine
    b) 3-Hydroxy pentanoic acid is a monomer of Nylon 2-nylon 6
    c) PHBV can never be used in the manufacture of orthopaedic devices d) None of these

48. The difference in the densities of low density (LDP) and high density polymers (HDP) is due to the fact that

a)
LDP are highly branched structures while HDP consists of closely packed linear molecules

b) LDP are linear chains while HDP are branched chains of polythene

c) both LDP and HDP are unbranched linear chains with different lengths

d) at high temperature, the density of polymer is reduced

49. Assertion: Dacron is formed by step growth polymerisation of monomer units.
Reason: Dacron fibre is crease resistant.
a) If both assertion and reason are true and reason is the correct explanation of assertion

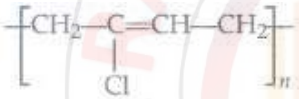
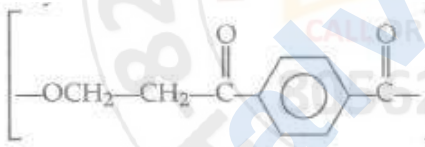
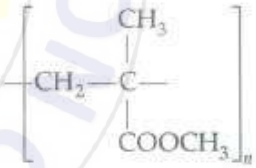
b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

50. Nylon-6, 6 is a polyamide obtained by the reaction of _____ .
a) $COOH(CH_2)_4COOH + H_2NC_6H_4NH_2$ - (p) b) $COOH(CH_2)_4COOH + NH_2(CH_2)6NH_2$
c) $COOH(CH_2)_6COOH + NH_2(CH_2)_4NH_2$ d) $COOHC_6H_4COOH$- (p)+$NH_2(CH_2)_6NH_2$

51. Which of the following is a biodegradable synthetic polymer?
a) Aliphatic polyesters b) PHBV c) Nylon-2-nylon-6 d) All of these

52. Terylene is a condensation polymer of ethylene glycol and _____.
a) benzoic acid b) Phthalic acid c) salicylic acid d) terephthalic acid

53. Which of the following is not correctly matched?
a) Neoprene :  b) Nylon-6,6 :
c) Terylene :  d) PMMA : 

54. Of the following which one is classified as polyester polymer?
a) Terylene b) Bakelite c) Melamine d) Nylone-6, 6

55. Lowdensity polythene (LDP) is used in the insulation of electricity carrying wires and manufacture of flexible pipes and squeeze bottles because
a) it is tough, hard and rigid

b) it is chemically inert, tough, flexible and poor conductor of electricity

c) it is very tough, good conductor of electricity and flexible

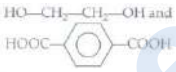
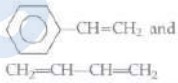
d) it is chemically inert, very soft, water absorbent and poor conductor of heat

56. During addition polymerisation of ethene molecules, the initiator like benzoyl peroxide, acetyl peroxide, tert-butyl peroxide, etc. are added. Their function is to
a) ensure anti-Markownikoff's addition of molecules to form polymer
b) give cations during the reaction which join together to form bigger molecules
c) decrease the temperature of the reaction mixture
d) generate free radical which adds to the monomer to give bigger free radical.

57. Which one of the following is not a condensation polymer?
a) Melamine b) Glyptal c) Dacron d) Neoprene

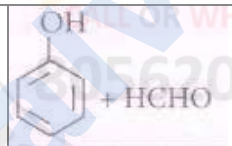
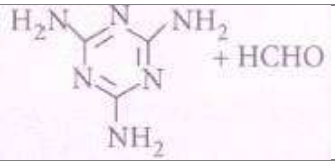
58. Which of the following polymers is not correctly matched?
    a) Formation of dacron - Step growth polymerisation
    b) Formation of polytetratluoroethene - Step growth polymerisation
    c) Formation of polythene - Chain growth polymerisation in presence of benzoyl peroxide
    d) Formation of polyacrylonitrile - Chain growth polymerisation in presence of peroxide

59. Assertion: Most of the synthetic polymers are nonbiodegradable.
    Reason: During polymerisation, the polymers become toxic and non-biodegradable.
    a) If both assertion and reason are true and reason is the correct explanation of assertion
    b) If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false d) If both assertion and reason are false

60. Which one of the following sets forms the biodegradable polymer?
    a) CH_2 == CH—CN and CH_2 == CN-CH == H_2N-CH_2-COOH and H_2N-(CH_2h-COOHCH$_2$
    b) $H_2N—CH_2—COOH$ and $H_2N—(CH_2)_5—COOH$ c)  d) 

61. cis-Polyisoprene possesses elastic property because
    a) it is soft and soluble in non-polar solvent b) it is unsaturated and porous
    c) it has a coiled structure and chains held together by weak van der Waals forces
    d) it has a fibrous structure and reactive sites at various double bonds

62. Match the polymers given in column I with monomers in column II and mark the appropriate choice.

Column I		Column II	
(A)	Melamine-formaldehyde polymer	(i)	
(B)	Bakelite	(ii)	$CH_2 = \overset{Cl}{\overset{\vert}{C}} - CH = CH_2$
(C)	Neoprene	(iii)	$CH_2 = \overset{CH_3}{\overset{\vert}{C}} - CH = CH_2$
(D)	Natural rubber	(iv)	

    a) (A) ⟶ (iv), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iii) b) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (ii)
    c) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii) d) (A) ⟶ (ii), (B) ⟶ (iv), (C) ⟶ (iii), (D) ⟶ (i)

63. Assertion: Rayon is a semi-synthetic polymer and is taken as a better choice than cotton fabric.
    Reason: Mechanical and aesthetic properties of cellulose can be improved by acetylation.
    a) If both assertion and reason are true and reason is the correct explanation of assertion
    b) If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false d) If both assertion and reason are false

64. Which one of the following statements is wrong?

a) PVC stands for poly vinyl chloride b) PTFE stands for teflon

c) PMMA stands for polymethyl methyl acrylate d) Buna-S stands for natural rubber

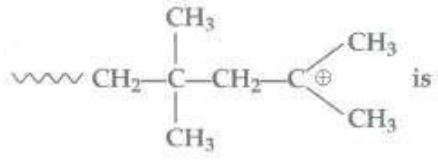
65. $CF_2=CF_2$ is monomer of :

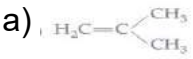
a) teflon b) orlon c) polythene d) nylon-6

66. Glycogen, a naturally occurring polymer stored in animals is a:

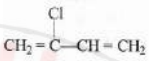
a) monosaccharide b) disaccharide c) trisaccharide d) polysaccharide

67. The monomer of the polymer :



a)  b) $CH_3CH{=}{=}CHCH_3$ c) $CH_3CH{=}{=}CH_2$ d) $(CH_3)_2C{=}{=}C(CH_3)_2$

68. Which one of the following monomers gives the polymer neoprene on polymerization?

a) $CF_2=CF_2$ b) $CH_2=CHCl$ c) $CCl_2=CCl_2$ d) 

69. $\sim\sim[NH(CH_2)_6NHCO(CH_2)_4CO]_n\sim\sim$ is a :

a) homopolymer b) copolymer c) addition polymer d) thermosetting polymer

70. On complete hydrogenation, natural rubber produces

a) ethylene-propylene copolymer b) vulcanised rubber c) polypropylene

d) polybutylene.

71. The monomers of biodegradable polymer, nylon 2-nylon 6 are

a) glycine + adipic acid b) glycol + phthalic acid c) phenol + urea

d) glycine + amino caproic acid

72. Which of the following statements is false?

a) Artificial silk is derived from cellulose. b) Nylon-6, 6 is an example of elastomer.

c) The repeat unit in natural rubber is isoprene.

d) Both starch and cellulose are polymers of glucose.

73. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Buna-S	(i)	Thermosetting
(B)	Polyamides	(ii)	Fibres
(C)	Polyvinyls	(iii)	Elastomer
(D)	Urea-formaldehyde	(iv)	Thermoplastics

a) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶ (ii) b) (A) ⟶ (ii), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (iv)

c) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (i) d) (A) ⟶ (i), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (iii)

74. Assertion: Buna-S is a copolymer.

Reason: Buna-S is formed by condensation reaction between two different monomers.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

75. Few polymers are matched with their uses. Point out the wrong match.

a) Polyesters - Fabric, tyre cords, safety belts b) Nylon 6 - Ropes, tyre cords, fabrics

c) Bakelite - Packaging industry, lubricant d) Teflon - Oil seals, gaskets, non-stick utensils

76. Which of the following is a natural polymer?

a) Poly (Butadiense-acrylonitrile) b) cis-1, 4-polyisoprene c) poly (Butadiense-stysene)

d) polybutadiene

77. Assertion: PHBV is a biodegradable polymer.

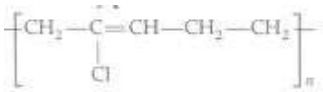
Reason: PHBV is an aliphatic polyester.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

78. Structures of some common polymers are given. Which one is not correctly presented?

a) Neoprene: 

b) Terylene:

c) Nylon 6,6:

d) Teflon:

79. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Natural polymer	(i)	Rayon
(B)	Addition polymer	(ii)	Bakelite
(C)	Copolymer	(iii)	Silk
(D)	Semi-synthetic polymer	(iv)	Neoprene

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (iii) b) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (ii), (D) ⟶ (i)

c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (i), (D) ⟶ (iv) d) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii)

80. Which of the following polymers does not involve cross-linkages?

a) Vulcanised rubber b) Bakelite c) Melamine d) Teflon

81. Synthetic biopolymer, PHBV is made up of the following monomers,

a) 3-hydroxybutanoic acid + 3-hydroxypentanoic acid

b) 2-hydroxybutanoic acid + 2- hydroxypropanoic acid

c) 3-chlorobutanoic acid + 3-chloropentanoic acid

d) 2-chlorobutanoic acid + 3-methylpentanoic acid.

82. Natural rubber is a polymer of _____.

a) butadiene b) ethyne c) styrene d) isoprene

83. Out of the following which one is classified as polyester polymer?

a) Terylene b) Bakelit c) Melamine d) Nylon-6,6

84. Nylon is an example of?

a) Polysaccharide b) Polyamide c) Polythene d) Polyester

85. Polymer which has amide linkage is:

a) nylon-6, 6 b) terylene c) teflon d) bakelite

86. Which of the following polymers of glucose is stored by animals?

a) Cellulose b) Amylose c) Amylopectin d) Glycogen

87. Assertion: Bakelite is a thermosetting polymer.
Reason: Bakelite is formed by cross-linking of novo lac and formaldehyde.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

88. Formation of nylons and polyesters are called step growth polymerisation because
a) the polymers are formed by adding a monomer step by step
b)
the polymers are formed by condensation and monomers are joined by loss of simple molecules like water
c) the monomers used for condensation are unsaturated molecules
d)
the polymers are formed by addition of a large number of free radicals formed by monomers

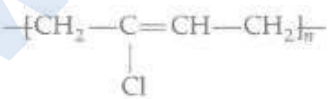
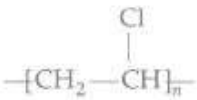
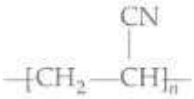
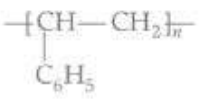
89. Mark the incorrect use of the polymer.
a) High density polythene - Buckets, pipes b) Nylon 6, 6 - Ropes, bristles for brushes
c) Orlon - Synthetic wool, carpets d) Glyptal - Electrical switches, combs

90. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	PVC	(i)	Rubber
(B)	Condensation polymer	(ii)	Thermoplastic
(C)	Polysaccharide	(iii)	Dacron
(D)	Elastomer	(iv)	Natural polymer

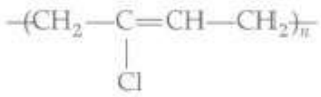
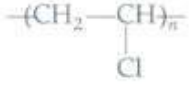
a) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i) b) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (iii)
c) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii) d) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii)

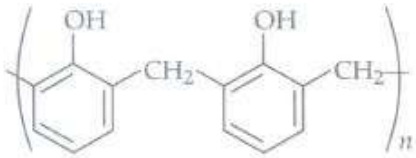
91. Which one of the followng statements is not true?
a)
In vulcanization the formation of sulphur bridges between different chains make rubber harder and stronger.
b) Natural rubber has trans-configuration at every double bond
c) Buna-S is a copolymer of butadiene and styrene
d) Natural rubber is a 1, 4-polymer of isoprene

92. Which of the following structures represents neoprene polymer?
a) 
b) 
c) 
d) 

93. Which of the following alkenes is least reactive towards anionic polymerisation?
a) $CH_2 = CHCH_3$ b) $CH_2 = CF_2$ c) CH_2 = Proverbs d) $CH_2 = CHC_6H_5$

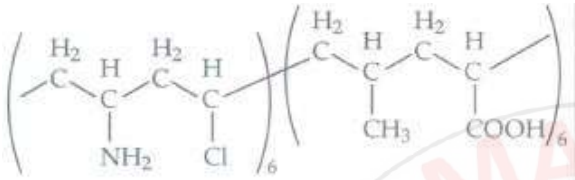
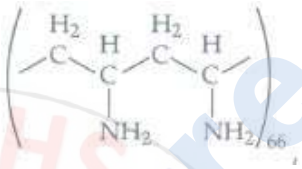
94. Which one of the following is an example of thermosetting polymer?

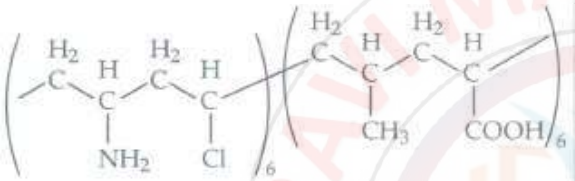
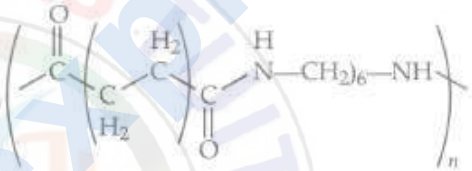
a)  b)  c)

d) 

95. Assertion: The physical properties of natural rubber can be improved by vulcanisation.
Reason: Neoprene is the monomer of natural rubber.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

96. Which one of the following structures represents nylon 6, 6 polymer?

a)  b) 

c)  d) 

97. The Bakelite is prepared by the reaction between :
a) phenol and formaldehyde b) tetramethylene glycol c) urea and formaldehyde
d) ethylene glycol

98. Which of the following polymer is biodegradable?

a) $\left(-CH_2 - \underset{CI}{C} = CH - CH_2 - \right) n$

b) $\left(-CH_2 - CH = CH - CH_2 - CH_2 - \overset{CN}{CH} - \right) n$

c) $\left(-O - \underset{CH_3}{CH} - CH_2 - \underset{O}{C} - O - \underset{CH_2CH_3}{CH} - CH_2 - \underset{O}{C} - \right) N$

d) $\left(-\overset{H}{N} - (CH_2)_6 - \overset{H}{N} - \overset{O}{C} - (CH_2)_4 - \overset{O}{C} - \right) N$

99. In vulcanization of rubber
a) sulphur reacts to form a new compound b) sulphur cross-links are introduced
c) sulphur forms a very thin protective layer over rubber d) all statements are correct

100. Which of the following is a condensation polymer?
a) Teflon b) PVC c) Polyester d) Neoprene

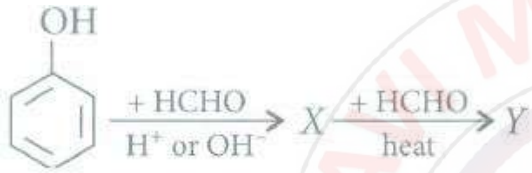
101. Which of the following polymers are used as fibre?
a) Nylon b) Polytetra fluoroethane c) Terylene d) Buna-S

102. Which of the following is not true for thermoplastic polymers?
a) Thermoplastics are linear polymers b) They soften and melt on heating
c) Molten polymer can be remoulded into any shape
d) They have cross-linkages which break on heating

103. Which of the following is not a semi-synthetic polymer?
a) cis-Polyisoprene b) Cellulose nitrate c) Cellulose acetate d) Vulcanised rubber

104. The monomers used in addition polymerisation through free radical should be very pure because
a) the traces of impurities act like inhibitors resulting in short chain polymers
b) the impurities result in formation of different products c) the polymer formed is impure
d) catalyst does not function in presence of impurities

105. Identify X and Y in the given polymerisation reactions.



a) X = Bakelite, Y = Novolac b) X = Novolac, Y = Melamine
c) X = Bakelite, Y = Melamine d) X = Novolac, Y = Bakelite

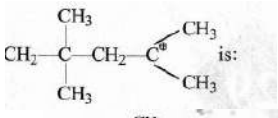
106. Which of the following represents chloroprene, the monomer of neoprene?
a) CH_2=CH-CH=CH_2Cl b) $CH_2 = \underset{Ch_3}{C} - CH = CHCI$
c) $CH_2 = \underset{CI}{C} - CH = CH_2$ d) $CH_2 = \underset{CH_3}{C} - \underset{CI}{C} = CH_2$

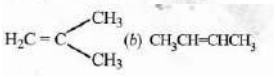
107. Arrange the following polymers in an increasing order of intermolecular forces; fibre, plastic, elastomer.
a) Elastomer < Fibre < Plastic b) Elastomer < Plastic < Fibre
c) Plastic < Elastomer < Fibre d) Fibre < Elastomer < Plastic

108. Assertion: The correct order of increasing molecular forces in the given polymers is: Buna-S, Polythene, Nylon-6, 6.
Reason: The properties of polymers depend upon the molecular forces.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

109. Glyptal polymer is obtained by the following monomers,
a) malonic acid + ethylene glycol b) phthalic acid + ethylene glycol
c) maleic acid + formaldehyde d) acetic acid + phenol.

110. The monomer of the polymer;



a)  b) $CH_3CH=CHCH_3$ c) $CH_3CH=CH_2$ d) $(CH_3)_2C=C(CH_3)_2$

111. Fill up the blanks with suitable reagents to show synthesis of polyvinyl chloride.

$$CH \equiv CH \xrightarrow{X} CH_2 = CHCI \xrightarrow{Y} \left(CH_2 - CHCI - \overset{CI}{\underset{|}{CH}} \right) n$$

a) X = HCl, $HgCl_2$; Y = Polymerisation, peroxide

b) X = Cl_2, $FeCl_3$; Y = Polymerisation, heat c) X = HCl, CuCl; Y= H_2O, H^+

d) X = HCl, $HgCl_2$; Y = Pt, high pressure

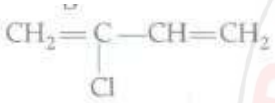
112. Assertion: In vulcanisation of rubber, sulphur cross- links are introduced.
Reason: Vulcanisation is a free radical initiated chain reaction.

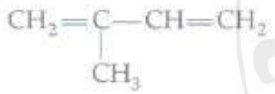
a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

113. Which is the monomer of neoprene in the following?

a)  b) CH_2 == CH—C ≡ CH c) CH_2 == CH—CH ≡ CH_2

d) 

114. Among cellulose, poly(vinylchloride), nylon and natural rubber, the polymer in which the intermolecular force of attraction is weakest is

a) nylon b) poly(vinyl chloride) c) cellulose d) natural rubber

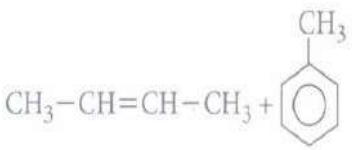
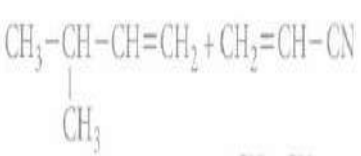
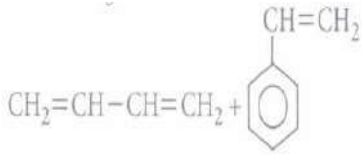
115. Match the column I with column II and mark the appropriate choice.

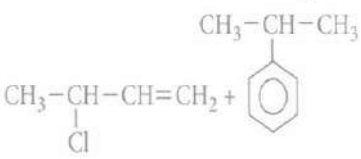
Column I		Column II	
(A)	Buna-N	(i)	Phthalic acid and ethylene glycol
(B)	Nylon-6,6	(ii)	Terephthalic acid and ethylene glycol
(C)	Dacron	(iii)	Hexamethylene diamine and adipic acid
(D)	Glyptal plastic	(iv)	Acrylonitrile and butadiene

a) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i) b) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iv), (D) ⟶ (iii)

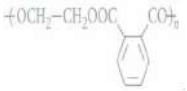
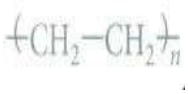
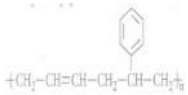
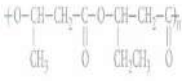
c) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii) d) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)

116. The correct structure of monomers of buna-S is:

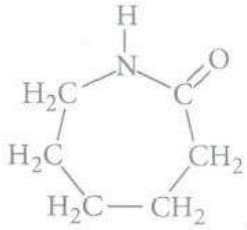
a)  b)  c) 

d) 

117. In which of the following polymers ethylene glycol is one of the monomer units?

a)  b)  c)  d) 

118. Which of the following polymers can be formed by using the following monomer unit?



a) Nylon-6, 6 b) Nylon-2-nylon-6 c) Melamine polymer d) Nylon-6

119. Which of the following is not a characteristic of thermosetting polymers?

a) Linear or slightly branched long chain polymers

b) Heavily branched and cross-linked polymers c) Become infusible on moulding

d) Cannot be remoulded or reused on heating

120. Dacron is an example of

a) polyamides b) polypropenes c) polyacrylonitrile d) polyesters

121. Which of the following statements is not true about low density polythene?

a) Tough b) Hard c) Poor conductor of electricity d) Highly branched structure

122. Which one of the following is used to make 'non-stick' cookware?

a) Poly-ethylene terephthalate b) Polytetrafluoroethylene c) PVC d) Polystyrene

123. Biodegradable polymer which can be produced from glycine and aminocaproic acid is: _____.

a) PHBV b) Buma-N c) Nylon 6,6 d) Nylon-2-nylon 6

124. Assertion: Network polymers are thermosetting.

Reason: Network polymers have high molecular mass.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

125. Which of the following is not true about polymers?

a) Polymers are high molecular mass macromolecules

b) Polymers may be of natural or synthetic origin

c) Condensation polymers are made up of one type of monomers only

d) They have high viscosity and do not carry any charge

126. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Raincoats, hand bags	(i)	PHBV
(B)	Laminated sheets	(ii)	PVC
(C)	Television cabinets	(iii)	Urea-formaldehyde
(D)	Orthopaedic devices	(iv)	Polystyrene

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv) b) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii)
c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i) d) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii)

127. Identify the type of polymer.
(i) - A - A - A - A - A - A -
(ii) - A - B - B - A - A - A - B - A -
a) (i) Homopolymer, (ii) Copolymer b) (i) Natural polymer, (ii) Synthetic polymer
c) (i) Linear polymer, (ii) Branched polymer d) (i) Fibre, (ii) Elastomer

128. Cellulose is polymer of :
a) glucose b) fructose c) ribose d) sucrose

129. $[NH(CH_2)_6NHCO(CH_2)_4CO]_n$ is a _____.
a) addition polymer b) thermosetting polymer c) homopolymer d) copolymer

130. In elastomer, the intermolecular forces are _____.
a) Strong b) Weak c) nil d) none of the above

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Time : 1 Mins **ENVIRONMENT AND EVERYDAY LIFE IN CHEMISTRY 1** **Marks : 868**

1. Assertion: Soluble fluoride is often added to drinking water to bring its concentration up to 1 ppm.
   Reason: F^- ion concentration above 2 ppm causes brown mottling of teeth.
   a)
   If both assertion and reason are true and reason is the correct explanation of assertion.
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion.
   c) If assertion is true but reason is false. d) If both assertion and reason are false.
2. Carbon monoxide is harmful to human beings as it
   a) is carcinogenic b) is antagonistic to CO_2
   c) has higher affinity for haemoglobin as compared to oxygen d) is destructive to CO_2
3. Assertion: Heavy metals such as cadmium, mercury, nickel etc. are water pollutants.
   Reason: Heavy metals are not harmful to humans
   a)
   If both assertion and reason are true and reason is the correct explanation of assertion.
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion.
   c) If assertion is true but reason is false. d) If both assertion and reason are false.
4. Which of the following gases is not a greenhouse gas?
   a) CO b) O_3 c) CH_4 d) H_2O vapour
5. Which of these are biodegradable pollutants?
   (i) Pesticides
   (ii) Mercuric salts
   (iii) Sewage
   (iv) Radioactive wastes
   a) (i) and (ii) b) (i) and (iii) c) (i), (iii) and (iv) d) (iii) only
6. Match the column I with column II and mark the appropriate choice.

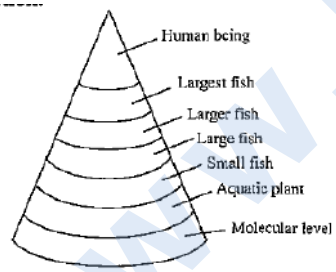
Column I		Column II	
(A)	Peroxyacetyl nitrate	(i)	Global warming
(B)	Polychlorinated biphenyls	(ii)	Photochemical smog

(C)	Dioxides of carbon and sulphur	(iii)	Water pollutant
(D)	IR active molecules	(iv)	Acid rain

a) (A) → (ii), (B) → (iii), C → (iv), (D) → (i) b) (A) → (iii), (B) → (iv), C → (ii), (D) → (i)
c) (A) → (iv), (B) → (ii), C → (iii), (D) → (i) d) (A) → (i), (B) → (iii), C → (ii), (D) → (iv)

7. Which of the following is not a common component of Photochemical smog?
   a) Ozone b) Acrolein c) Peroxyacetyl nitrate d) Chloroflurocarbons
8. Identify the correct statements.
   i) Winter smog is reducing in nature due to presence of particulate carbon and SO_2
   ii) The pollutant obtained from emission tubes of diesel engines is benzopyren.
   iii) Photochemical smog is made up of PAN, O_3 and oxides of nitrogen
   iv) CFCs are stable in troposphere and act as pollutants in stratosphere.
   a) (ii), (iii) and (iv) b) (i), (iii) and (iv) c) (i), (ii) and (iii) d) all of these
9. Photochemical smog is formed in
   a) summer during day time b) summer during morning time
   c) winter during morning time d) winter during day time
10. Which of the following statements is not true about classical smog?
    a)
    Its main components are produced by the action of sunlight on emissions of automobiles and factories.
    b) Produced in cold and humid climate c) It contains compounds of reducing nature.
    d) It contains smoke, fog and sulphur dioxide
11. As DDT passes into food chain, its concentration
    a) remains same b) decreases c) becomes zero d) increases
12. Assertion: Catalytic converters must be used in cars.
    Reason: Catalytic converter helps to reduce the formation of acid rai
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.
13. Assertion : Mists are non-viable particulates produced by particles of spray liquids and by condensation of vapours in air.
    Reason: Herbicides and insecticides that miss their targets, travel through air and form mists
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.

14. Few pollutants and their effects are listed below. Mark the incorrect match.
    a) Phosphate fertilizers in water - Eutrophication
    b) Hydrogen released in air - Global warming
    c) Sewagedisposed in water - Increase in BOD level
    d) Carbon dioxide in air - Acid rain
15. Mark the incorrect choice of ill effects caused by the pollutant
    a) Lead - Kidney, Liver, Reproductive system b) Fluoride - Bones and teeth
    c) Nitrate - Blue baby's syndrome d) Sulphur dioxide - Nervous system diseases
16. Assertion: Excess nitrate in drinking water causes 'blue baby' syndrome.
    Reason: The maximum limit of nitrate in drinking water is 50 ppb.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.
17. The two strong acids present in the acid rain are
    a) HNO_2 and HNO_3 b) H_2SO_4 and HNO_3 c) H_2SO_3 and H_2SO_4 d) H_2CO_3 and HCl
18. Sulphur oxides which are responsible for major air pollution are caused by
    a) burning of coal and refining of petroleum b) burning of fuels in automobiles
    c) combustion offuels containing C and H
    d) using indoor combustion devices like cooking gas.
19. The secondary precursors of photochemical smog are
    a) SO_2 and NO_2 b) NO_2 and hydrocarbons c) O_3 and PAN d) CO_2 and O_2
20. Study the given diagram and answer the following question.



    Which is the most appropriate statement about the figure?
    a) The trophic levels decrease from molecular level to human beings.
    b) At each tropic level the pollutants get approximately 10 times concentrated.
    c) The level of pollutants is maximum at molecular level and minimum in human beings.
    d) Repeated use of toxins reduces its concentration at highest level.
21. Which of the following is a sink for CO?
    a) Microorganisms present in the soil b) Oceans c) Plants d) Haemoglobin
22. Mark the correct statement

a)
Photochemical smog occurs in day time while the classical smog occurs in early morning hours.
b) Acid rain damages the buildings while it is not toxic to vegetation and aquatic life.
c) Carbon monoxide is a greenhouse gas which results in global warming.
d)
Smoke consists of fine particles produced during crushing and grinding of solid materials.

23. Which of the following free radicals is responsible for causing break down of ozone into oxygen due to use CFCs?
a) $\dot{O}$ b) $\dot{C}l$ c) $\dot{C}H_3$ d) $\dot{O}H$

24. Assertion: Classical smog is oxidising smog whereas photochemical smog is reducing smog.
Reason: Classical smog occurs in warm, dry and sunny climate whereas photochemical smog occurs in cool humid climate.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

25. Green chemistry involves
a) production of chemicals of our daily use from green house gases
b) such chemical processes in which green plants are used
c) those reactions which are of biological origin
d) use of non-toxic reagents and solvents to produce environment friendly products.

26. The pollutants which come directly in the air from sources are called primary pollutants. Primary pollutants are sometimes converted into secondary pollutants. Which of the following belongs to secondary air pollutants?
a) CO b) Hydrocarbon c) Peroxyacetyl nitrate d) NO

27. Which of the following statements is not true?
a) Ammonia acts as sink for NO_x b) Limestone acts as sink for SO_x.
c) The average residence time of NO is one month.
d) SO_x can be removed from flue gases by passing through a solution of citrate ions.

28. B.O.D values of four samples of water A, B, C and D are given below
A.160 ppm
B. 35 ppm
C. 180 ppm
D. 25 ppm
The decreasing order of extent of pollution in water is:
a) C > A > D > B b) D > B > A > C c) C > A > B > D d) D > A > B > C

29. Photochemical smog is formed due to presence of:
    a) oxides of sulphur b) oxides of nitrogen c) oxides of carbon d) oxides of lead
30. Which of the following is not correctly matched?
    a) Water pollution - using synthetic detergents for washing clothes
    b) Photochemical smog releasing gases produced by automobiles and factories
    c) Damaging ozone layer - using CFCS
    d) Acid rain - releasing pesticides and fertilizers in water
31. Mists are produced by
    a) smoke formed during combustion of organic matter
    b) particles of spray liquids and by condensation of vapours in air
    c) fine solid particles produced during crushing and grinding
    d) condensation of vapours during chemical reactions.
32. Mark the example which is not correctly matched?
    a) Air pollutants - Oxides of sulphur, nitrogen and carbon
    b) Particulate pollutants - Dust, mist, fumes
    c) Global warming - Methane, ozone, CFCs
    d) Water soluble chemical pollutants - Oxides of nitrogen, carbon and sodium
33. Assertion: Ozone in the troposphere is a product of ultraviolet radiations acting on dioxygen molecules.
    Reason: Ozone is thermodynamically very stable. Photochemical smog occurs in warm, dry and sunny climate. It has high concentration of oxidising agents and is therefore, called as oxidising smog.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.
34. Assertion: Manures and biofertilizers should be used in place of chemical fertilizers.
    Reason: Chemical fertilizers cause pollution by releasing excess nutrients in water bodies.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.
35. Which of the following practices will not come under green chemistry?

a)
If possible, making use of soap made of vegetable oils instead of using synthetic detergents
b) Using H_2O_2 for bleaching purpose instead of using chlorine based bleaching agents
c)
Using bicycle for travelling small distances instead of using petrol/diesel based vehicles.
d) Using plastic cans for neatly storing substances

36. Assertion: The effects of particulate pollutants are largely dependent on the particle size.
Reason: Air-borne particles such as dust, fumes, mist etc., are dangerous for human health.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

37. Assertion: Acid rain causes lakes and rivers to become acidic.
Reason: Building materials like limestone, marble, etc. are weakened on reaction with acid rain.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

38. Which of the following gases is not responsible for photochemical smog?
a) Oxides of nitrogen b) Hydrocarbons c) Inert gases d) Carbon monoxide

39. Roasting of sulphides give the gas X as a by product. This is colourless gas with choking smell of burnt sulphur and caused great damage to respiratory organs as a result of acid rain. Its aqueous solution is acidic, acts as a reducing agent and its acid has never been isolated' The gas X is:
a) SO_2 b) CO_2 c) SO_3 d) H_2S

40. Choose the correct words to fill in the blanks. Pollutant is defined as, a substance or an agent which causes pollution. _____(i)_____ and _____(ii)_____ are chemical pollutants. Pollutants can be _____(iii)_____ which rapidly break down by _____(iv)_____ processes.

a)

i	ii	iii	iv
Heavy metals	DDT	degradable	natural

b)

i	ii	iii	iv
Particulates	Heavy metals	non-degradable	artificial

c)

i	ii	iii	iv
non-degradable	petroleum	degradable	artificial

d)

i	ii	iii	iv
Micro-organisms	natural gas	non-degradable	natural

41. Which one of the following statements is not true?
    a) pH of drinking water should be between 5.5 - 9.5
    b) Concentration of DO below 6 ppm is good for the growth of fish.
    c) Clean water would have a BOD value of less than 5ppm.
    d) Oxides of sulphur, nitrogen and carbon, are the most widespread air pollutants

42. Which of the following statements about photochemical smog is not correct?
    a) It occurs in warm, dry and sunny climate.
    b) Chemically, it is a reducing mixture and is called reducing smog.
    c)
    It is formed as a result of action of sunlight on unsaturated hydrocarbons and nitrogen oxides.
    d) It has high concentration of oxidising agents and is also called oxidising smog.

43. Which of the following processes is not responsible for adding particulates to the atmosphere?
    a) Photosynthesis b) Combustion of fuels c) Industrial processes
    d) Agricultural processes

44. Organic matter is considered as a major source of water pollution caused by wastes of food, animal and human excreta, garbage etc. The excess of organic matter in water causes a threat to aquatic life because
    a) the space available to aquatic life decreases
    b) microorganisms consume dissolved oxygen to decompose organic matter
    c) organic matter is swallowed by small animals
    d) decomposition of organic matter increases the temperature of water

45. The region which is greatly affected by air pollution is
    a) troposphere b) stratosphere c) mesosphere d) thermosphere

46.

	List-I		List-II
(A)	Troposphere	(i)	Prevents UV rays coming to earth
(B)	Stratosphere	(ii)	Ionization of gases

(C)	Mesosphere	(iii)	Maintenance of heat balance
(D)	Thermosphere	(iv)	Non propagation of sound waves

The correct match is

a)

A	B	C	D
(ii)	(iv)	(iii)	(i)

b)

A	B	C	D
(iv)	(ii)	(i)	(iii)

c)

A	B	C	D
(iii)	(i)	(iv)	(ii)

d)

A	B	C	D
(i)	(iii)	(ii)	(iv)

47. Which one of the following is not a common component of photochemical smog?
a) Ozone b) Acrolein c) Peroxyacetyl nitrate d) Chlorofluorocarbons

48. Dinitrogen and dioxygen are main constituents of air, but these do not react with each other to form oxides of nitrogen because _____.
a) the reaction is endothermic and requires very high temperature
b) the reaction can be initiated only in presence of a catalyst
c) oxides of nitrogen are unstable d) N_2 and O_2 are unreactive

49. Freons are not recommended to be used in refrigerators because they
a) cause global warming b) cause acid rain c) cause depletion of ozone layer
d) cause very less cooling

50. Acid rain is produced by _____ .
a) excessive release of CO in air b) excessive release of SO_2 and H_2S in air
c) excessive release of NO_2 and SO_2 in air
d) excessive release of NH_3 and CO_2 in air.

51. Increased level of greenhouse gases causes global warming which will result in
a) biomagnification b) eutrophication c) melting of glaciers d) ozone depletion

52. Which of the following statements about photochemical smog is wrong?
a) It has high concentration of oxidising agents.
b) It has low concentration of oxidising agent.
c) It can be controlled by controlling the release of NO_2, hydrocarbons, ozone etc.
d) Plantation of some plants like pinus helps in controlling photochemical smog.

53. Lung diseases are about four times more probable in urban areas as compared to rural areas. This is due to the presence of which of the following inatmosphere?
a) CO_2 b) NO_2 c) O_2 d) N_2

54. An object is located at a height of 18 km from the surface of earth. The object is located in
a) thermosphere b) mesosphere c) ionosphere d) stratosphere

55. Match the column I with column II and mark the appropriate choice

Column I		**Column II**	
(A)	Biodegradable pollutants	(i)	DDT
(B)	Non -biodegradable pollutants	(ii)	SO_2
(C)	Primary pollutants	(iii)	PAN
(D)	Secondary pollutants	(iv)	Sewage

a) (A) → (iii), (B) → (iv), (C) → (ii), (D) → (i)
b) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)
c) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)
d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

56. Incomplete combustion of petrol or diesel in automobile engine produces
a) CO and H_2O vapours b) CO and NO_2 c) CO d) SO_2

57. Green chemistry means such reactions which
a) produce colour during reactions
b) reduce the use and production of hazardous chemicals
c) are related to the depletion ofozone layer d) study the reactions in Plants

58. Consider the following statements:
(i) Zirconium-Alizarins dye is used for testing fluoride ions in water
(ii) Ozone layer is present in mesosphere
(iii) The poisonous gas present in the exhaust
fumes of automobiles is CO
(iv) TajMahal is affected by CO_2 gas
The correct statements are
a) (i) and (iii) b) (i), (ii), (iii) c) (i), (iii) and (iv) d) all of these

59. Which one of the following statements regarding photochemical smog is not correct?
a) Carbon monoxide does not play any role in photochemical smog formation.
b) Photochemical smog is an oxidizing agent in character.
c)
Photochemical smog is formed through photochemical reaction involving solar energy.
d) Photochemical smog does not cause irritation in eyes and throat.

60. 10 mL of water requires 1.47 mg of $K_2Cr_2O_7$ (M. wt.=294) for oxidation of dissolved organic matter. C.O.D is:
a) 2.44 ppm b) 24 ppm c) 32 ppm d) 1.6 ppm

61. Which of the following practices involve green chemistry?
(i) Substitute CFCs by environmental friendly HFCs and other compounds.
(ii) Replace halogenated solvent by liquid CO_2 for drycleaning.
(iii) Use of H_2O_2 for bleaching instead of Cl_2.
(iv) Making disposable eating utensils and storage jars of plastics.
a) (i) and (ii) b) (ii) and (iv) c) (iii) and (iv) d) (i), (ii) and (iii)

62. Which of the following reactions is taking place resulting in discolouration of marble of the buildings like Taj Mahal?
a) $CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$ b) $CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$
c) $CaCO_3 + H_2O \rightarrow Ca(OH)_2 + CO_2$ d) $CaCO_3 \rightarrow CaO + CO_2$

63. Assertion: The amount of BOD in the water is a measure of the amount of organic material in the water.
Reason: Clear water has BOD less than 5 ppm whereas highly polluted water can have BOD value of 17 ppm or more.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

64. Assertion: The process in which nutrient rich water bodies develop plant population is called eutrophication.
Reason : Eutrophication helps in enhancement of plants and animals population by providing them oxygen.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

65. The dissolution of ozone layer causes ozone hole in the blanket surrounding the atmosphere. What are the ill effects of ozone hole?
a) Greenhouse effect b) Global warming c) Acid rain d) UV rays reaching the earth

66. Ozone hole is maximum over
a) Europe b) Antarctica c) India d) Africa

67. Identify the correct statement.
a) Non-conventional sources of energy cause more pollution.
b) Ozone is a harmless gas present in the atmosphere.
c) Chlorofluorocarbons break down to chlorine atoms by ultraviolet radiation.
d) Trees do not help in decreasing rate of global warming

68. Which of the following is not regarded as a pollutant?
a) NO_2 b) CO_2 c) SO_2 d) CO

69. Which of the following pollutants is not harmful for lungs?
a) CO b) CO_2 c) SO_2 d) NO_2

70. Which of the following practices will come under green chemistry?
a)
If possible, making use of soap made of vegetable oils instead of using synthetic detergents
b) Using H_2O_2 for bleaching purpose instead of using chlorine based bleaching agents
c)
Using bicycle for travelling small distances instead of using petrol/diesel based vehicles
d) All of these

71. Biochemical Oxygen Demand, (BOD) is a measure of organic material present in water. BOD value less than 5 ppm indicates a water sample to be_____

a) rich in dissolved oxygen b) poor in dissolved oxygen c) highly polluted
d) not suitable for aquatic life

72. In Antarctica, ozone depletion is due to the formation of which of the following compounds?
a) Acrolein b) PAN c) PCBs d) Chlorine nitrate

73. Which of the following is not a common component of photochemical smog?
a) Peroxyacetyl nitrate b) Acrolein c) Formaldehyde d) Carbon dioxide

74. Which one of the following statements regarding photochemical smog is not correct?
a) Carbon monoxide does not play any role in photochemical smo g formation
b) Photochemical smog is an oxidising agent in character
c)
Photochemical smog is formed through photochemical reaction involving solar energy
d) Photochemical smog does not cause irritation in eyes and throat.

75. The zone which extends above troposphere up to 50 km above sea level and contains dinitrogen, dioxygen, ozone and little water vapour is called
a) exosphere b) mesosphere c) ionosphere d) stratosphere

76. Which of the following is a greenhouse gas?
a) SO_2 b) H_2S c) CO_2 d) O_2

77. Smog is a common pollutant in places which have
a) high altitudes b) high temperature c) high concentration of SO_2 in air
d) high concentration of NH_3 in air.

78. Which of the following statements is correct?
a) Ozone hole is a hole formed in stratosphere from which ozone oozes out
b) Ozone hole is a hole formed in the troposphere from which ozone oozes out.
c) Ozone hole is thinning of ozone layer of stratosphere at some places.
d) Ozone hole means vanishing of ozone layer around the earth completely.

79. Assertion: The main reason of ozone layer depletion is believed to be the release of chlorofluorocarbon compounds known as freons.
Reason: CFCs are transporting agents for continuously generating chlorine radicals into the stratosphere.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

80. Carbon monoxide is naturally produced by oxidation of X, a gas present in swamp area while it can be produced by Y of fuels containing carbon.
a) X = CO_2, Y = complete combustion b) X = CH_4, Y = incomplete combustion
c) X = C, Y = oxidation d) X = CH_4, Y = complete combustion

81. Which of the following is not an air pollutant?
a) H_2 b) SO_2 c) O_3 d) NO_x

82. Assertion: Normally rain water has a pH of 5.6.
Reason: H^+ ions are formed by the reaction of rain water with carbon dioxide present in the air.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

83. The gaseous envelope around the earth is known as atmosphere. The lowest layer of this is extended upto 10 km from sea level, this layer is_____.
a) stratosphere b) troposphere c) mesosphere d) hydrosphere

84. Match the column I with column II and mark the appropriate choice

Column I (Pollutants)		**Column I (Source)**	
(A)	Toxic heavy metals	(i)	Domestic sewage
(B)	Microorganisms	(ii)	Industries and chemical factories
(C)	Organic wastes	(iii)	Chemical fertilizers
(D)	Plant nutrients	(iv)	Discharge from food processing factories

a) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)
b) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)
c) (A) → (iv), (B) →(ii), (C) → (iii), (D) → (i)
d) (A) → (ii), (B) → (i), (C) → (iv), (D) → (iii)

85. Biological Oxygen Demand (BOD) can be defined as,
a)
the amount of oxygen required by bacteria to break down the organic matter of a sample of water
b)
the amount of chemicals required to break down the organic matter of a sample of water
c) the amount of phosphate required to oxidise the organic matter of a sample of water
d) the amount of organic matter present in the given sample of water.

86. Sewage containing organic waste should not be disposed in water bodies because it causes major water pollution. Fish in such a polluted water die because of
a) large number of mosquitoes b) increase in the amount of dissolved oxygen
c) decrease in the amount of dissolved oxygen in water d) clogging of gills by mud.

87. Match the upper limit concentrations of the pollutants in drinking water given in column I with column II and mark the appropriate choice.

Column I	Column II

(A)	Lead	(i)	500 ppm
(B)	Sulphate	(ii)	1ppm
(C)	Nitrate	(iii)	50 ppb
(D)	Fluoride	(iv)	50ppm

a) (A) → (ii), (B) → (iii), (C) → (i), (D) → (iv)
b) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)
c) (A) → (i), (B) → (iv), (C) → (iii), (D) → (ii)
d) (A) → (iv), (B) → (ii), (C) → (iii), (D) → (i)

88. Which one of the following statements is not correct?
a) DDT and BHC are not good insecticides because they are highly soluble in water.
b)
DDT and BHC are not good insecticides because they are absorbed by the soil and contaminate root crops
c) Aldrin is not a good insecticide because it is not biodegradable
d) All the above are incorrect.

89. The brown, hazy fumes of photochemical smog are due to
a) nitrogen dioxide b) PAN formation c) aldehydes d) SO_2

90. Which oxide of nitrogen is not a common pollutant introduced into the atmosphere both due to natural and human activity?
a) N_2O b) NO_2 c) N_2O_5 d) NO

91. Eutrophication causes
a) increase in nutrients b) increase in dissolved salts
c) reduction in dissolved oxygen d) reduction in water pollution

92. Photochemical smog consists of excessive amount of X in addition to aldehydes, ketones, PAN etc. X is
a) methane b) carbon monoxide c) carbon dioxide d) ozone

93. Which of the following statements is wrong?
a) Ozone is not responsible for green house effect
b) Ozone can oxidise sulphur dioxide present in the atmosphere to sulphur trioxide
c) Ozone hole is thinning of ozone layer present in the stratosphere.
d) Ozone is produced in upper stratosphere by the action of UV rays on oxygen

94. Among the following. the one that is not a green house gas is
a) Methane b) Ozone c) Sulphur dioxide d) Nitrous oxide

95. Photochemical smog occurs in warm, dry and sunny climate. One of the following is not amongst the components of photochemical smog, identify it.
a) NO b) O_3 c) SO_2 d) Unsaturated hydrocarbon

96. Assertion: Chlorine sinks are formed during summer, hence, preventing ozone depletion.
Reason: In summer season, nitrogen dioxide and methane react with chlorine monoxide and chlorine radicals.

a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

97. The chemical substances used to bring down body temperature in high fever are known as
a) analgesics b) antipyretics c) antihistamines d) tranquilizers

98. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion : 0.2 percent solution of phenol is an antiseptic while its one percent solution is disinfectant.
Reason: Antiseptics are also called disinfectant.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

99. Bithional is generally added to the soaps as an additive to function as a/an: _____ .
a) Dryer b) Buffering agent c) Antiseptic d) Softner

100. Which of the following is a cationic detergent?
a) Sodium dodecylbenzene sulphonate b) Sodium lauryl sulphate
c) Sodium stearate d) Cetyltrimethyl ammonium bromide

101. Which of the following is not a surfactant?
a) CH_3-$(CH_2)_{15}$ - $N^+(CH_3)Br^-$ b) CH_3-$(CH_2)_{14}$ -CH_2NH_2
c) CH_3-$(CH_2)_{16}$ -$CH_2OSO_2^-Na^+$ d) OHC-$(CH_2)_{14}$-CH_2-COO^-Na^+

102. The most useful classification of drugs for medicinal chemists is_____
a) on the basis of chemical structure b) on the basis of drug action
c) on the basis of molecular targets d) on the basis of pharmacological effect

103. Which of the following is employed as a tranquilizer?
a) Naproxen b) Tetracycline c) Chlorpheninamine d) Equanil

104. Which of the following antibiotics is bactericidal?
a) Erythromycin b) Tetracycline c) Penicillin d) Chloramphenicol

105. Which of the following is not true about drug receptors?

a) Receptor proteins are embedded in the cell membrane.

b)
The chemical known as chemical messenger are received at the binding sites of receptors

c) The receptors show selectivity for one chemical messenger over the other.

d) Receptor protein is decomposed and destroyed after removal of chemical messenger

106. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Clothes washed with soap using hard water do not absorb dyes evenly.
Reason: Hard water contains calcium and magnesium ions.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

107. Which statement about aspirin is not true?
a) Aspirin belongs to narcotic analgesics b) It is effective in relieving pain.

c) It has antiblood clotting action d) It is a neurologically active drug

108. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Use of aspartame is limited to cold foods and soft drinks.
Reason : Aspartame is roughly 100 times as sweet as cane sugar.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false.

109. Which of the following is scientific explanation of depression?
a) An increased level of sugar in the blood leads to depression.

b) Low levels of noradrenaline, a neurotransmitter in the blood leads to depression.

c) Release of extra gastric juices in the stomach leads to depression

d) Sleep inducing drugs lead to depression

110. Salvarsan is arsenic containing drug which was first used for the treatment of_____
a) syphilis b) typhoid c) meningitis d) dysentry

111. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: Low level of noradrenaline causes depression.

Reason: Equanil is used in controlling depression.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false.

112. Which of the following statements is incorrect?

a) Aspirin is both analgesic and antipyretic b) Ampicillin is a natural antibiotic

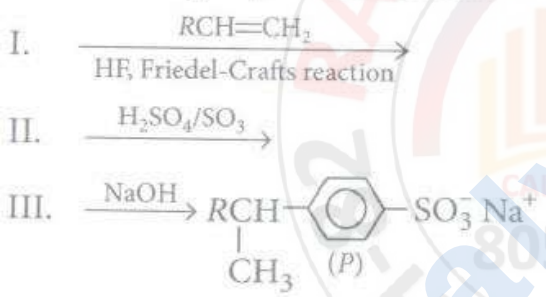
c) Salvarsan is toxic to human beings

d) Some disinfectants are used as antiseptics in lower concentrations

113. Which one of the following is employed as a tranquilizer drug?

a) Promthazine b) Valium c) Naproxen d) Mifepristone

114. For the preparation of a detergent 'P' from benzene, the following steps are involved:



These steps should be in sequence of

a) I, III, II b) I, II, III c) II, I, III d) II, III, I

115. Which of the following is not an antidepressants?

a) Iproniazid b) Phenelzine c) Equanil d) Salvarsan

116. An antioxidant which is added to butter to increase its shelf life from months to years is

a) Sodium benzoate b) Butylated hydroxy anisole c) Sulphur dioxide

d) Butylated hydroxy toluene

117. Which of the following will not act as a tranquilizer?

a) Equanil b) Analgin c) Meprobamate d) Chlordiazepoxide

118. The compound that causes general antidepressant action on the central nervous system belongs to the class of

a) analgesics b) tranquilizers c) narcotic analgesics d) antihistamines

119. The use of aspartame is limited to cold foods and drinks because

a) it is unstable to heat and decomposes at cooking temperature

b) it is 500 times sweeter than cane sugar c) it becomes bitter at cooking temperature

d) it reacts with the food at cooking temperature.

120. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Metal hydroxides are better antacids than hydrogen carbonates.
Reason: Being insoluble metal hydroxides do not increase the pH above neutrality.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

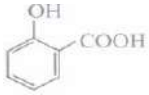
121. Which of the following forms cationic micelles above certain concentration?
a) Sodium dodecyl sulphate b) Sodium acetate c) Urea
d) Cetyltrimethylammonium bromide

122. Which of the following statements is not correct?
a) Some disinfectants can be used as antiseptic at low concentration.
b) Aspirin is analgesic and antipyretic c) Norethindrone is an antihistamine.
d) Chloramphenicol is a broad spectrum antibiotic

123. Which of the following is an analgesic?
a) Novalgin b) penicilin c) Streptornycin d) Chloromycetin

124. The sweeteners value of aspartame in comparison to cane sugar is
a) 550 b) 100 c) 600 d) 2000

125. Soaps do not work in hard water containing calcium and magnesium ions because
a) $Ca^{2+}$and Mg^{2+}ions form insoluble calcium and magnesium salts in the form of scum
b) Na^{+} and K^{+} present in soap react with Ca^{2+} and $Mg^{2+}$and hinder cleansing process
c) a large amount of soap is to be used in presence of $Ca^{2+}$and Mg2+
d)
scum formed by combination of Na^{+}, Ca^{2+} and Mg^{2+}stick to the cloth and are not removed on agitation.

126. Which of the following compounds represents an analgesic?
a) b) c) d) 

127. The drugs which are given to the patients suffering from anxiety and mental tension are known as
a) tranquilizers b) analgesics c) antimicrobials d) antibiotics.

128. Dettol is the mixture of _____.
a) Terpineol and Bithionol b) Chloroxylenol and Bithionol
c) Chloroxylenol and Terpineol d) Phenol and Iodine

129. Which one of the following is employed as Antihistamine?

a) Chloramphenicol b) Diphenyl hydramine c) Norothindrone d) Omeprazole

130. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	$CH_3(CH_2)10CH_2OSO_3^-Na^+$	(i)	Cationic detergent
(B)	$[CH_3(CH_2)_{15}N(CH_3)\text{-}CH_3]^+Br^-$	(ii)	Non-ionic detergent
(C)	$CH_3(CH_2)_{16}COO(CH_2CH_2O)nCH_2CH_2OH$	(iii)	Soap
(D)	$C_{l7}H_{35}COONa$	(iv)	Anionic detergent

a) (A)→ (iii), (B) → (ii), (C) →(iv), (D)→ (i)
b) (A) →(ii), (B)→(iv), (C) → (i), (D)→ (iii)
c) (A)→ (i), (B) → (iii), (C)→ (iv), (D)→ (ii)
d) (A)→ (iv), (B) → (i), (C)→(ii), (D) → (iii)

131. Refrigeration helps in food preservation by
a) killing the germs b) reducing the rates of biochemical reactions
c) destroying enzyme action d) decreasing the size of bacteria

132. Artificial sweetener which is stable under cold conditions only is :
a) saccharine b) sucralose c) aspartame d) alitame

133. Barbiturates acts as
a) hypnotic i.e., sleep producing agents b) non-narcotic analgesics
c) activator of neurotransmitters d) antiallergic drugs.

134. Gammexane is :
a) bromobenzene b) benzyl chloride c) chlorobenzene d) benzene hexachloride

135. Which is not true for a detergent molecule?
a) It has a non-polar organic part and a polar group b) It is not easily biodegraded.
c) It is a sodium salt offatty acid d) It is a surface active reagent.

136. Diazo coupling is useful to prepare some :
a) pesticides b) dyes c) proteins d) vitamins

137. Which of the following chemicals can be added for sweetening of food items at cooking temperature and does not provide calories?
a) Sucrose b) Glucose c) Aspartame d) Sucralose

138. Match the column I with column II and mark the appropriate choice

Column I		Column II	
(A)	Alitame	(i)	Antihistamine
(B)	Iodoform	(ii)	Artificial sweetener
(C)	Prontosil	(iii)	Antibacterial agent
(D)	Terfenadine	(iv)	Antiseptic

a) (A) →(i), (B) → (ii), (C) → (iv), (D)→(iii)
b) (A) → (ii), (B) → (iv), (C) → (iii), (D) → (i)
c) (A)→ (iii), (B) → (i), (C) → (ii), (D)→ (iv)
d) (A) → (iv), (B)→ (iii), (C)→ (i), (D) →(ii)

139. The main difference between bathing and washing soap is

a)
bathing soaps are potassium salts of fatty acids while washing soaps are sodium salts of fatty acids

b)
bathing soaps are sodium salts of fatty acids while washing soaps are potassium salts of fatty acids

c) bathing soaps are cationic in nature while washing soaps are anionic

d)
bathing soaps are calcium salts of fatty acids while washing soaps are magnesium salts of fatty acids

140. Antiseptics and disinfectants either kill or prevent growth of microorganisms. Identify which of the following statement is not true :

a) Dilute solutions of boric acid and hydrogen peroxide are strong antiseptics.
b) Disinfectants harm the living tissues.
c) A 0.2% solution of phenol is an antiseptic while 1% solution acts as disinfectant.
d) Chlorine and iodine are used as strong disinfectants.

141. The term 'broad spectrum antibiotics' means

a) bactericidal antibiotics b) bacteriostatic antibiotics

c) which kill or inhibit a wide range of gram -ve and gram +ve bacteria

d) which kill or inhibit all types of gram +ve bacteria.

142. Which of the following statements is not true about enzyme inhibitors?

a) Inhibit the catalytic activity of the enzyme b) Prevent the binding of substrate

c) Generally a strong covalent bond is formed between an inhibitor and an enzyme.

d) inhibitor can be competitive or non-competitive

143. Barbituric acid and its derivatives are well known as

a) tranquilizers b) antiseptics c) analgesics d) antipyretics

144. Bithionol is generally added to the soaps as an additive to function as a/an:

a) buffering agent b) antiseptic c) softener d) dryer.

145. What type of forces bind the substrate to the active site of enzyme?

(i) Ionic bonding
(ii) Hydrogen bonding
(iii) van der Waals forces
(iv) Reaction with functional group of enzymes

a) (i), (ii) and (iv) b) (i), (iii) and (iv) c) (i), (ii) and (iii) d) (i), (ii), (iii) and (iv)

146. Which is the correct statement about birth control pills?

a) Contain estrogen only b) Contain progesterone only

c) Contain a mixture of estrogen and progesterone derivatives

d) Progesterone enhances ovulation

147. Which of the following will not act as antacid?
a) Sodium hydrogencarbonate b) Magnesium hydroxide c) Sodium carbonate
d) Aluminium carbonate

148. Which of the following can be used as an analgesic without causing addiction?
a) Morphine b) Aspirin c) Heroin d) Codeine

149. Which one of the following is employed as a tranquilizer?
a) Naproxen b) Tetracycline c) Chlorpheniramine d) Equanil

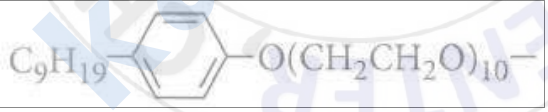
150. Which of the following is a criteria to classify drugs?
a) Chemical structure b) Molecular targets c) Drug action d) All of these

151. Name an artificial sweetener which is derivative of sucrose
a) Saccharine b) Sucrolose c) Sucrobenzamide d) Aspartame

152. The main cause of acidity in the stomach is
a) release of extra gastric acids which decrease the pH level
b) indigestion and pain in large intestine c) increase the pH level in the stomach
d) release of extra bile juice which increases alkaline medium in stomach.

153. Identify the hydrophilic and hydrophobic parts in the following non-ionic detergent present in liquid detergents and wetting agents.

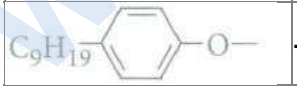
a)

Hydrophobic part	Hydrophilic part
$-CH_2CH_2OH$	

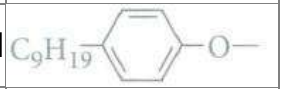
b)

Hydrophobic part	Hydrophilic part
	$-O(CH_2CH_2O)_{10}CH_2CH_2OH$

c)

Hydrophobic part	Hydrophilic part
	$-(CH_2CH_2O)_{10}CH_2CH_2OH$

d)

Hydrophobic part	Hydrophilic part
$-(CH_2CH_2O)_{10}CH_2CH_2OH$	

154. What is tincture of iodine?
a) 2-3% solution of iodine in alcohol-water mixture.
b) A mixture of iodine in chloroxylenol.

c) A mixture of 0.2% phenol and 2-3% iodine in water

d) 2-3% solution of iodine in potassium iodide.

155. Aspartame, the artificial sweetener is made by a dipeptide of the amino acids
a) aspartic acid and phenylalanine b) aspartic acid and glycine
c) alanine and glycine d) aspartic acid and glutamic acid.

156. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
Assertion: Competitive inhibitors compete with the natural substrate for their attachment on the active sites of enzymes.
Reason : In competitive inhibition, inhibitor binds to allosteric site of the enzyme
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false.

157. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Detergents with straight chain of hydrocarbons are preferred over branched chain.
Reason: Detergents with branched chain hydrocarbon part are expensive.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

158. Which one of the following is employed as antihistamine?
a) Chloramphenicol b) Diphenlyhdramine c) Norethindrone d) Omeprazole

159. Which of the following enhances lathering property of soap?
a) Sodium carbonate b) Sodium rosinate c) Sodium stearate
d) Trisodium phosphate

160. Which of the following is a narcotic analgesic?
a) Ibuprofen b) Aspirin c) Paracetamol d) Morphine

161. Antiseptics and disinfectants either kill or prevent growth of microorganisms. Identify which of the following statements is not true: _____.
a) Chlorine and iodine are used as strong disinfectants.
b) Dilute solutions of Boric acid and Hydrogen Peroxide are strong antiseptics

c) Disinfectants harm the living tissues

d) A 0.2% solution of phenol is an antiseptic while 1 % solution acts as a disinfectant

162. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion : Receptors are crucial to body's communication process.

Reason: Receptors are proteins.

a)

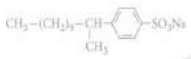
If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false

163. Which of the following is an example of non-biodegradable detergent?

a) b)  c) d) CH_3 -$(CH_2)_{10}$ -CH_2 -OSO_3Na

164. Chloropicrin is obtained by the reaction of :

a) steam on carbon tetrachloride b) nitric acid on chlorobenzene

c) chlorine on picric acid d) nitric acid on chloroform.

165. Which of the following is not a true statement about the detergents?

a)

Anionic detergents are sodium salts of sulphonated long chain alcohols or hydrocarbons.

b)

Cationic detergents are quarternary ammonium salts of amines with acetates, chlorides or bromides as an ions.

c) Non-ionic detergents do not contain any ion in their constitution.

d) Detergents containing branched hydrocarbon chains are biodegradable

166. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: The -As=As- linkage present in arsphenamine (a sulpha drug) resembles the -N=N- linkage present in azo dyes.

Reason : The first antibacterial agent, prontosil resembles in structure to the compound salvarsan.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

167. Which of the following will not enhance nutritional value of food?

a) Minerals b) Artificial sweeteners c) Vitamins d) Amino acid

168. _____ and_____ are useful antioxidants for wine and beer.
a) Sulphur trioxide and sulphate b) BHT and BHA c) Sulphur dioxide and sulphite
d) None of these

169. Which of the following statements is correct?
a)
Some tranquilizers function by inhibiting the enzymes which catalyse the degradation of noradrenaline.

b) Tranquilizers are narcotic drugs.

c)
Tranquilizers are chemical compounds that do not affect the message transfer from nerve to receptor

d) tranquilizers are chemical compounds that can relieve pain and fever

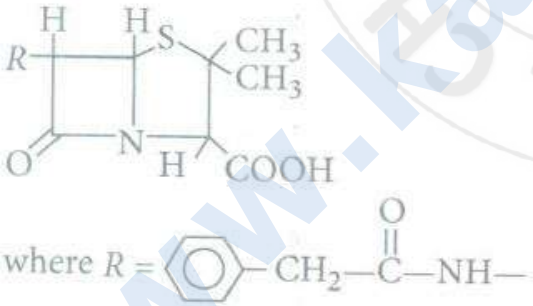
170. Which of the following is not a food additive?
a) Preservatives b) Sweetening agents c) Flavours d) Oxidants

171. Which one of the following is employed as a tranquilizer drug?
a) Promethazine b) Valium c) Naproxen d) Mifepristone

172. Mixture of chloroxylenol and terpineol acts as :
a) analgesic b) antiseptic c) antipyretic d) antibiotic

173. Drugs that bind to the receptor site and inhibit its natural function are called
a) agonistic drugs b) antagonistic drugs c) antimicrobial drugs d) allosteric drugs

174. The structure given below is known as



a) Penicillin F b) Penicillin G c) Penicillin K d) Ampicillin

175. An ester which is used as a medicine
a) ethyl acetate b) methyl acetate c) methyl salicylate d) ethyl benzoate.

176. The pair whose both species are used in antacid medicinal preparation is:
a) $NaHCO_3$ and $Mg(OH)_2$ b) Na_2CO_3 and $Ca(HCO_3)$ c) $Ca(HCO_3)$ and $Mg(OH)_2$
d) $Ca(OH)_2$ and $NaHCO_3$

177.

The final product 'Y' is medicine. Which of the following is incorrect regarding 'Y'?

a) It has analgesic as well as antipyretic properties b) It helps to prevent heart attacks.
c) It has anti-blood dotting action d) It suppresses the gastric anomalies

178. Which of the following statements is not correct about penicillin?
a) Penicillin G has a narrow spectrum.
b) It is extracted from antibacterial fungus Penicillium
c) Ampicillin and amoxycillin are synthetic modifications of penicillins.
d) It has bacteriostatic effect.

179. Which of the following statements is not correct?
a) Some antiseptics can be added to soaps
b) Dilute solutions of some disinfectants can be used as antiseptic.
c) Disinfectants are antimicrobial drugs d) Antiseptic medicines can be ingested

180. Diazo coupling is useful to prepare some _____.
a) pesticides b) dyes c) proteins d) vitarnins

181. Which of the following is not used as a food preservative?
a) Sodium salt of benzoic acid b) Sodium salt of sorbic acid
c) Sodium salt of propanoic acid d) Sodium salt of palmitic acid

182. Glycerol is added to soap. It functions_____
a) as a filler b) to increase lathering c) to prevent rapid drying
d) to make soap granules

183. The main constituents of dettol are
a) chloramphenicol + glycerol b) 2-3% solution of iodine in alcohol
c) 0.2% solution of phenol d) chloroxylenol and terpineol.

184. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Chemical messengers are received at the binding sites of receptor proteins.
Reason: Chemical messenger gives messages to the cell without entering the cell
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

185. Some drugs do not bind to the enzyme's active site, instead bind to a different site of enzyme. This site is called
a) allosteric site b) substrate site c) ionic site d) competitive site.

186. What are the hydrolysis products of glyceryl oleate $(C_{17}H_{32}COO)C_3H_5$ during preparation of soap?

a) $C_{17}H_{32}COONa + C_3H_5OH$ b) $C_{17}H_{32}COOH + CH_3CH_2CH_2OH$

c) $C_{17}H_{32}COOH + CH_2OH - CHOH - CH_2OH$

d) $C_{17}H_{32}COONa + CH_2OH - CHOH - CH_2OH$

187. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: Penicillin (G) is an antihistamine.

Reason: Penicillin (G) is effective against gram positive as well as gram negative bacteria.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

188. The antibiotic which is effective against certain strains of cancer cells,

a) dysidazirine b) sulphanilamide c) vancomycin d) ofloxacin.

189. Antihistamines are not helpful

a) in curing nasal allergies b) in treating rashes caused by itching

c) in bringing down acute fever d) in vasodilation

190. Chloroamphenicol is an :

a) antifertility drug b) antishistaminic c) antiseptic and disinfectant

d) antibiotic-broad spectrum

191. In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

Assertion: Chemicals added to foods for increasing their shelf life are called preservatives.

Reason : Natural sweeteners like sucrose and artificial sweeteners like saccharin are commonly used as food preservatives.

a)

If both assertion and reason are true and reason is the correct explanation of assertion.

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false

192. Which one is a broad spectrum antibiotic?

a) Chloramphenicol b) Plasmoquin c) Xylocaine d) Antiseptic

193. In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: Chemical messengers are chemicals that enable communication of message

between two neurons or between neurons and muscles.
Reason: Chemicals enter the cell through receptor
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false.

194. Which of the following defines the term opiates?
a) Narcotic analgesics obtained from the opium poppy.
b) Non-narcotic analgesics which reduce fever.
c) Narcotic drugs that inhibit pathogenic microbes.
d) Tranquilizers used to induce sleep.

195. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Sulpha drug contains sulphonamide group.
Reason: Salvarsan is a sulpha drug.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

196. Polyethylene glycols are used in the preparation of which type of detergents?
a) Cationic detergents b) Anionic detergents c) Non-ionic detergents d) Soaps

197. A narrow spectrum antibiotic is active against_____
a) gram positive or gram negative bacteria b) gram negative bacteria only
c) single organism or one disease d) both gram positive and gram negative bacteria

198. Commonly used antiseptic 'Dettol' is a mixture of _____.

a) o-chlorophenoxylenol + terpineol b) o-cresol + terpineol c) phenol + terpineol
d) chloroxylenol + terpineol

199. Which of the following statements is not correct?
a) Antiseptics can be safely applied to the living tissues.
b) Antiseptics can be incorporated into deoderants, face powders and soaps
c) Disinfectants can also be applied to the skin safely
d) A very dilute solution of a few disinfectants can be used as antiseptics.

200. Which of the following is not a correct statement?

a)
Transparent soaps are made by dissolving the soap in ethanol and then evaporating excess solvent.

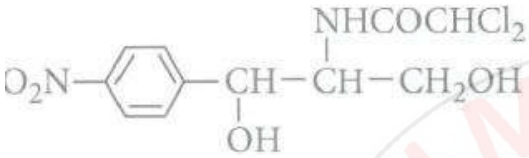
b) Soaps that float in water are made by beating tiny air bubbles before their hardening.

c) Medicated soaps contain alcohol to prevent rapid drying

d) Potassium soaps are soft to the skin than sodium soaps

201. Antimicrobial drugs include
(i) antiseptics
(ii) antibiotics
(iii) disinfectants
a) (i) and (ii) b) (i) and (iii) c) (ii) and (iii) d) (i), (ii) and (iii)

202. The structure given below is known as



a) prontosil b) sulphapyridine c) chloramphenicol d) chloroxylenol.

203. Antiseptics are the chemicals which either _____ or the growth of microorganisms and are applied to the _____.
a) kill, prevent, living tissues b) kill, prevent, non-living objects
c) increase, decrease, living tissues d) kill, increase, non-living tissues

204. Chloroamphenicol is an: _____.
a) antiferrility drug b) Antihistarninic c) Antiseptic and disinfectant
d) Antibiotic-broad spectru

205. Which of the following is not a target molecule for drug function in body?
a) Carbohydrates b) Lipids c) Vitamins d) Proteins

206. Which one of the following statements is not true?
a) Ampicillin is a natural antibiotic b) Aspirin is both analgesic and antipyretic
c) Sulphadiazine is a synthetic antibacterial drug
d) Some disinfectants can be used as antiseptics.

207. Which of the following is not true about antifertility drugs?
a)
Birth control pills contain a mixture of synthetic estrogen and progesterone derivatives

b) Both compounds i.e., estrogen and progesterone are vitamins.

c) Progestrone is supposed to suppress ovulation

d) Norethindrone is an example of synthetic progesterone derivative

208. Which of the following is not a fat soluble vitamin?
a) Vitamin B complex b) Vitamin D c) Vitamin E d) Vitamin A

209. Match the drugs in column I with the examples given in column II and mark the appropriate choice

Column I		Column II	
(A)	Antibiotic	(i)	Codeine
(B)	Antiseptic	(ii)	Phenelzine
(C)	Analgesic	(iii)	Chloramphenicol
(D)	Tranquilizer	(iv)	Chloroxylenol

a) (A)→ (i), (B)→ (iii), (C) → (ii), (D) → (iv)
b) (A) → (iv), (B) → (ii), (C) → (iii), (D) → (i)
c) (A) → (ii), (B) → (iv), (C) → (i), (D)→ (iii)
d) (A)→ (iii), (B) → (iv), (C) → (i), (D)→ (ii)

210. The use of chemicals for treatment of diseases is called
a) chemotherapy b) physiotherapy c) angiotherapy d) polytherapy

211. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Transparent soaps are made by dissolving soaps in ethanol.
Reason: Ethanol makes things invisible
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

212. What is the problem faced while using alitame as artificial sweetener?
a) It decomposes when added to the food items
b) It provides a huge number of calories to the food.
c) It is difficult to control the sweetness of food while using it.
d) It increases the volume of the contents to a large extent.

213. A drug which is effective in curing malaria is
a) aspirin b) quinine c) morphine d) analgin

214. Which of the following can possibly be used as analgesic without causing addiction and moon modification?
a) Diazepam b) Tetrahydrocationl c) Morphine d) N-Acetyl-para-aminophenol

215. A drug which acts as antipyretic as well as analgesic is
a) chloroquine b) penicillin c) chlordiazepoxide d) 4-acetamidophenol.

216. Aspirin is an acetylation product of :
a) m-Hydroxybenzoic acid b) o-Dihydroxybenzoic acid c) o-Hydroxybenzoic acid
d) p-Dihydroxybenzene

217. Which among the following is not an antibiotic?

a) Chloramphenicol b) Oxytocin c) Erythromycin d) Tetracyclin

218. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Bacteriostatic	(i)	Crucial to body's communication process
(B)	Bactericidal	(ii)	Inhibit growth of microbes
(C)	Narrow spectrum antibiotics	(iii)	Kill microbes
(D)	Receptors	(iv)	Effective against single disease

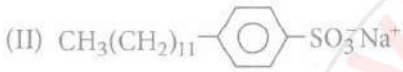
a) (A)→ (i), (B) → (ii), (C) → (iv), (D) → (iii)
b) (A)→(ii), (B) → (iii), (C)→ (iv), (D) → (i)
c) (A) → (iii), (B) → (iv), (C) → (i), (D)→(ii)
d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

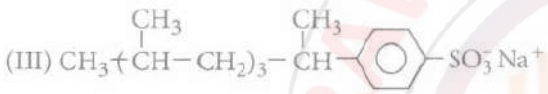
219. Which of the following is an analgesic?

a) Streptomycin b) Chloromycetin c) Novalgin d) Penicillin

220. Examples of three detergents are given below. Mark the correct statement following the examples.

(I) $CH_3(CH2)_{10}CH_2OSO^-_3Na^+$

(II) 

(III) 

a) I and II are non-biodegradable detergents and III is biodegradable.
b) I and II are biodegradable detergents and III is non -biodegradable.
c) I, II and III are non-biodegradable detergents.
d) I is biodegradable and II, III are nonbiodegradable.