### PHYSICS

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1.** | (B) | **2.** | (A) | **3.** | (D) | **4.** | (C) | **5.** | (A) | **6.** | (C) | **7.** | (C) |
| **8.** | (B) | **9.** | (A) | **10.** | (B) | **11.** | (A) | **12.** | (B) | **13.** | (A) | **14.** | (B) |
| **15.** | (C) | **16.** | (B) | **17.** | (A) | **18.** | (D) | **19.** | (B) | **20.** | (A) | **21.** | (D) |
| **22.** | (A) | **23.** | (C) | **24.** | (A) | **25.** | (B) | **26.** | (B) | **27.** | (A) | **28.** | (D) |
| **29.** | (B) | **30.** | (D) | **31.** | (B) | **32.** | (B) | **33.** | (A) | **34.** | (B) | **35.** | (B) |
| **36.** | (D) | **37.** | (D) | **38.** | (D) | **39.** | (B) | **40.** | (C) | **41.** | (A) | **42.** | (B) |
| **43.** | (D) | **44.** | (B) | **45.** | (D) | **46.** | (D) | **47.** | (D) | **48.** | (D) | **49.** | (D) |
| **50.** | (C) | | | | | | | | | | | | |

### CHEMISTRY

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **51.** | (C) | **52.** | (C) | **53.** | (A) | **54.** | (B) | **55.** | (C) | **56.** | (C) | **57.** | (A) |
| **58.** | (C) | **59.** | (B) | **60.** | (B) | **61.** | (D) | **62.** | (D) | **63.** | (B) | **64.** | (A) |
| **65.** | (A) | **66.** | (C) | **67.** | (A) | **68.** | (A) | **69.** | (C) | **70.** | (D) | **71.** | (D) |
| **72.** | (D) | **73.** | (B) | **74.** | (A) | **75.** | (B) | **76.** | (D) | **77.** | (C) | **78.** | (B) |
| **79.** | (C) | **80.** | (D) | **81.** | (B) | **82.** | (A) | **83.** | (D) | **84.** | (B) | **85.** | (A) |
| **86.** | (B) | **87.** | (B) | **88.** | (D) | **89.** | (C) | **90.** | (B) | **91.** | (A) | **92.** | (B) |
| **93.** | (D) | **94.** | (B) | **95.** | (D) | **96.** | (B) | **97.** | (B) | **98.** | (A) | **99.** | (C) |
| **100.** | (C) | | | | | | | | | | | | |

### BIOLOGY

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **101.** | (D) | **102.** | (C) | **104.** | (C) | **105.** | (A) | **106.** | (B) | **107.** | (D) | **108.** | (D) |
| **109.** | (A) | **110.** | (C) | **111.** | (A) | **112.** | (B) | **113.** | (A) | **114.** | (C) | **115.** | (C) |
| **116.** | (B) | **16.** | (B) | **117.** | (B) | **118.** | (D) | **119.** | (B) | **120.** | (C) | **121.** | (B) |
| **122.** | (A) | **123.** | (A) | **124.** | (A) | **125.** | (C) | **126.** | (A) | **127.** | (B) | **128.** | (B) |
| **129.** | (A) | **130.** | (C) | **131.** | (A) | **132.** | (A) | **133.** | (A) | **134.** | (B) | **135.** | (C) |
| **136.** | (A) | **137.** | (C) | **138.** | (B) | **139.** | (B) | **140.** | (C) | **141.** | (D) | **142.** | (B) |
| **143.** | (B) | **144.** | (A) | **145.** | (D) | **146.** | (B) | **147.** | (D) | **148.** | (B) | **149.** | (A) |
| **150.** | (A) | **151.** | (D) | **152.** | (B) | **153.** | (C) | **154.** | (D) | **155.** | (B) | **156.** | (D) |
| **157.** | (B) | **158.** | (A) | **159.** | (A) | **160.** | (C) | **161.** | (A) | **162.** | (B) | **163.** | (C) |
| **164.** | (B) | **165.** | (D) | **166.** | (B) | **167.** | (B) | **168.** | (B) | **169.** | (D) | **170.** | (D) |
| **171.** | (D) | **172.** | (C) | **173.** | (B) | **174.** | (D) | **175.** | (B) | **176.** | (D) | **177.** | (B) |
| **178.** | (C) | **179.** | (C) | **180.** | (B) | **181.** | (D) | **182.** | (A) | **183.** | (D) | **184.** | (D) |
| **185.** | (A) | **186.** | (C) | **187.** | (C) | **188.** | (D) | **189.** | (A) | **190.** | (D) | **191.** | (C) |
| **192.** | (B) | **193.** | (C) | **194.** | (A) | **195.** | (C) | **196.** | (D) | **197.** | (B) | **198.** | (D) |
| **199.** | (A) | **200.** | (A) | | | | | | | | | | |

**1.** (B)

**Sol.** $[Pressure] = [stress] = [ML^{-1}T^{-2}]$

**2.** (A)

**Sol.** $S_n = u + \dfrac{a}{2}(2n-1) = \dfrac{a}{2}(2n-1)$ because u = 0

Hence $\dfrac{S_4}{S_3} = \dfrac{7}{5}$

**3.** (D)

**Sol.** Maximum range = $\dfrac{u^2}{g} = 100\,m$

Maximum height = $\dfrac{u^2}{2g} = 50\,m$

**4.** (C)

**Sol.** 2mg – T = 2ma        ...(i)

T − mgsin30° = ma        ...(ii)

(i) + (ii) gives,

$2mg - \dfrac{mg}{2} \Rightarrow \alpha = \dfrac{g}{2}$

**5.** (A)

**Sol.** By the principle of conservation of linear momentum,

$M_v = mv_1 + mv_2 \Rightarrow M_v = 0 + (M - m)v_2 \Rightarrow v_2 = \dfrac{Mv}{M-m}$

**6.** (C)

**Sol.** Loss in K.E. = $\dfrac{m_1 m_2}{2(m_1 + m_2)}(u_1 - u_2)^2$

$= \dfrac{4 \times 6}{2 \times 10} \times (12 - 0)^2 = 172.8J$

**7.** (C)

**Sol.** $m_1 r_1 = m_2 r_2 \Rightarrow \dfrac{r_1}{r_2} = \dfrac{m_2}{m_1}$

$\therefore r \alpha \dfrac{1}{m}$.

**8.** (B)

**Sol.** $\dfrac{l_{Ring}}{l_{Disc}} = \dfrac{MR^2}{1/2MR^2} = 2:1$

**9.** (A)

**Sol.** $g` = g\left(\dfrac{R}{R+h}\right)^2 = g\left(\dfrac{R}{R+2R}\right)^2 = \dfrac{g}{9}$

**10.** (B)

**Sol.** For a moving satellite kinetic energy = $\dfrac{GMm}{2r}$

Potential energy

$= -\dfrac{GMm}{r} \Rightarrow \therefore \dfrac{Kinetic\ energy}{Potential\ energy} = \dfrac{1}{2}$

**11.** (A)

**Sol.** $E_f = \dfrac{-GMm}{6R}$

$E_i = \dfrac{-GMm}{R}$

$\therefore$ Minimum energy required = $E_f - E_i = \dfrac{5GmM}{6R}$

**12.** (B)

**Sol.** Young's modulus of material Y = $\dfrac{Linear\ stress}{Longitudinal\ strain}$

If longitudinal strain is equal to unity, then Y = Linear stress produced
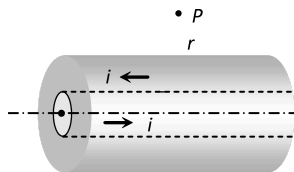
**13.** (A)

**14.** (B)

**15.** (C)

**Sol.** Let the original temperature be 0°C ; Volume of

A = 1 × π(2r)² = $V_1$ ; V'$_1$ = $V_1(1+ ^\gamma \Delta T)$

$\left(\dfrac{V_1' - V_1}{V_1}\right) = \gamma\Delta T \Rightarrow V_1' - V_1 \propto V_1 \Rightarrow \dfrac{(V_2' - V_2)}{V_2} = \gamma\Delta T$

$\Rightarrow V_2' - V_2 \propto V_2 \therefore \dfrac{\Delta V_1}{\Delta V_2} = \dfrac{1(2r)^2}{2lr^2} = \dfrac{2}{1}$

**16.** (B)

**Sol.** $V_{rms} = \sqrt{\dfrac{3RT}{M}} = \sqrt{3}\sqrt{\dfrac{RT}{M}} = 1.73\sqrt{\dfrac{RT}{M}}$

**17.** (A)

**Sol.** If T is in °C then $V_T = V_o\left(1 + \dfrac{T}{273}\right)$

**18.** (D)

**Sol.** $PV^{\gamma}$ = constant

$\Rightarrow \dfrac{P_2}{P_1} = \left(\dfrac{V_1}{V_2}\right)^{\gamma} \Rightarrow P_2 = (8)^{5/3} P_1 = 32\ P_1$

**19.** (B)

**Sol.** $\lambda_{m_2} = \dfrac{T_1}{T_2} \times \lambda_{m_1} = \dfrac{2000}{3000} \times \lambda_{m_1} = \dfrac{2}{3}\lambda_{m_1} = \dfrac{2}{3}\lambda_m$

**20.** (A)

**Sol.** $E \propto T^4 \Rightarrow \dfrac{E_1}{E_2} = \dfrac{T^4}{T^4} \times 2^4 \Rightarrow E_2 = \dfrac{E}{16}$

**21.** (D)

**Sol.** The potential energy of a particle executing SHM is periodic with time period T/2.

**22.** (A)

**Sol.** With mass $m_2$ alone, the extension of the spring l is given as $m_2 g = kl$ ……..(i)

With mass$(m_1 + m_2)$, the extension l' is given by $(m_1 + m_2)g = k(l+\Delta l)$ …….(ii)

The increase in extension is $\Delta l$ which is the amplitude of vibration. Subtracting (i) from (ii), we get

$m_1 g = k\Delta l$ or $\Delta l = \dfrac{m_1 g}{K}$

**23.** (C)

**Sol.** Loudness depends upon intensity while pitch depends upon frequency.

**24.** (A)

**Sol.** Electric lines are originating from A (+ve charge) and terminate at B (-ve charge).

Also density of lines at A is more than lines at B

**25.** (B)

**Sol.** $\vec{E} = -\dfrac{\sigma}{2\epsilon_0}\hat{K} - \dfrac{2\sigma}{\epsilon_0}\hat{K} - \dfrac{\sigma}{2\epsilon_0} = -\dfrac{2\sigma}{\epsilon_0}\hat{K}$

**26.** (B)

**Sol.** The two capacitors are in parallel so

$C = \dfrac{\epsilon_0\ A}{t \times 2}\ (K_1 + K_2)$

**27.** (A)

**Sol.** $v_d = \dfrac{e}{m} \times \dfrac{V}{l}\tau$ or $v_d = \dfrac{e}{m}\cdot\dfrac{El}{l}\tau$ (Since $V = El$)

$\therefore v_d \propto E$

**28.** (D)

**Sol.** $E = \dfrac{e}{(R + R_h + r)}\dfrac{R}{L} \times I\dfrac{2}{(10+40+0)} \times \dfrac{10}{1} \times 0.4 = 0.16V$

**29.** (B)

**Sol.** $W = U_{final} - U_{intial} = MB\ (\cos 0 - \cos 60°)$

$W = \dfrac{MB}{2} = \sqrt{3}J \Rightarrow MB\sqrt[2]{3}J$

$\tau = \vec{M} \times \vec{B} = MB\sin 60° = \sqrt[2]{3} \times \dfrac{\sqrt{3}}{2} = 3J.$

**30.** (D)

**31.** (B)

**Sol.** The respective figure is shown below Magnetic field at $P$ due to inner and outer conductors are equal and opposite. Hence net magnetic field at $P$ will be zero.



**32.** (B)

**Sol.** $|e| = A.\dfrac{\Delta B}{\Delta t} = 2 \times \dfrac{(4-1)}{2} = 3\ V$ .

**33.** (A)

**34.** (B)

**35.** (B)

**36.** (D)

**Sol.** Number of electrons = 8+2 = 10
Number of protons = 8
Number of neutrons, N = 8

Atomic number, $Z$ = number of protons = 8
Mass number, $A = Z + N = 8+8 = 16$

The proper symbol of the species is $^{16}_{8}O^{2-}$

**37.** (D)
**Sol.** $(E_{ion})_{Na} = Z^2(E_{ion})_H = (11)^2 13.6 \ eV$

**38.** (D)
**Sol.** $E = mc^2 = 1 \times (3 \times 10^8)^2 = 9 \times 10^{16} \approx 10^{17} \ J$

**39.** (B)
**Sol.** Since diode is in forward bias

$i = \dfrac{\Delta V}{R} = \dfrac{4(-6)}{1 \times 10^3} = \dfrac{10}{10^3} = 10^{-2}$ A.

**40.** (C)

**41.** (A)

**42.** (B)

**43.** (D)
**Sol.** The phase difference between the ac and emf in RL circuit varies between zero to $\pi/2$, but never equal to $\pi/2$.

**44.** (B)

**45.** (D)
**Sol.** The nature of the path is decided by the direction of velocity and the direction of acceleration. The trajectory can be a straight line, circle or a parabola depending on these factors.

**46.** (D)
**Sol.** The nature of the path is decided by the direction of velocity and the direction of acceleration. The trajectory can be a straight line, circle or a parabola depending on these factors.

**47.** (D)
**Sol.** $A = 30°$, $\mu = \sqrt{2}$ . As we know
$A = r_1 + r_2 = 0 + r_2 \Rightarrow A = r_2$.
Applying Snell;s law for the surface AC
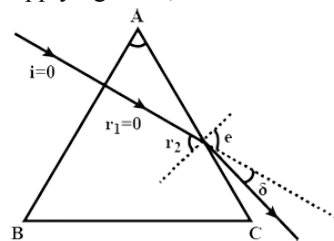


$\dfrac{1}{\mu} = \dfrac{\sin_{\sin r_2}}{\sin_{\sin e}} = \dfrac{\sin_{\sin A}}{\sin_{\sin e}}$

$\Rightarrow \dfrac{1}{\sqrt{2}} = \dfrac{\sin_{\sin 30°}}{\sin_{\sin e}} \Rightarrow e = 45$

$\delta = e - r_2 = 45° - 30° = 15°$

**48.** (D)
**Sol.** Distance of the nth bright fringe from the

centre $x_n = \dfrac{n\lambda D}{d}$

$\Rightarrow X_3 = \dfrac{3 \times 6000 \times 10^{-10} \times 2.5}{0.5 \times 10^{-3}} = 9 \times 10^{-3} \ m = 9 \ mm$

**49.** (D)
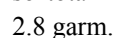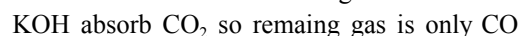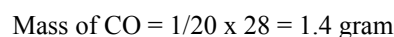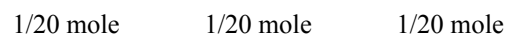**Sol.** Required angle = $2 \times 57.5 + 90 = 205°$
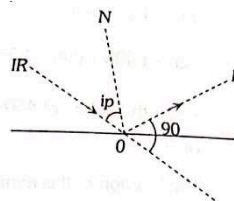


**50.** (C)

## CHEMISTRY

**51.** (C)
**Sol.** Atoms of an element are alike.

**52.** (C)
**Sol.** HCOOH + $H_2C_2O_4$
2.3 gram   4.5 gram

HCOOH + $H_2SO_4$ (Conc.) $\longrightarrow$ $CO_{(g)}$ + $H_2O_{(\ell)}$
          2.3 / 46

1/20 mole          1/20 mole
Mass of CO = 1/20 x 28 = 1.4 gram

$H_2C_2O_4$ + $H_2SO_4$ (Conc.) $\longrightarrow$ $CO_{(g)}$ + $H_2O_{(\ell)}$ + $CO_2$ (gas)          4.5 / 90

1/20 mole          1/20 mole          1/20 mole
Mass of CO = 1/20 x 28 = 1.4 gram
KOH absorb $CO_2$ so remaing gas is only CO so total mass of remaing gas is (1.4 + 1.4) = 2.8 garm.
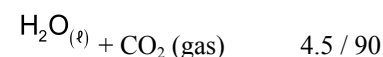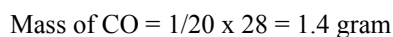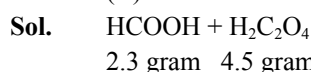
**53.** (A)
**Sol.** Angular momentum J = mvr
$J^2 = m^2v^2r^2$

or $\dfrac{J^2}{2} = \left(\dfrac{1}{2}mv^2\right)\ mr^2$ or

K.E. $= \dfrac{J^2}{2mr^2}$

**54.** (B)

**Sol.** The value of �?ᐟ (azimuthal quantum number) for s -electron is equal to zero.

Orbital angular momentum $= \sqrt{\ell(\ell+1)}.\dfrac{h}{2\pi}$

Substituting the value of l for s-electron =

$\sqrt{0(0+1)}.\dfrac{h}{2\pi} = 0$

**55.** (C)

**Sol.** $O^{2-}$ and $F^-$ have two shells while $Li^+$ and $B^{3+}$ have only one shell. Also, $O^{2-} > F^-$ (for isoelectric species, as Z increases, size decreases).

**56.** (C)

**Sol.** The atomic radii of the second and third transition series are almost the same. This phenomenon is associated with the intervention of the 4f orbitals which must be filled before the 5d series of elements begin. The filling of 4f before 5d orbital results in a regular decrease in atomic radii called **Lanthanide contraction** which essentially compensates for the expected increase in atomic size with increasing atomic number. The net result of the lanthanide contraction is that the second and the third d series exhibit similar radii (e.g., Zr 160 pm, Hf 159 pm).

**57.** (A)

**Sol.** Down the group, ionic radii increases with increasing atomic number because of the increase in the number of shells. But across the period, the ionic radii decreases due to increase in effective nuclear charge as electrons are added in the same shell. $Li^+$ and $Mg^{2+}$ are diagonally related but $Mg^{2+}$ having higher charge is smaller than $Li^+$, so correct order is $Na^+ > Li^+ > Mg^{2+} > Be^{2+}$.

$Be^{2+} = 0.31$ Å
$Mg^{2+} = 0.72$ Å
$Li^+ = 0.76$ Å
$Na^+ = 1.02$ Å

**58.** (C)

**Sol.** $H_2^{2+}$ : Bond order = 0

$He_2$ : Bond order $= \dfrac{2-2}{2} = 0$

So, both $H_2^{2+}$ & $He_2$ do not exist.

**59.** (B)

**Sol.** There is extensive intermolecular hydrogen bonding in the condensed phase.

**60.** (B)

**Sol.** $BCl_3$ and $AlCl_3$ both have incomplete octate and act as Lewis acid

**61.** (D)

**Sol.** Bond angle in $SO_2$ ᐧ 120°. but in $NH_3$ its 107°.

**62.** (D)

**Sol.** A bond length is the average distance between the centres of nuclei of two bonded atoms. A multiple bond (double or triple bond) always shorter than the corresponding single bond.

The C-atom in $CO_3^{2-}$ is sp²-hybridised as shown
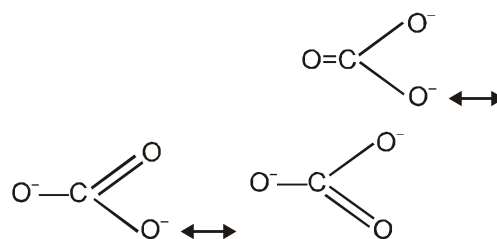


The C-atom in $CO_2$ is sp-hybridised with bond distance carbon oxygen is 122 pm.
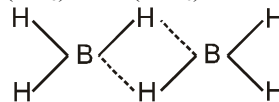
$O=C=O \longleftrightarrow {}^+O \equiv C - \bar{O} \longleftrightarrow$

$\bar{O} -C \equiv {}^+O$
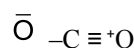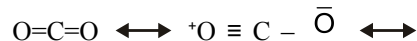
The C-atom in CO is sp-hybridised with C–O bond distance is 110 pm.

$:C \equiv O^+:$

So, the correct order is

$CO < CO_2 < CO_3^{2-}$

**63.** (B)

**Sol.** $(BH_3)_2$ or $(B_2H_6)$



It contains two 3 centre-2 electron bonds.

**64.** (A)

**Sol.** The general electronic configuration of Zn, Cd and Hg is $(n-1)d^{10}\ ns^2$.

**65.** (A)

**Sol.** Cerium $Ce_{58}[Xe]4f^15d^16s^2$
Its most stable oxidation state is +3 but +4 is also existing.

**66.** (C)

**Sol.** The assertion is correct but the reason is false. Actually transition metal show variable

valency due to very small difference between the $ns^2$ and $(n-1)d$ electrons, Therefore, assertion is correct but reason is false.

**67.** (A)

**Sol.** $[Co(en)_2Cl_2]^+$ shows geometrical as well as optical isomerism. (Only cis-form but not trans form as it has one of the symmetry elements).



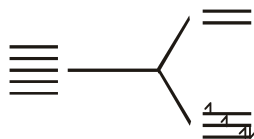dextro          mirror          laevo
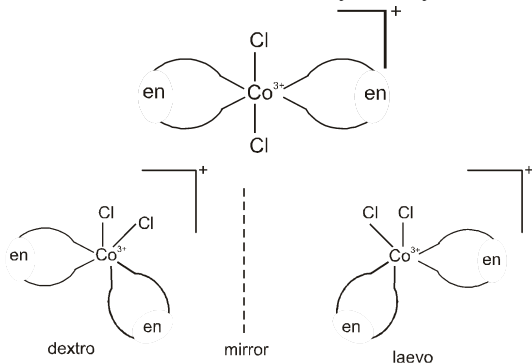
(B) It exists only in one.
(C) Exist in cis and trans forms only (no optical isomerism because of the presence of the plane of symmetry).
(D) Exist in cis and trans forms only (no optical isomerism because of the presence of the plane of symmetry).

**68.** (A)



**Sol.** $3d^4$

CN$^-$ is strong field ligand ; so it compels for pairing of electrons to have two d-orbital empty.

$$\mu = \sqrt{n(n+2)} = \sqrt{2(2+2)} = 2.84 \text{ B.M}$$

**69.** (C)

**Sol.** EDTA has four carboxylate oxygens and two ammine nitrogens as donor atoms. So it is a hexadentate ligand.
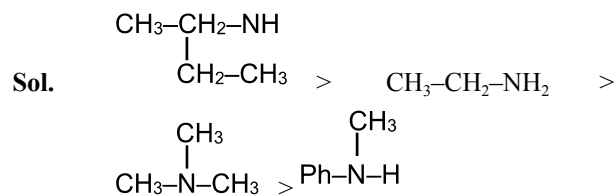
**70.** (D)

**Sol.** CFSE depends on the relative magnitude of crystal field splitting, $\Delta_o$ and pairing energy and in turns $\Delta_o$ depends upon the field produced by ligand and charge on the metal ion. The order of increasing crystal field strength is $C_2O_4^{3-} < H_2O < NH_3 < CN^-$.
Thus the (D) option is correct.

**71.** (D)

**Sol.** The conjugate base of $CH(CN)_3$ is $\overline{C}(CN)_3$ and in $\overline{C}(CN)_3$ the negative charge is extensively delocalized.

**72.** (D)

**Sol.**
$$\underset{\substack{|\\ CH_2-CH_3}}{CH_3-CH_2-NH} > CH_3-CH_2-NH_2 >$$
$$\underset{\substack{|\\ CH_3}}{CH_3-N-CH_3} > \underset{\substack{|\\ CH_3}}{Ph-N-H}$$

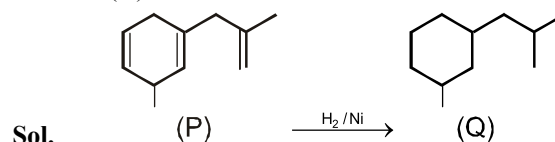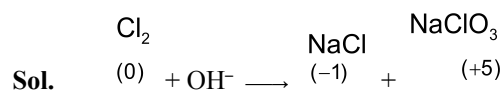**73.** (B)

**Sol.** In Ethyne ($CH{\equiv}CH$) both carbon atoms are sp hybrid as the hybridisation of combustion product, carbon atom of $O{=}C{=}O\,(CO_2)$.

**74.** (A)



**Sol.** (P) $\xrightarrow{H_2/Ni}$ (Q)

**75.** (B)

**Sol.** $\underset{(0)}{Cl_2} + OH^- \longrightarrow \underset{(-1)}{NaCl} + \underset{(+5)}{NaClO_3}$

**76.** (D)

**Sol.** Vision is a fast photochemical reaction in which the compound, retinal, present in the eye undergoes isomerisation by absorbing a photon of light.

**77.** (C)

**Sol.** $\Delta S = \dfrac{\Delta H}{T} = \dfrac{1.435 \times 10^3}{273} = 5.260 \text{ cal/mol-K}$

**78.** (B)

**Sol.** $\Delta H = \Delta U + \Delta ng\, RT$

$= 2.1 + \dfrac{2 \times 2 \times 300}{1000} = 1.2$
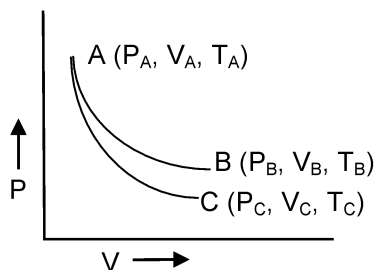
$\Delta G = \Delta H - T\Delta s$

$= 3.3 - 300 \times \dfrac{26}{1000} = 3.3 - 6 = -2.7 \text{ K cal}$

**79.** (C)

**Sol.** $q = 0$

$$\Delta E = w = -P_{ext}\,\Delta V$$
$$= -2.5\,(4.5 - 2.5)$$
$$= -5 \text{ Latm}$$
$$= -5 \times 101 = -505 \text{ J}$$

**80.** (D)

**Sol.**



Isothermal

Give :   AB = isothermal expansion

AC = Adiabatic expansion

For reversible process DS = 0

In expansion work is –ve.

$$\Delta E = \underset{\substack{\parallel \\ O}}{q} + w$$

$$\Delta E = W$$

$$nC_v\Delta T = W \rightarrow \text{- ve}$$

So   $\Delta T = \text{-ve}$

$$T_A > T_C$$

**81.** (B)

**Sol.** Anionic hydrolysis results in basic solution.

**82.** (A)

**Sol.** Acetic acid will dissociate less due to common ion effect of $CH_3COO^-$

So, $H^+$ concentration will decrease hence pH will increase.

**83.** (D)

**Sol.** $K_{SP} = 4S^3 = 4 \times (0.5 \times 10^{-4})^3 = 5 \times 10^{-13}$

**84.** (B)

**Sol.**

For sparingly soluble salts, reason is not a correct explanation. Hence both assertion and reason are true but reason is not a correct explanation of assertion.

**85.** (A)

**Sol.** $P_B = P^o{}_B\, XB$   $P^o{}_B = 75 \text{ torr}$

$$X_B = \frac{78/78}{(78/78)+(46/92)} = \frac{1}{1+0.5} = \frac{1}{1.5}$$

$$P_B = 75 \times \frac{1}{1.5} = 50 \text{ torr.}$$

**86.** (B)

**Sol.** Isotonic solutions have same osmotic pressure.
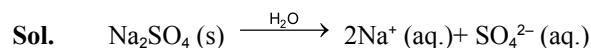
$\pi_1 = C_1\,RT$ , $\pi_2 = C_2\,RT$

For isotonic solution, $\pi_1 = \pi_2$

$\therefore$    $C_1 = C_2$.

or   $\dfrac{1.5/60}{V} = \dfrac{5.25/M}{V}$   [where M = molecular weight of the substance]

or   $\dfrac{1.5}{60} = \dfrac{5.25}{M}$   or M = 210.

**87.** (B)

**Sol.** $Na_2SO_4\,(s) \xrightarrow{H_2O} 2Na^+\,(aq.)+ SO_4{}^{2-}\,(aq.)$

$\Delta T_f = i\,K_f m = 3 \times 1.86 \times 0.01 = 0.0558 \text{ K.}$

**88.** (D)

**Sol.** Salt bridge complete the electrical circuit and minimises the liquid - liquid junction potential.

**89.** (C)

**Sol.** Lower S.R.P. containing ion can displace higher S.R.P. containing ion.

**90.** (B)

**Sol.**

$H_{2_{(p_1)}} \longrightarrow 2H^+ + 2e^-$

$2H^+ + 2e^- \longrightarrow H_{2_{(p_2)}}$

$X_{2_{(p_1)}} \longrightarrow X_{2_{(p_2)}}$

$$E = 0 - \frac{0.0591}{2} \log \frac{p_2}{p_1}$$

$P_2 < P_1$ for E $\rightarrow$ +ve

**91.** (A)

**Sol.** $t_{1/2} = \dfrac{0.6932}{k}$

Half life of first order reaction is independent on initial conc. of reactant.

**92.** (B)

**Sol.** The relative reactivity of alkyl halides towards $S_N2$ reactions is an follows :

Primary > Secondary > Tertiary

However, if the primary alkyl halide or the nucleophile/base is sterically hindered the nucleophile will have difficulty to getting the back side of the carbon as a result of this, the elimination product will be predominant. Here

CH$_3$CH$_2$Br is the least hindered, hence it has the highest relative rate towards S$_N$2 reaction.

**93.** (D)

**Sol.**

| | 1$^{st}$ order | 2$^{nd}$ order |
|---|---|---|
| Rate | rate = K[A]$^1$ | rate = K[A]$^2$ |

$$T_{\frac{1}{2}} = \frac{\ell n2}{K}$$

Half life

$$T_{\frac{1}{2}} = \frac{1}{KC_0}$$

As $T_{\frac{1}{2}}$ of 1$^{st}$ order reaction does not depends on C$_0$ while. $T_{\frac{1}{2}}$ of 2$^{nd}$ order reaction depends on C$_0$.
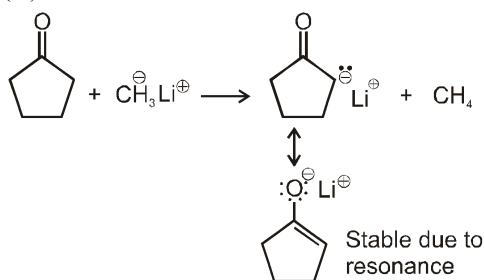
**94.** (B)

**Sol.** 1 mole of silver = 1$g$ equivalent of silver

1 mole of copper = 2$g$ equivalent of copper

We know from Faraday's law of electrolysis that "The weight of ion deposited on an electrode is directly proportional to the quantity of electricity passed".
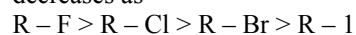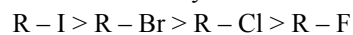
**95.** (D)

**Sol.**



**96.** (B)

**Sol.** F, Cl, Br and I are the elements of VII A group. In A group atomic, radii increases from top to bottom and the bond dissociation energy decreases as -
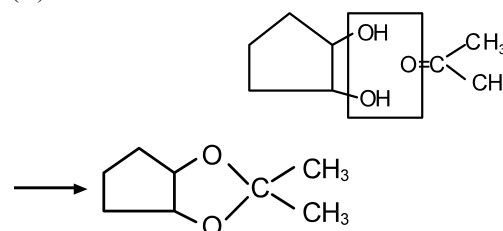
R – F > R – Cl > R – Br > R – 1

So, during dehydrohalogenation R – I bond breaks more easily than R – F bond. Hence, order of reactivity will be -

R – I > R – Br > R – Cl > R – F

**97.** (B)

**Sol.**



**98.** (A)

**Sol.** Ethalpy of hydrogenation is inversally proportional to stability of alkene.

**99.** (C)

**Sol.** Na/NH$_3$(+) with C$_2$H$_5$OH is known as Birch reduction.

**100.** (C)

**Sol.** Fructose is not hydrolysed simple compounds hence called monosaccharide.