1. Copper is extracted from copper pyrites by

(a) Thermal decomposition (b) Reduction by coke

(c) Electrometallurgy (d) Auto reduction

Ans: (d)

Sol: Copper extracted from copper pyrites by auto reduction

$2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$

2. Function of potassium ethylxanthate in froth floatation process is to make the ore

(a) Lighter (b) Hydrophobic (c) Hydrophilic (d) Heavier

Ans: (b)

Sol: Potasium ethylxanthate being collector in the froth flotation process enhances the non-wettability of the ore particles i.e. it makes the ore hydrophobic.

3. Sulphide ore on roasting gives a gas X. X reacts with Cl_2 in the presence of activated charcoal to give Y. Y is:

(a) SO_2Cl_2 (b) S_2Cl_2 (c) SCl_6 (d) $SOCl_2$

Ans: (a)

Sol: Sulphide ore $+ O_2 \xrightarrow{\text{Roasting}} \underset{X}{SO_2}$

$SO_2 + Cl_2 \rightarrow \underset{Y}{SO_2Cl_2}$

4. Aqueous solution of a salt (A) forms a dense white precipitate with $BaCl_2$ solution. The precipitate dissolves in dilute HCl to produce a gas (B) which decolourises acidified $KMnO_4$ solution

A and B respectively are:

(a) $BaSO_3, SO_2$ (b) $BaSO_4, H_2S$ (c) $BaSO_3, H_2S$ (d) $BaSO_4, SO_2$

Ans: (a)

Sol: $MSO_3 + BaCl_2(aq) \rightarrow BaSO_3\downarrow + MCl_2$

$BaSO_3 + 2HCl \rightarrow BaCl_2 + H_2SO_3$

$H_2SO_3 \longrightarrow H_2O + SO_2$

SO_2 decolourises acidified $KMnO_4$ solution

5. Bond angle in PH_4^+ is more than that of PH_3. This is because

(a) Lone pair–bond pair repulsion exists in PH_3

(b) PH_4^+ has square planar structure

(c) PH_3 has planar trigonal structure

(d) Hybridisation of P changes when PH_3 is converted to PH_4^+

Ans: (a)

Sol: PH_4^+ has tetrahedral geometry whereas PH_3 has Pyramidal shape.

This is because of lone pair –bond pair repulsion

6. Incorrectly matched pair is:

(a) XeO_3 - pyramidal

(b) XeF_4 - tetrahedral

(c) XeF_6 - disorted octahedral

(d) $XeOF_4$ - square pyramidal

Ans: (b)

Sol: XeF_4 has square planar structure because of the presence of two lone pair electrons

7. Phosphorus pentachloride

(a) On hydrolysis gives an oxo acid of phosphorus which is tribasic

(b) On hydrolysis gives an oxo acid of phosphorus which is a good reducing agent

(c) Has all the five equivalent bonds

(d) Exists as an ionic solid in which cation has octahedral structure and anion has tetrahedral structure

Ans: (a)

Sol: PCl_5 in solid state exists as $[PCl_6]^-$ which is octahedral and $[PCl_4]^+$ which is tetrahedral.

PCl_5 on hydrolysis gives oxo acid (H_3PO_4) which is tribasic and not reducing.

8. Identify the set of paramagnetic ions among the following:

(a) V^{2+}, Co^{2+}, Ti^{4+} (b) $Ni^{2+}, Cu^{2+}, Zn^{2+}$ (c) $Ti^{3+}, Cu^{2+}, Mn^{3+}$ (d) Sc^{3+}, Ti^{3+}, V^{3+}

Ans: (c)

Sol: $Ti^{3+}\left(3d^1\right)$, $Cu^{2+}\left(3d^9\right)$ and $Mn^{3+}\left(3d^4\right)$ have unpaired electrons and hence paramagnetic. Whereas $Sc^{3+}\left(3d^o\right)$, $Ti^{4+}\left(3d^o\right)$ and $Zn^{2+}\left(3d^{10}\right)$ have no unpaired electrons and diamagnetic

9. How many moles of acidified $K_2Cr_2O_7$ is required to liberate 6 moles of I_2 from an aqueous solution of I^-?

(a) 2 (b) 1 (c) 0.25 (d) 0.5

Ans: (a)

Sol: $K_2Cr_2O_7 + 7H_2SO_4 + 6KI \rightarrow 4K_2SO_4 + Cr_2(SO_4)_3 + 3I_2 + 7H_2O$

1 Mole of $K_2Cr_2O_7$ liberates 3 Moles of I_2

$\therefore$ 6 Moles of I_2 is liberated by 2 mole of $K_2Cr_2O_7$

10. Cu_2Cl_2 and $CuCl_2$ in aqueous medium

(a) $CuCl_2$ is more stable than Cu_2Cl_2

(b) Stability of Cu_2Cl_2 is equal to stability of $CuCl_2$

(c) Both are unstable

(d) Cu_2Cl_2 is more stable than $CuCl_2$

Ans: (a)

Sol: Cu^{2+} ion is more stable than Cu^+ ion in aqueous solution

11. The Co-ordination number of Fe and Co in the complex ions, $\left[Fe(C_2O_4)_3\right]^{3-}$ and $\left[Co(SCN)_4\right]^{2-}$ are respectively:

(a) 3 and 4 (b) 6 and 8 (c) 4 and 6 (d) 6 and 4

Ans: (d)

Sol: $C.N$ of Fe in $\left[Fe_2(C_2O_4)_3\right]^{3-}$ is 6

$C.N$ of Co in $\left[Co(SCN)_4\right]^{2-}$ is 4

12. Number of stereoisomers exhibited by $\left[Co(en)_2Cl_2\right]^+$ is

(a) 4 (b) 2 (c) 5 (d) 3

Ans: (d)

Sol: $\left[Co(en)_2Cl_2\right]^+$ shows two geometrical isomers $cis-\left[Co(en)_2Cl_2\right]^+$ and $trans-\left[Co(en)_2Cl_2\right]^{-1}$

$Cis-\left[Co(en)_2Cl_2\right]^+$ shows optical isomerism and has two isomers

Total number of isomers $=3$

13. Give the IUPAC name of $\left[Pt(NH_3)_4\right][PtCl_4]$ is

(a) Tetra ammine platinum (o) tetra chloride platinum (IV)

(b) Tetra ammine palatinate (II) tetra chlorido platinum (II)

(c) Tetra ammine palatinate (o) tetra chlorido platinum (IV)

(d) Tetra ammine platinum (II) tetra chlorido palatinate (II)

Ans: (d)

Sol: The IUPAC name of $\left[Pt(NH_3)_4\right]\ [PtCl_4]$ is tetraammineplatinum(II) tetrachloridoplatinate(II)

14. Prolonged exposure of chloroform in humans may cause damage to liver. It is due to the formation of the following compound

(a) CCl_4 (b) $COCl_2$ (c) CH_2Cl_2 (d) Cl_2

Ans: (b)

Sol: Chloroform easily gets converted to $COCl_2$ which damages liver.

15. Which of the following halide shows highest reactivity towards S_N1 reaction?

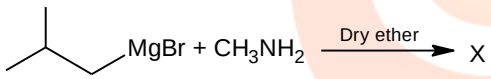
(a) $C_6H_5CH_2Cl$ (b) CH_3-CH_2Cl

(c) $CH_3-CH_2-CH_2-CH_2I$ (d) C_6H_5Cl

Ans: (a)

Sol: $C_6H_5CH_2Cl$ undergo S_N1 reaction as $C_6H_5CH_2^+$ ion formed is more stable.

16. In the reaction

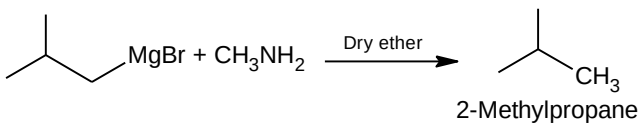


The number of possible isomers for the organic compound X is

(a) 4 (b) 5 (c) 3 (d) 2

Ans: (d)

Sol:



It has 2 isomers $n-$Butane and Isobutane

The number of isomers are two.

17. Which of the following on heating gives an ether as major products?

$P: C_6H_5CH_2Br + CH_3ONa$ $Q: C_6H_5ONa + CH_3Br$

$R: (CH_3)_3C - Cl + CH_3ONa$ $S: C_6H_5CH = CHCl + CH_3ONa$

(a) Both R and S (b) Both P and R (c) Both Q and S (d) Both P and Q

Ans: (d)

Sol: $P: C_6H_5CH_2Br + CH_3ONa \rightarrow C_6H_5CH_2 - O - CH_3 + NaBr$

$Q: C_6H_5ONa + CH_3Br \rightarrow C_6H_6 - O - CH_3 + NaBr$

Reaction in R and S do not yield ether as the major product

18. The steps involved in the conversion of propan-2-ol to propan-1-ol are in the order

(a) Dehydration, addition of HBr, heating with aq. KOH

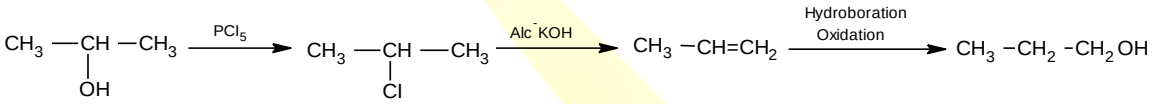
(b) Heating with PCl_5, heating with alc. KOH, acid catalysed addition of water

(c) Heating with PCl_5, heating with alc. KOH, hydroboration oxidation

(d) Dehydration, addition of HBr in presence of peroxide, heating with alc. KOH

Ans: (c)

Sol:



19. Which of the following is the strongest base?

(a) CH_3COO^- (b) Cl^- (c) OH^- (d) CH_3O^-

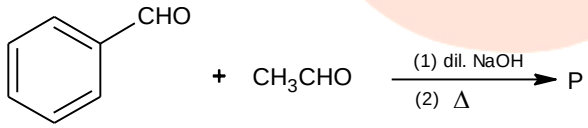
Ans: (d)

Sol: Acidic Nature: $HCl > CH_3COOH > H_2O > CH_3OH -$

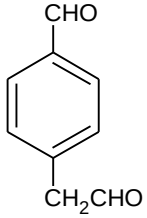
Applying Bronsted- Lowry acid base theory

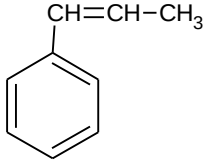
$Cl^- < CH_3COO^- < OH^- < CH_3O^-$

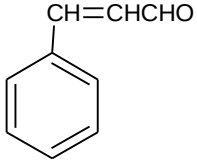
$\therefore CH_3O^- \rightarrow$ Strongest base

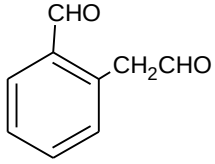
20. 

The product 'P' is

(a) 

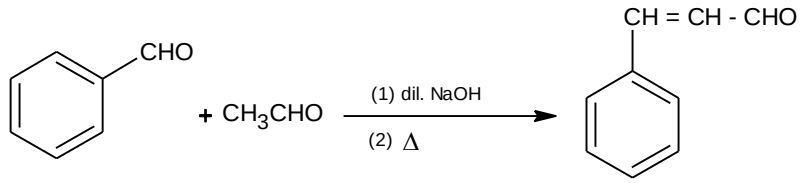
(b) 

(c) 

(d) 

Ans: (c)

Sol:



Cross aldol condensation

21. Which of the following has the lowest boiling point?

(a) CH_3CH_2OH (b) $CH_3-CH_2-NH_2$ (c) CH_3-O-CH_3 (d) $HCOOH$

Ans: (c)

Sol: Ethers show lowest boiling point due to absence of hydrogen bonds.

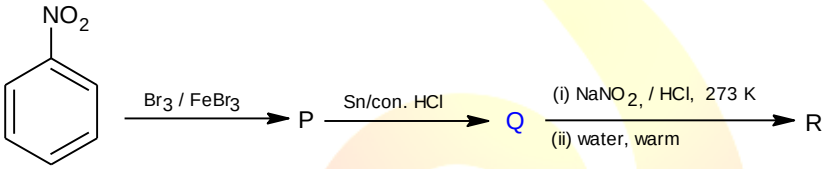
22. The carbonyl compound that does not undergo aldol condensation is

(a) Acetone (b) Di chloro acetaldehyde

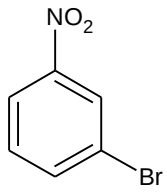
(c) Tri chloro acetaldehyde (d) Acetaldehyde

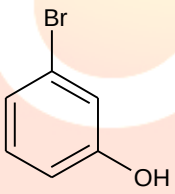
Ans: (c)

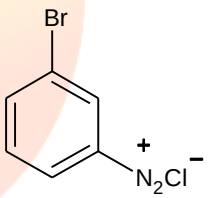
Sol: Trichloroacetaldehyde (CCl_3CHO) has no 'α' hydrogen. Hence does not undergo aldol condensation.

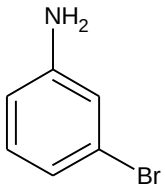
23. 

The final product R is

(a) 

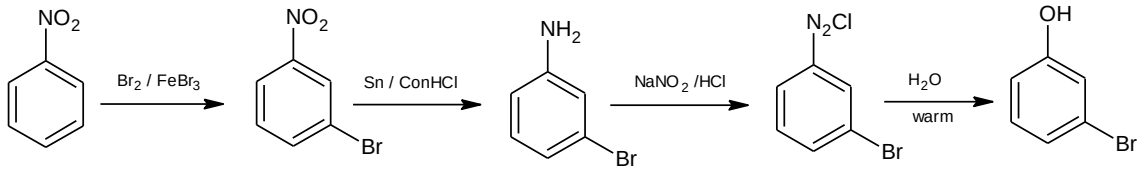
(b) 

(c) 

(d) 

Ans: (b)

Sol:



24. Hinsberg's reagent is

(a) $(CH_3CO)_2O$/ pyridine (b) $C_6H_5SO_2Cl$

(c) $C_6H_5SO_2NH_2$ (d) CH_3COCl/ pyridine

Ans: (b)

Sol: Hinsberg reagent is $C_6H_5SO_3Cl$

25. Which one of the following vitamins is not stored in adipose tissue?

(a) A (b) B_6 (c) D (d) E

Ans: (b)

Sol: Vitamin B_6 is water soluble. Hence it is not stored in adipose tissue.

26. Hypothyroidism is caused by the deficiency of

(a) Vitamin $B-12$ (b) Adrenalin (c) Thyroxine (d) Glucocorticoid

Ans: (c)

Sol: Hypothyroidism is caused by the deficiency of Thyroxine.

27. C_1-C_4 glycosidic bond is NOT found in

(a) Maltose (b) Sucrose (c) Lactose (d) Starch

Ans: (b)

Sol: C_1-C_4 glycosidic bond is found in lactose, maltose and starch (amylose).

C_1-C_2 glycosidic bond is found in sucrose.

28. Which of the following polymer has strongest intermolecular forces of attraction?

(a) Neoprene (b) Terylene (c) Polythene (d) Polystyrene

Ans: (b)

Sol: Terylene being polyester has strongest intermolecular forces of attraction (hydrogen bonds).

29. Which of the following monomers can undergo condensation polymerization?

(a) Styrene (b) Glycine (c) Isoprene (d) Propene

Ans: (b)

Sol: Glycine being a compound with two functional groups undergoes condensation polymerization.

30. A food additive that acts as an antioxidant is

(a) BHA (b) Saccharin (c) Sugar syrup (d) Salt

Ans: (a)

Sol: BHA acts as an antioxidant.

31. $0.4g$ of dihydrogen is made to react with $7.1g$ of dichlorine to form hydrogen chloride. The volume of hydrogen formed at $273K$ and 1 bar pressure is

(a) $9.08L$ (b) $4.54L$ (c) $90.8L$ (d) $45.4L$

Ans: (b)

Sol: $H_2 + Cl_2 \longrightarrow 2HCl$

$1\,\text{mole} \quad 1\,\text{mole} \quad 2\,\text{mole}$

$\frac{0.4}{2}g \quad \frac{7.1}{71}g$

$0.2\,\text{mol} \quad 0.1\,\text{mol} \quad 0.2\,\text{mole}$

One mole of HCl gas at $273K$ and 1 bar pressure has a volume $22.7\,\text{L}$

$\therefore$ 0.2 Mole of HCl at the same condition has a volume. $22.7 \times 02 = 4.54\,\text{L}$

32. With regard to photoelectric effect, identify the correct statement among the following

(a) Energy of e^- ejected increases with the increase in the intensity of incident light

(b) Number of e^- ejected increases with the increase in the frequency of incident light

(c) Number of e^- ejected increases with the increase in work function

(d) Number of e^- ejected increases with the increase in the intensity of incident light

Ans: (d)

Sol: Number of electrons ejected during photo electric effect increases with the increase in the intensity of incident light.

33. The last element of the p-block in 6^{th} period is represented by the outer most electronic configuration

(a) $7s^2 7p^6$ (b) $5f^{14}6d^{10}7s^2 7p^5$ (c) $4f^{14}5d^{10}6s^2 6p^4$ (d) $4f^{14}5d^{10}6s^2 6p^6$

Ans: (d)

Sol: The last element in the 6^{th} period belong to 18^{th} group $(n=6)$ and has an electronic configuration $4f^{14}\ 5d^{10}\ 6s^2\ 6p^6$

34. The conjugate base of NH_3 is

(a) NH_4^+ (b) NH_4OH (c) NH_2OH (d) NH_2^-

Ans: (d)

Sol: The conjugate base of NH_3 is NH_2^-.

35. A gas mixture contains 25% He and 75% CH_4 by volume at a given temperature and pressure. The percentage by mass of methane in the mixture is approximately____

(a) 75% (b) 25% (c) 92% (d) 8%

Ans: (c)

Sol: The ratio of He and CH_4 in the mixture 25% and 75% by volume (same can be extended to moles)

Volume ratio or mole ratio: $25\%:75\%$ or $1:3$

$\therefore$ mass ratio $1\times4:3\times16=4:48$

$\therefore$ % of methane by mass $=\frac{48}{52}=92\%$

36. The percentage of $s-$character in the hybrid orbitals of nitrogen in NO_2^+, NO_3^- and NH_4^+ respectively are

(a) 33.3%, 50%, 25% (b) 33.3%, 25%, 50%

(c) 50%, 33.3%, 25% (d) 25%, 50%, 33.3%

Ans: (c)

Sol: NO_2^+, NO_3^-, NH_4^+

Hybridization sp sp^2 sp^3

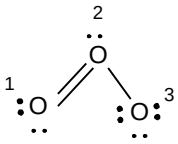
% s character 50% 33.3% 25%

37. The formal charge on central oxygen atom in ozone is

(a) -1 (b) 0 (c) $+2$ (d) $+1$

Ans: (d)

Sol:



Formal charge on central oxygen atom in ozone

$=6-2-\frac{1}{2}(6)=+1$

38. When the same quantity of heat is absorbed by a system at two different temperatures T_1 and T_2, such that $T_1>T_2$, change in entropies are ΔS_1 and ΔS_2 respectively. Then

(a) $\Delta S_1<\Delta S_2$ (b) $\Delta S_1=\Delta S_2$ (c) $S_2>S_1$ (d) $\Delta S_2<\Delta S_1$

Ans: (a)

Sol: $\Delta S_1=\frac{Q}{T_1}$ $\Delta S_2=\frac{Q}{T_2}$

$\Delta S_1T_1=\Delta S_2T_2$

Since $T_1>T_2$ $\Delta S_1<\Delta S_2$

39. The oxidation number of nitrogen atoms in NH_4NO_3 are

(a) $+5,+5$ (b) $-3,+5$ (c) $+3,-5$ (d) $-3,-3$

Ans: (b)

Sol: Oxidation state of N in NH_4NO_3

$O.S$ of N in $NH_4^+\rightarrow x+4=+1$ or $x=-3$

$O.S$ of N in $NO_3^- \rightarrow x+3(-2)=-1$ or $x=+5$

40. A Lewis acid 'X' reacts with $LiAlH_4$ in ether medium to give a highly toxic gas. This gas when heated with NH_3 gives a compound commonly known as inorganic benzene. The gas is

(a) B_2O_3 (b) B_2H_6 (c) $B_3N_3H_6$ (d) BF_3

Ans: (b)

Sol: $4BF_3+3L:AlH_4 \xrightarrow{ether} 2B_2H_6+3LiF+3AlF_3$

$3B_2H_6+6NH_3 \xrightarrow{\Delta} 2B_3N_3H_6+12H_2$

41. The oxide of potassium that does not exist is

(a) K_2O (b) KO_2 (c) K_2O_2 (d) K_2O_3

Ans: (d)

Sol: The oxide of potassium that does not exist in K_2O_3

42. The metal that products H_2 with both $dil\,HCl$ and $NaOH(aq)$ is

(a) Zn (b) Mg (c) Ca (d) Fe

Ans: (a)

Sol: $Zn+2HCl \rightarrow ZnCl_2+H_2\uparrow$

$Zn+2NaOH \rightarrow Na_2ZnO_2+H_2\uparrow$

43. Which of the following is NOT a pair of functional isomers?

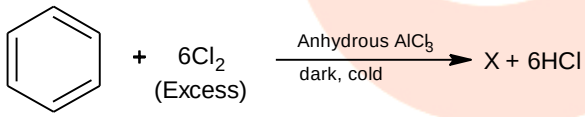
(a) $C_2H_5OC_2H_5$ and $C_3H_7OCH_3$ (b) CH_3CH_2OH and CH_3OCH_3

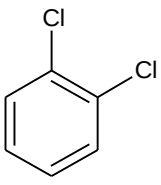
(c) $CH_3CH_2NO_2$ and H_2NCH_2COOH (d) CH_3COOH and $HCOOCH_3$

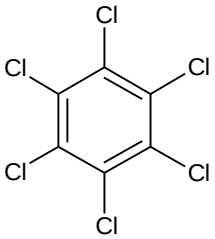
Ans: (a)

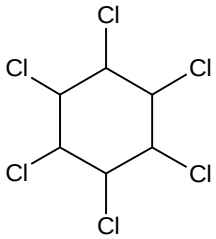
Sol: $C_2H_5-O-C_2H_5$ and $C_3H_7-O-CH_3$ are metamers not functional isomers.

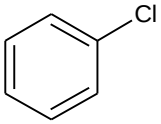
44. Identify 'X' in the following reaction



(a) 

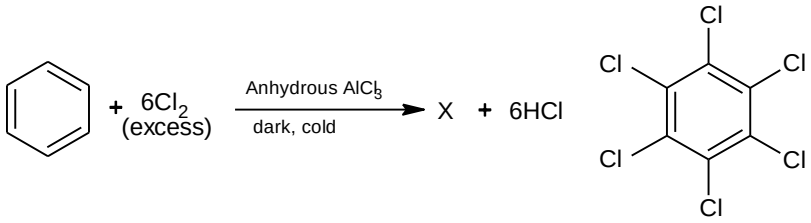
(b) 

(c) 

(d) 

Ans: (b)

Sol:



45. Which of the following is NOT a greenhouse gas?

(a) CFC (b) CO_2 (c) O_2 (d) NO_2

Ans: (c)

Sol: O_2 is not a greenhouse gas whereas NO_2. CFC and CO_2 are given house gases

46. A metal exists as an oxide with formula $M_{0.96}O$. Metal M can exist as M^{+2} and M^{+3} in its oxide $M_{0.96}O$. The percentage of M^{+3} in the oxide is nearly

(a) 8.3% (b) 4.6% (c) 5% (d) 9.6%

Ans: (a)

Sol: Let x be the amount of M^{+2} in the compound

Then $0.96-x$ is the amount of M^{+3} in the compound

$+2(x)+3(0.96-x)=-2$

$2x+2.88-3x=-2$ or $x=0.88$

Amount of $M^{+3}=0.08$

$\therefore$ % of $M^{+3}=\frac{0.08}{0.96}\times 100=8.3\%$

47. A metal crystallises in face centred cubic structure with metallic radius $\sqrt{2}$Å. The volume of the unit cell (in m^3) is

(a) 4×10^{-10} (b) 6.4×10^{-29} (c) 4×10^{-9} (d) 6.4×10^{-30}

Ans: (b)

Sol: For fcc lattice

$4r=\sqrt{2}a$ or $a=\frac{4r}{\sqrt{2}}$

Volume of the cube $=a^3=\left(\frac{4r}{\sqrt{2}}\right)^3=\frac{64\times\left(\sqrt{2}\right)^3\times\left(10^{-10}\right)^3}{\left(\sqrt{2}\right)^3}=64\times10^{-30}m^3=6.4\times10^{-29}m^3$

48. Silicon doped with gallium forms

(a) n – type semiconductor (b) both n and p type semiconductor

(c) an intrinsic semiconductor (d) p – type semiconductor

Ans: (d)

Sol: Silicon doped with gallium (trivalent) forms p – type semiconductor

49. The pair of electrolytes that possess same value for the constant (A) in the Debye – Huckel – Onsagar equation, $\lambda_m = \lambda_m^\circ - A\sqrt{C}$ is

(a) $MgSO_4, NaSO_4$ (b) $NH_4Cl, NaBr$ (c) $NaBr, MgSO_4$ (d) $NaCl, CaCl_2$

Ans: (b)

Sol: The constant $'A'$ in the Debye, Huckel and Onsager equation depends on the type of the salt. i.e. all electrolytes of a particular type have the same value for the constant A

$\therefore NH_4Cl$ and $NaBr$ (A-B type salt) have same value for $'A'$.

50. Which of the following pair of solutions is isotonic?

(a) 0.01M $BaCl_2$ and 0.015M $NaCl$ (b) 0.001M $Al_2(SO_4)_3$ and 0.01M $BaCl_2$

(c) 0.001M $CaCl_2$ and 0.001M $Al_2(SO_4)_3$ (d) 0.01M $BaCl_2$ and 0.001M $CaCl_2$

Ans: (a)

Sol: $0.01M$ $BaCl_2$ and $0.015M$ $NaCl$ have same ionic concentration. Hence they form isotonic solutions.

51. Solute $'X'$ dimerises in water to the extent of 80%. $2.5g$ of $'X'$ in $100g$ of water increases the boiling point by $0.3°C$. The molar mass of $'X'$ is $\left[K_b = 0.52\,K\,kg\,mol^{-1}\right]$

(a) 13 (b) 52 (c) 65 (d) 26

Ans: (d)

Sol: $\alpha_{ass} = \dfrac{1-n}{1-\dfrac{1}{n}} \times 100$ or $80 = \dfrac{1-i}{1-\dfrac{1}{2}} \times 100 \quad : i = 0.6$

$$\Delta T_b = \frac{i \times k_b \times w_2 \times 1000}{M_2 \times W_1}$$

or $M_2 = \dfrac{0.6 \times 0.52 \times 2.5 \times 1000}{0.3 \times 100} = 26$

52. Given $E^\circ_{Fe^{+3}/Fe^{+2}} = +0.76V$ and $E^\circ_{I_2/I^-} = +0.55V$. The equilibrium constant for the reaction taking place in galvanic cell consisting of above two electrodes is $\left[\dfrac{2.303RT}{F} = 0.06\right]$

(a) 1×10^7 (b) 1×10^9 (c) 3×10^8 (d) 5×10^{12}

Ans: (a)

Sol: $E°_{cell} = 0.76 - 0.55 = 0.21V$

$$E°_{cell} = \frac{0.06}{n} \log K_c$$

$0.21 = \frac{0.06}{2}\log K_c$

$\log K_c = \frac{2\times 0.21}{0.06} = 7$ or $K_c = 1\times 10^7$

53. If an aqueous solution of NaF is electrolyzed between inert electrodes, the product obtained at anode is

(a) F_2 (b) H_2 (c) Na (d) O_2

Ans: (d)

Sol: The product obtained at anode when aqueous NaF electrolysed is oxygen (O_2).

54. In which of the following cases a chemical reaction is possible?

(a) $ZnSO_{4(aq)}$ is placed in a copper vessel

(b) $AgNO_3$ solution is stirred with a copper spoon

(c) Conc. HNO_3 is stored in a platinum vessel

(d) gold ornaments are washed with $dil\ HCl$

Ans: (b)

Sol: Standard reduction potential of $Ag\,(E^\circ = 0.8V)$ is higher than that of copper $(E^\circ = 0.34V)$

$Cu + 2AgNO_3 \rightarrow Ca(NO_3)_2 + 2Ag$

55. The time required for 60% completion of a first order reaction is $50\,\text{min}$. The time required for 93.6% completion of the same reaction will be

(a) $100\,\text{min}$ (b) $83.8\,\text{min}$ (c) $50\,\text{min}$ (d) $150\,\text{min}$

Ans: (d)

Sol: $k = \frac{2.303}{t}\log\frac{a}{a-x} = \frac{2.303}{50}\log\frac{100}{40}$

$t_{93.6} = \frac{2.303}{\frac{2.303}{50}\times 0.398}\times\log\frac{100}{6.4}$

$= 149.5$ or $150\,\text{min}$

56. For an elementary reaction $2A + 3B \longrightarrow 4C + D$ the rate of appearance of C at time 't' is $2.8\times 10^{-3}\,\text{mol}\,\text{L}^{-1}\text{S}^{-1}$. Rate of disappearance of B at 't' t will be

(a) $\frac{4}{3}\left(2.8\times 10^{-3}\right)\text{mol}\,\text{L}^{-1}\text{S}^{-1}$ (b) $\frac{3}{4}\left(2.8\times 10^{-3}\right)\text{mol}\,\text{L}^{-1}\text{S}^{-1}$

(c) $2\left(2.8\times 10^{-3}\right)\text{mol}\,\text{L}^{-1}\text{S}^{-1}$ (d) $\frac{1}{4}\left(2.8\times 10^{-3}\right)\text{mol}\,\text{L}^{-1}\text{S}^{-1}$

Ans: (b)

Sol: $2A + 3B \rightarrow 4c + D$

$$-\frac{1}{3}\frac{dB}{dt}=\frac{1}{4}\frac{dc}{dt}$$

$$-\frac{dB}{dt}=\frac{3}{4}\frac{dc}{dt}=\frac{3}{4}\left(2.8\times10^{-3}\right)\text{mol}\,L^{-1}S^{-1}$$

57. The rate constant of a reaction is given by $k=P\,Ze^{-Ea/RT}$ under standard notation. In order to speed up the reaction, which of the following factors has to be decreased?

(a) Z (b) Both Z and T (c) E_a (d) T

Ans: (c)

Sol: Lower the activation energy, higher will be the reaction rate.

58. A sol of AgI is prepared by mixing equal volumes of 0.1M $AgNO_3$ and 0.2M KI, which of the following statement is correct ?

(a) Sol obtained is a negative sol with NO_3^- adsorbed on AgI

(b) Sol obtained is a positive sol with Ag^+ adsorbed on AgI

(c) Sol obtained is a positive sol with K^+ adsorbed on AgI

(d) Sol obtained is a negative sol with I^- adsorbed on AgI

Ans: (d)

Sol: $AgNO_3+KI\rightarrow AgI+KNO_3$

Because of the common ion effect, AgI sol will be negative with adsorption of I^- ions

59. During Adsorption of a gas on a solid

(a) $\Delta G<0,\Delta H<0,\Delta S<0$ (b) $\Delta G>0,\Delta H>0,\Delta S>0$

(c) $\Delta G<0,\Delta H<0,\Delta S>0$ (d) $\Delta G<0,\Delta H>0,\Delta S>0$

Ans: (a)

Sol: During adsorption of a gas on solid,

ΔG is $-$ve or $\Delta G<0$ [Adsorption is spontaneous]

ΔH is $-$ve or $\Delta H<0$ [Process exothermic]

ΔS is $-$ve or $\Delta S<0$

Key Answers:

1. d	2. b	3. a	4. a	5. a	6. b	7. a	8. c	9. a	10. a
11. d	12. d	13. d	14. b	15. a	16. d	17. d	18. c	19. d	20. c
21. c	22. c	23. b	24. b	25. b	26. c	27. b	28. b	29. b	30. a
31. b	32. d	33. d	34. d	35. c	36. c	37. d	38. a	39. b	40. b
41. d	42. a	43. a	44. b	45. c	46. a	47. b	48. d	49. b	50. a
51. d	52. a	53. d	54. b	55. d	56. b	57. c	58. d	59. a	