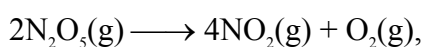


**CHEMISTRY****SOLUTION****SECTION-A**

Q.	1	2	3	4	5	6	7	8	9	10
A.	C	C	A	A	D	A	A	A	B	A
Q.	11	12	13	14	15	16				
A.	B	C	B	D	D	B				

**SECTION-B**

17. Given Reaction :



$$(\text{given} \Rightarrow \frac{\Delta[\text{NO}_2]}{\Delta t} = 2.8 \times 10^{-3} \text{ M / sec. or M sec}^{-1})$$

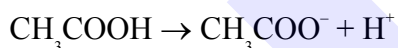
$$\text{Rate of the Reaction} \Rightarrow \boxed{-\frac{1}{2} \frac{\Delta[\text{N}_2\text{O}_5]}{\Delta t} = \frac{1}{4} \frac{\Delta[\text{NO}_2]}{\Delta t} = \frac{\Delta[\text{O}_2]}{\Delta t}}$$

$$-\frac{1}{2} \frac{\Delta[\text{N}_2\text{O}_5]}{\Delta t} = \frac{1}{4} \frac{\Delta[\text{NO}_2]}{\Delta t}$$

$$-\frac{\Delta[\text{N}_2\text{O}_5]}{\Delta t} = \frac{2}{4} \frac{\Delta[\text{NO}_2]}{\Delta t} = \frac{1}{2} \times 2.8 \times 10^{-3} \text{ M sec}^{-1}$$

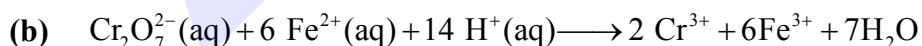
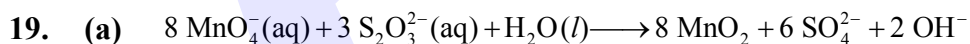
$$-\frac{\Delta[\text{N}_2\text{O}_5]}{\Delta t} = 1.4 \times 10^{-3} \text{ M sec}^{-1} \text{ or M/sec.}$$

$$18. \Lambda_m^c = k \times 1000/C = 3.905 \times 10^{-5} \times 1000/0.001 = 39.05 \text{ S cm}^2/\text{mole}$$



$$\Lambda^0 \text{CH}_3\text{COOH} = \Lambda^0 \text{CH}_3\text{COO}^- + \Lambda^0 \text{H}^+ \\ = 40.9 + 349.6$$

$$\Lambda^0 \text{CH}_3\text{COOH} = 390.5 \text{ S cm}^2/\text{mol} \\ = 39.05/390.5 = 0.1$$



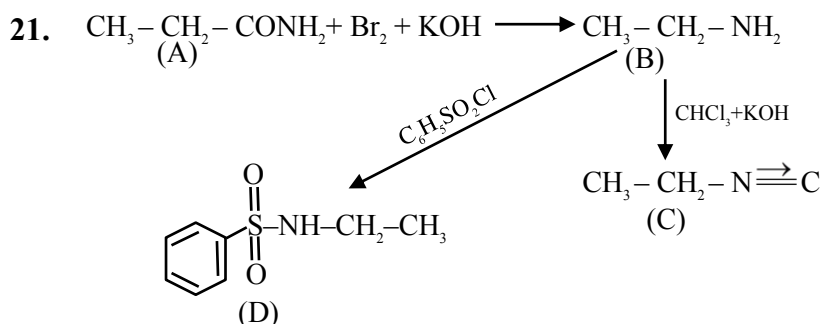
20. (a) Pentaamminenitrito – O-cobalt (III)

(b) Potassium tetrachloridonickelate (II)

**OR**

(a) When a di- or polydentate ligand uses its two or more donor atoms to bind a single metal ion, it is said to be a chelate ligand. Such complexes, called chelate complexes eg.  $\text{EDTA}^{4-}$ .

(b) Complex in which a metal is bound to more than are kind of donor group eg.  $[\text{Co}(\text{NH}_3)_5(\text{ONO})]^{2+}$



## SECTION-C

22. (a)  $E_{\text{cell}} = E_{\text{cell}}^0 - \frac{0.0591}{n} \log \frac{[\text{Cr}^{3+}]^2}{[\text{Fe}^{2+}]^3}$

$$0.261\text{V} = E_{\text{cell}}^0 - \frac{0.0591}{6} \log \frac{[0.01]^2}{[0.01]^3}$$

$$0.261\text{V} = E_{\text{cell}}^0 - \frac{0.0591}{6} \log 100$$

$$E_{\text{cell}}^0 = 0.261 + 0.0197$$

$$= 0.2807\text{V}$$

(b) A because low value of SRP

23. (a)  $E^\circ$  value for  $\text{Mn}^{3+}/\text{Mn}^{2+}$  couple is much more positive than that for  $\text{Fe}^{3+}/\text{Fe}^{2+}$ , due to the  $\text{Mn}^{2+}$  have higher stability than  $\text{M}^{3+}$  due to half-filled  $d^5$  configuration.

(b) Iron has higher enthalpy of atomization than that of copper because Iron has higher number of unpaired  $e^-$  than Cu due to which extent of covalent bonding is more.

(c)  $\text{Sc}^{3+}$  is colourless is due to the absence of unpaired  $e^-$  as it attains  $3d^0$  configuration while  $\text{Ti}^{+3}$  has  $3d^1$ -configuration

24. (a)  $[\text{CoF}_6]^{3-} \Rightarrow \text{Hybridization} = sp^3d^2$   
Magnetic character = Paramagnetic

(b) dibromidobis – ethane-1,2-diamine cobalt(I)

(c)  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_2 \longrightarrow [\text{Co}(\text{NH}_3)_6]^{3+} + 2\text{Cl}^-$   
(aq. sol.)  $\therefore$  3 ions produced

25. (a) (i) Heat both the compounds with NaOH and  $\text{I}_2$ ,  $\text{C}_6\text{H}_5-\text{CH}=\text{CH}-\text{COCH}_3$  gives yellow ppt of iodoform while  $\text{C}_6\text{H}_5-\text{CH}=\text{CH}-\text{COCH}_2\text{CH}_3$  does not.

(ii) Add ammonical silver nitrate solution (Tollens' reagent),  $\text{HCOOH}$  gives silver mirror while  $\text{CH}_3\text{CH}_2\text{COOH}$  does not.

(b)  $\text{CH}_3\text{COCH}_3 < \text{CH}_3\text{CH}_2\text{OH} < \text{CH}_3\text{COOH}$

26. (a)  $\rightarrow$  (A)  $\text{CH}_3\text{CONH}_2$  (B)  $\rightarrow \text{CH}_3\text{NH}_2$

(b)  $\rightarrow$  (A)  $\text{C}_6\text{H}_5\text{NH}_2$  (B)  $\rightarrow \text{C}_6\text{H}_5\text{N}_2\text{Cl}$

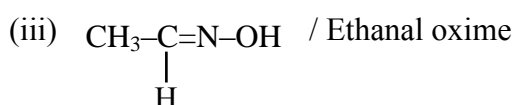
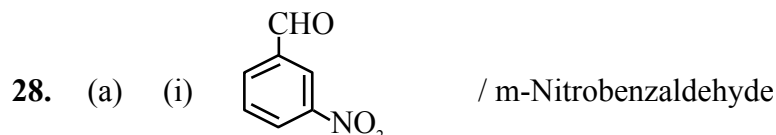
(c)  $\rightarrow$  (A)  $\text{C}_6\text{H}_5\text{CN}$  (B)  $\rightarrow \text{C}_6\text{H}_5\text{COOH}$

27. (a) 
$$E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.059}{6} \log \frac{[\text{Al}^{3+}]^2}{[\text{Cu}^{2+}]^3}$$

(b) Batteries which are rechargeable

Example- Lead storage, Ni-Cd batteries (Or any other one example)

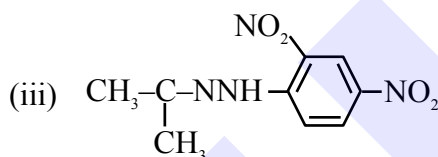
(c)  $\Lambda_m$  decreases with increase in concentration for both strong & weak electrolyte.



OR

(b) (i) Because of oxidation of propanal involves cleavage of C—H bond which is weaker than C—C bond of propanone.

(ii) On heating with NaOH and  $\text{I}_2$ , acetophenone gives yellow precipitate of iodoform whereas benzophenone does not.

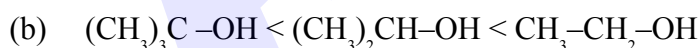


### SECTION-D

29. (a) Alcohols can form H-bonds with water and break the H-bonds already existing between water molecules. Therefore, they are water soluble.

On contrary, hydrocarbons and ethers cannot form H-bonds with water and thus are insoluble in water.

OR



(c) (i) Because phenolate conjugate base is resonance stabilised. The methoxide conjugate base has no such stabilisation and therefore is formed much more reluctantly.

(ii) Picric acid

30. (a) The freezing point of the solution is always lower than that of pure solvent as the vapour pressure of the solvent decreases in the presence of non-volatile solute.

(b) Molal freezing point depression constant ( $K_f$ ) or cryoscopic constant is defined as the depression in freezing point for 1 molal solution i.e. a solution containing 1 g mole of solute dissolved in 1000 g of solvent.

(c) Given,

$$w_{\text{solute}} = 5\text{g}, M_{\text{solute}} = 180\text{ g mol}^{-1} \quad w_{\text{solvent}} = 95\text{ g}$$

$$\text{Molality of glucose solution} = \frac{5}{180} \times \frac{1000}{95} = 0.2924$$

$$\Delta T_f = K_f \times m$$

$$\therefore \Delta T_f = \frac{2.15}{0.154} \times 0.2924 = 4.08\text{ K}$$

OR

(i) Depression in freezing point ( $\Delta T_f = K_f \times m$ )

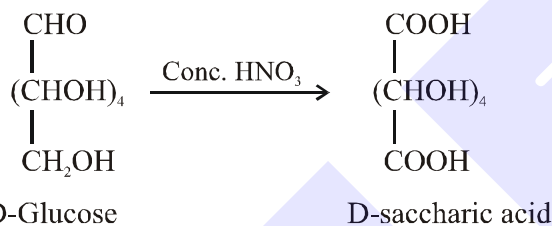
$$\frac{K_f \times w_{\text{solute}} \times 1000}{w_{\text{solvent}} \times M_{\text{solute}}}$$

$$M_{\text{solute}} = \frac{K_f \times w_{\text{solute}} \times 1000}{\Delta T_f \times w_{\text{solvent}}}$$

(ii) The unit of  $K_f$  is  $\text{K kg mol}^{-1}$ .

### SECTION-E

31. (a)



(b) The amino acids contains both acidic  $-\text{COOH}$  group & basic  $-\text{NH}_2$  (amino) group in their structure, due to which they can exist both as acid & base, this nature is called Amphoteric nature



(c) In  $\alpha$ -helix, a polypeptide chain form by all possible hydrogen bonds by twisting into a right handed helical structure with  $-\text{NH}$  group of each amino acid.

In  $\beta$ -pleated all peptide chains are stretched out to nearly extensions & then laid side by side which are held together by intomolecular hydrogen bonding.

(d) Sodium Hydrogen Sulphite reaction/ Pentaacetate of glucose does not react with Hydroxylamine/Schiff's test (any one)

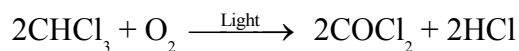
(e) Fat soluble - Vitamin A/D /E/ K

Water soluble - Vitamin B /C

32. (a) Grignard reagents in the presence of moisture, they react with  $\text{H}_2\text{O}$  to give alkanes.



- (b) Chloroform is slowly oxidised by air in the presence of light to an extremely poisonous gas phosgene (carbonyl chloride). It is therefore stored in closed dark coloured bottles completely filled so that air is kept out.



Phosgene

- (c) Iodide is better leaving group because of its larger size than bromide therefore ethyl iodide undergoes  $\text{SN}^2$  reaction faster than ethyl bromide.
- (d) +2 butanol is a racemic mixture it is a mixture which contains two enantiomers in equal proportion and thus have zero optical rotation so it is optically inactive.
- (e) Due to delocalisation of lone pairs of electron of X atom over the benzene ring. C-X bond in halobenzenes acquire some double bond character while in  $\text{CH}_3\text{-X}$ , C-X bond is a single bond.

33. (a) The rate constant increases.

(b)  $2 + \frac{1}{2} = \frac{5}{2}$

- (c) Order is determined by slow step of the reaction and molecularity determined by elementary step of reaction.

(d)  $k = \frac{2.303}{t} \log \frac{[\text{R}]_0}{[\text{R}]}$

$$t = \frac{2.303}{2 \times 10^{-3}} \log \frac{6}{2} = \frac{2.303}{2 \times 10^{-3}} \times 0.4771 = 549.38 \text{ s}$$

- (e) Decrease