## PRACTICE PAPER-2 (SOLUTIONS)

**CLASS: XII**

**SUBJECT : CHEMISTRY**

## SECTION – A

**1.** **(c)** 2,4 DNP test **[1]**
Fehling's, Tollen's and Cannizzao reaction is shown by aldehyde only

**2.** **(b) Cr** **[1]**

**3.** **(a)** increases four times **[1]**
Rate = $[A]^2$
If [A] is doubled then Rate' = $[2A]^2 = 4\,[A]^2 = 4$ Rate

**4.** **(c)** $V^{3+}$, $V^{2+}$, $Fe^{3+}$ **[1]**

**5.** **(b)** $[Co(NH_3)_5Cl]Cl_2$ **[1]**

**6.** **(b)** $[Co(CN)_6]^{3-}$ **[1]**

**7.** **(a)** unidentate **[1]**

**8.** **(d)** B < C < A **[1]**
In primary amine intermolecular association due to H-bonding is maximum while in tertiary it is minimum.

**9.** **(a)** 7.5 mol **[1]**

$\Delta T_f = K_f\, m$

$$\Delta T_f = K_f \frac{n_2 \times 1000}{w_1}$$

$$14 = \frac{1.86 \times n_2 \times 1000}{1000}$$

$n_2 = 7.5$ mol

**10.** **(b)** 1-methylcyclohexene **[1]**
According to Saytzeff rule i.e. highly substituted alkene is major product. Here dehydration reaction takes place, alkene is formed due to the removal of a water molecule.

**11.** **(a)** Hydrogen bonding (alcohols form intermolecular hydrogen bonds) **[1]**

**12.** **(b)** partial double bond character of C–OH bond **[1]**

**13.** **(c)** Non-volatile crystalline compounds **[1]**

**14.** **(d)** existence of alpha and beta forms of glucose **[1]**

**15.** **(b)** Assertion and reason both are correct statements but reason is not correct explanation for assertion. **[1]**

**16.** **(b)** Assertion and reason both are correct statements but reason is not correct explanation for assertion **[1]**

**17.** **(d)** Assertion is wrong, but reason is correct statement. **[1]**

**18.** **(b)** Both A and R are true but R is not the correct explanation of (A). **[1]**

## SECTION-B

**19.** $k = 0.693/t_{1/2}$

$k = 0.693/5730 \text{ years}^{-1}$

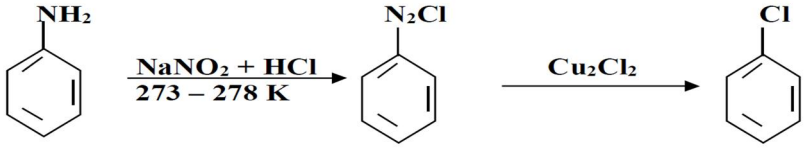
$t = \frac{2.303}{k}\log\frac{C_o}{C_t}$ **[1]**

let $C_o = 1$ $C_t = 3/10$

so $C_o/C_t = 1/(3/10) = 10/3$

$\frac{2.303}{0.693}\times 5730 \log\frac{10}{3}$

$t = 19042 \times (1 - 0.4771) = 9957$ years **[1]**

**20.** (a) 

**[1]**

(b) $CH_3CH(Br)CH_3 \xrightarrow{\text{alc KOH}} CH_3CH{=}CH_2 \xrightarrow{\text{HBr, organic peroxide}} CH_3CH_2CH_2Br$ **[1]**

**OR**

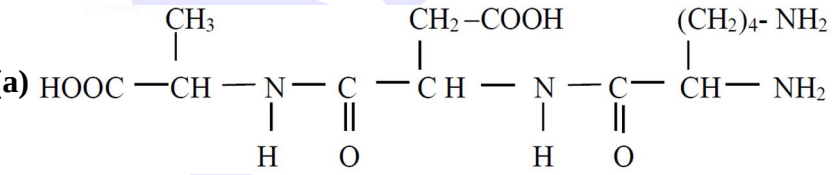
(a) Racemic mixture will be given by 2 chlorobutane as it is an optically active compound. **[1]**

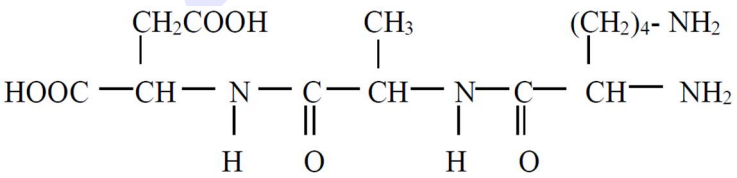
(b) When 2 chlorobutane undergoes $S_N1$ reaction, both front and rear attack are possible, resulting in a racemic mixture **[1]**

**21.** (a) Nucleotide **[1]**

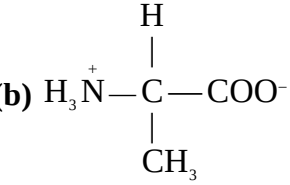
(b) Zwitter ion/dipolar ion **[1]**

**OR**

**(a)** 

**[1]**

**(b)** 

**[1]**

**22.** **Proteins :** These are macro molecules made up of amino acids joined by amide linkage is called as peptide linkage. These are required for growth and development of the body. **[1]**

**On the basis of their molecular shape, proteins are of two types.**

**(A) Fibrous Protein** **[½]**

(i) Polypeptide chains run parallel or anti- parallel and held together by hydrogen and disulphide bonds.

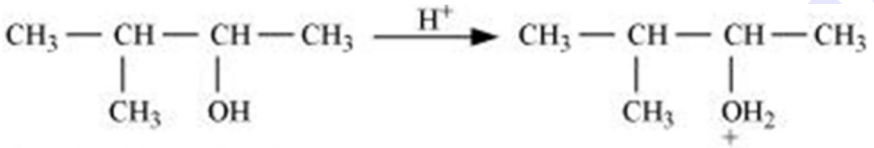
(ii) Generally insoluble in water e.g., keratin, collagen, myosin, fibroin.

**(B) Globular Protein** **[½]**

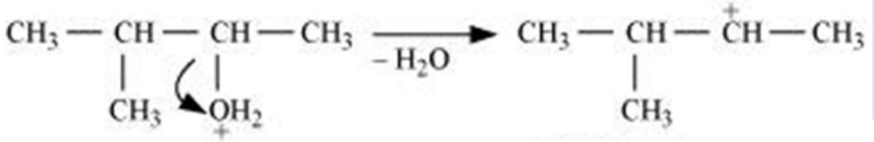
(i) Chains of polypeptide coil around to give a spherical shape.

(ii) Usually soluble in water, eg. insulin, thyroglobin, albumin, haemoglobin and fibrinogen gets converted into fibrous protein fibroin on clotting of blood.

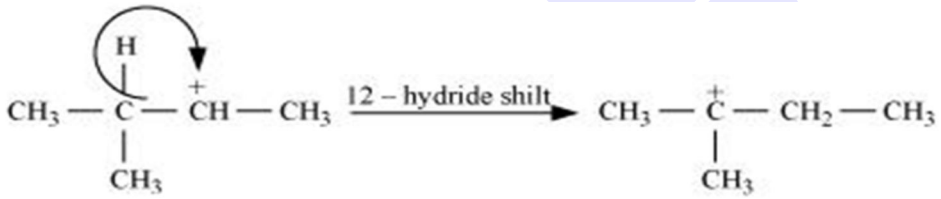
**23.**



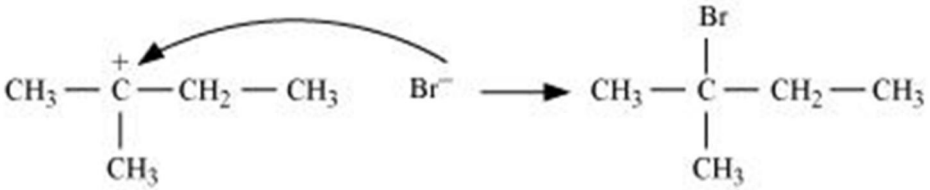

**[½]**




**[½]**




**[½]**




**[½]**

**24.** (a) The colour of coordination compound depends upon the type of ligand and d-d transition taking place.

$H_2O$ is weak field ligand, which causes small splitting, leading to the d-d transition corresponding green colour, however due to the presence of (en) which ia strong field ligand, the splitting is increased. Due to the change in $t_2g$-$e_g$ splitting the colouration of the compound changes from green to blue. **[1]**

(b) Formula of the compound is $[Co(H_2NCH_2CH_2NH_2)_3]_2 (SO_4)_3$. The hybridisation of the compound is: $d^2sp^3$ **[1]**

**25.** $[Co(NH_3)_5CO_3]Cl$ and $[Co(NH_3)_5Cl]CO_3$ **[1]**

Pentaamminecarbonatocobalt(III)chloride

Pentaamminechloridocobalt(III)carbonate **[1]**

## SECTION-C

**26.** **(a)** Manganese is having lower melting point as compared to chromium, as it has highest number of unpaired electrons, strong interatomic metal bonding, hence no delocalisation of electrons.

**[1]**

**(b)** There is much more frequent metal – metal bonding in compounds of the heavy transition metals i.e. 4d and 5d series, which accounts for lower melting point of 3d series. **[1]**

**(c)** Tungsten **[1]**

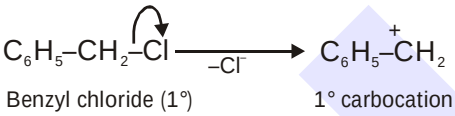
**27.** (a) Grignard reagents in the presence of moisture, they react with $H_2O$ to give alkanes. **[1]**

$$\underset{\text{Grigrard reagent}}{R\overset{\delta-}{M}g\overset{\delta+}{X}\overset{\delta-}{}} + H_2O \longrightarrow \underset{\text{Alkane}}{R-H} + Mg(OH)X$$

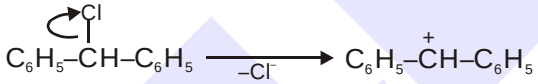
(b) Chloroform is slowly oxidised by air in the presence of light to an extremely poisonous gas phosgene (carbonyl chloride). It is therefore stored in closed dark coloured bottles completely filled so that air is kept out. **[1]**

$$2CHCl_3 + O_2 \xrightarrow{\text{Light}} \underset{\text{Phosgene}}{2COCl_2} + 2HCl$$

(c) $C_6H_5$ CHCl $C_6H_5$ (more reactive) **[1]**



Benzyl chloride (1°) 1° carbocation

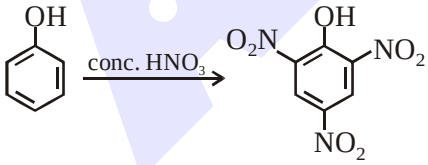


Chlorodiphenylmethane 2° carbocation

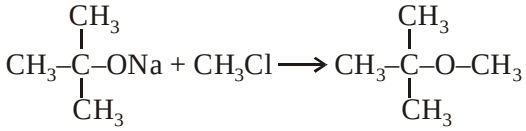
(more stable intermediate)

**28.** (a) Due to large surface area and ability to show variable oxidation states **[1½]**

(b) Due to high value of third ionisation enthalpy **[1½]**

**29.** (a)  (picric acid) **[1]**

(b) $CH_3–CH=CH_2+(½B_2H_6) \longrightarrow (CH_3–CH_2–CH_2–)_3B \xrightarrow[H_2O \mid 3H_2O_2,OH^-]{} 3CH_3–CH_2–CH_2–OH$ **[1]**

(c)  **[1]**

(d) Ethanol < Water < Phenol **[1]**

**30.** (a) $Fe + 2H^+ \longrightarrow H_2 + Fe^{2+}$

$$E_{cell} = E^0_{cell} - \frac{2.303RT}{nF}\log\frac{[Fe^{2+}]}{[H^+]^2}$$ **[½]**

$$E^0_{cell} = E^0_{H^+/H_2} - E^0_{Fe^{2+}/Fe}$$

$= -0(-0.44) = 0.44$ V **[½]**

$$0.1745 = 0.44 - \frac{0.0591}{2}\log\frac{[0.1]}{[x]^2}$$ **[½]**

$\text{Log } x = -5$

$\text{Log}[H^+] = -5$

$[H^+] = 10^{-5}$ **[½]**

(b) The mass of copper and silver deposited at the cathode will be different. The amount of different substances deposited by the same quantity of electricity passing through the electrolytic solution are directly proportional to their chemical equivalents. **[1]**

**OR**

(a) $\Lambda°(CH_3COOH) = \lambda°_{H^+} + \lambda°_{CH_3COO^-}$

$= 349.6 + 40.9 = 390.5\ S\ cm^2\ mol^{-1}$ **[½]**

$$\Lambda_m = \frac{\kappa \times 1000}{c}$$

$$\Lambda_m = \frac{8.0\times10^{-5} S\ cm^{-1} \times 1000 cm^3 L^{-1}}{0.0024 mol\ L^{-1}} = 33.33 S\,cm^2\ mol^{-1}$$ **[½]**

$$\alpha = \frac{\Lambda_m}{\Lambda°_m}$$ **[½]**

$$\alpha = \frac{33.33\ S\ cm^2\ mol^{-1}}{390.5\ S\ cm^2 mol^{-1}} = 0.085$$ **[½]**

(b) Electrolyte B is a strong electrolyte.

Limiting molar conductivity increases only to a smaller extent for a strong electrolyte, as on dilution the interionic interactions are overcome. **[1]**

Limiting molar conductivity increases to a larger extent for a weak electrolyte, as on dilution the degree of dissociation increases, therefore the number of ions in total volume of solution increases.

## SECTION-D

**31.** **(a)** 2F **[1]**

**(b)** Molarity $= \frac{38\times1.294\times1000}{98\times100} = 5.02M$ **[1]**

**(c)** Reaction taking place at anode when the battery is in use :

$Pb(s) + SO_4^{-2}(aq) \rightarrow PbSO_4(s) + 2e^-$ **[1]**

Reaction taking place at cathode when the battery is in use :

$PbO_2(s) + SO_4^{-2}(aq) + 4H^+(aq) + 2e^- \rightarrow PbSO_4(s) + 2H_2O(l)$ **[1]**

**OR**

**(c)** At anode : $O_2(g)$ **[1]**

At cathode : $H_2(g)$ **[1]**

**32.** **(a)** Age of fossils can be estimated by C-14 decay. All living organisms have C-14 which decays without being replaced back once the organism dies. **[1]**

**(b)** Carbon-14 atoms decay to stable nitrogen atoms and potassium-40 atoms decay to stable calcium. **[1]**

**(c)** $t = 2.303/ k \log (C_0/C_t)$

$C_0 = 20$ g $C_t = ?$

t = 10320 years k = 0.693/6000 (half-life given in passage) **[1]**

substituting in equation:

$10320 = 2.303 / (0.693/6000) \log 20/ C_t$

$0.517 = \log 20 / C_t$ antilog $(0.517) = 20/C_t$

$3.289 = 20/C_t$

$C_t = 6.17$ g **[1]**

**OR**

$t = 2.303/ k \log (C_0/C_t)$

$C_0 = 32$ g $C_t = 12$

t = ? k = 0.693/6000 (half-life given in passage) **[1]**

substituting in equation:

$t = 2.303 / (0.693 / 6000) \log 32/ 12$

$t = 2.303 \times 60000 / 0.693 \log 2.667$

$t = 2.303 \times 6000 \times 0.4260 / 0.693 = 8494$ years **[1]**

## SECTION-E

**33.** **(a)** Osmotic pressure is the only colligative property have measurable magnitude. So, the Osmotic pressure method is preferred for the determination of molar mass of macromolecules as proteins & polymers. **[1½]**

**(b)** In water, oxygen is in dissolved state & as temperature rises, the solubility of oxygen decreases, solubility of oxygen in water is an exothermic phenomena because of this reason Aquatic animals are more comfortable in cold water than in warm water. **[1½]**

**(c)** The value of Van't Haff factor is twice in 1M KCl than 1M sugar solution due to which elevation of Boiling point is more.

The solvent is somewhat but KCl is ionic due to which it dissociates completely.

The elevation of B.P. is $\boxed{\Delta T_b = i K_b m}$ {In both 1M KCl & 1M sugar solution}. **[2]**

**OR**

**(a)** $\%\frac{W}{V}=\frac{\text{Mass of solute(g)}}{\text{Vol. of solution (in ml)}}\times 100$ **[1½]**

$5=\frac{x}{200}\times 100$

$x = 10\ g$

**(b)** $\text{Molality} = \frac{w\times 1000}{m\times W(\text{in gm})}$ $\begin{cases}\text{molar mass of}\\ CH_3COOH = 60\ gmol^{-1}\end{cases}$

$=\frac{30\times 1000}{60\times 100}=\frac{10}{2}=5m$ **[1½]**

**(c)** (i) Anoxia **[1]**

(ii) At high altitudes, the partial pressure of oxygen is less than that at the ground. **[1]**

**34.** **(a)** A is an alkene $CH(CH_3) = C(CH_3)_2$

B is an aldehyde with $-CH_3$ group $CH_3CHO$

C is a methyl ketone $O = C(CH_3)_2$ **[1]**

**(b)** $CH_3CHO + 2[Ag(NH_3)_2]^+ + 3OH^- \longrightarrow CH_3COO^- + \overset{\oplus}{Ag} + 4NH_3 + 2H_2O$ **[1]**

**(c)** $CH_3COCH_3 + NaOH + I_2 \longrightarrow CHI_3 + CH_3COONa$ **[1]**

**(d)** $CH_3COCH_3 + CH_3CHO$ **[2]**

$\downarrow Ba(OH)_2$

$(CH_3)_2C(OH)CH_2COCH_3 + CH_3CH(OH)CH_2CHO + (CH_3)_2C(OH)CH_2CHO + CH_3CH(OH)CH_2COCH_3$

$\downarrow$ heat

$(CH_3)_2C = CHCOCH_3 + CH_3CH = CHCHO + (CH_3)_2C = CHCHO + CH_3CH = CHCOCH_3$

**OR**

**(a)** (A) : $CCl_3COOH$ (B) : $CH_3COOH$ **[1]**

**(b)** $CH_3COOH \xrightarrow[(ii)\ H_2O]{(i)\ Red\ P/Cl_2} CCl_3COOH$ , Hell Volhard Zelinsky reaction **[1]**

**(c)** $CH_3COCl \xrightarrow{H_2O} CH_3COOH$ **[1]**

**(d)** A will be more acidic due to presence of 3 Cl groups (electron withdrawing groups) which increase acidity of carboxylic acid. **[1]**

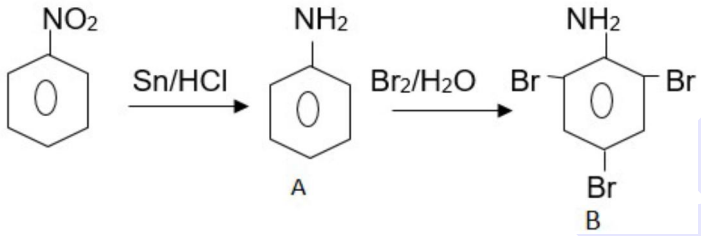
**(e)** $CH_3COOH \xrightarrow{(i)\ NaOH,\ CaO\ (ii)\ heat} CH_4 + Na_2CO_3$ **[1]**

**35.** **(a)** When N-ethylethanamine reacts with benzenesulphonyl chloride, N, N-diethylbenzene sulphonamide is formed. **[1]**

**(b)** When benzylchloride is treated with ammonia, Benzylamine is formed which on reaction with Chloromethane yields a secondary amine, N-methylbenzylamine. **[1]**

**(c)** When aniline reacts with chloroform in the presence of alcoholic potassium hydroxide, phenyl isocyanides or phenyl isonitrile is formed. **[1]**

**(d)** N-Ethyl-N-methylbenzenamine or N-Ethyl-N-ethylaniline. **[1]**

**(e)** 

**[1]**