GOVERNMENT OF KARNATAKA
KARNATAKA STATE EXAMINATION & ASSESSMENT BOARD
II YEAR PUC SUPPLIMENTARY EXAMINATION JUNE – 2023
SUBJECT: CHEMISTRY **SUBJECT CODE: 34**
SCHEME OF EVALUATION

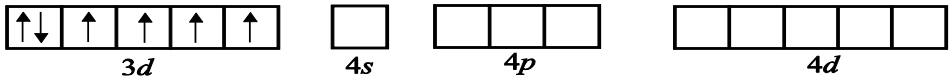
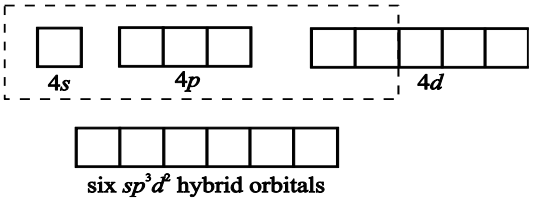
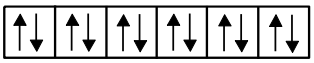
	PART-A	
I.	**Select the correct option from the given choices:**	**15X1=15**
1)	**In non-polar molecular solids, the particles are held together by** **a) Hydrogen bond b) Ionic bond c) Covalent bond d) London forces**	
Ans:	d) London forces OR d) OR London forces	**1**
2)	**Which of the following is a colligative property?** **a) Osmosis b) Osmotic pressure c) Optical activity d) Boiling point**	
Ans:	b) Osmotic pressure OR b) OR Osmotic pressure	**1**
3)	**Which of the following term is dependent on temperature?** **a) Molarity b) Mole fraction c) Molality d) Mass percentage (w/w)**	
Ans:	a) Molarity OR a) OR Molarity	**1**
4)	**How much electricity in terms of Faraday is required to produce one mole of Aluminum (Al) from Al^{3+} ion?** **a) 1F b) 6F c) 3F d) 2F**	
Ans:	c) 3F OR c) OR 3F	**1**
5)	**Unit of rate constant for zero order reaction is** **a) $molL^{-1}s^{-1}$ b) s^{-1} c) $mol^{-1}Ls^{-1}$ d) $molL^{-1}$**	
Ans:	a) $molL^{-1}s^{-1}$ OR a) OR $molL^{-1}s^{-1}$	**1**
6)	**Which one of the following has minimum flocculation power?** **a) Pb^{4+} b) Al^{3+} c) Mg^{2+} d) Na^{+}**	
Ans:	a) Pb^{4+} OR a) OR Pb^{4+}	**1**
7)	**Electrolytic refining is used to purify which of the following metal?** **a) Cu b) Ge c) Tl d) Hg**	
Ans:	a) Cu OR a) OR Cu	**1**
8)	**The noble gas which does not occur in the atmospheric air is** **a) Helium b) Neon c) Argon d) Radon**	
Ans:	d) Radon OR d) OR Radon	**1**
9)	**The valence shell electronic configuration of element with atomic number (z) = 24 is a) $3d^4\ 4s^2$ b) $3d^5\ 4s^1$ c) $3d^6\ 4s^1$ d) $3d^4\ 4s^1$**	
Ans:	b) $3d^5\ 4s^1$ OR b) OR $3d^5\ 4s^1$	**1**

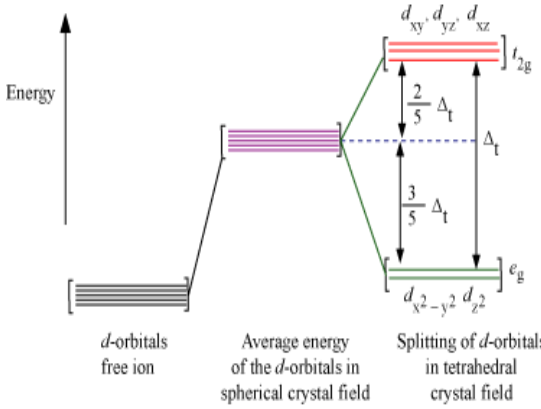
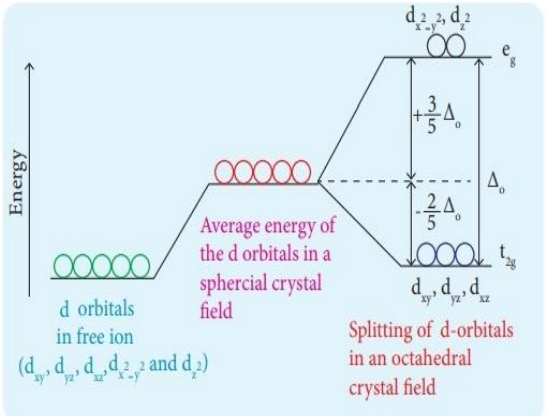
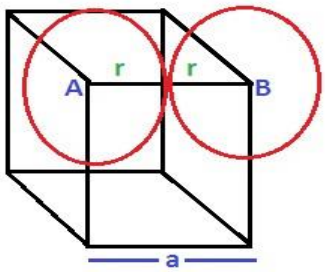
10)	**Indicate the complex ion which shows geometrical isomerism** **a) $[Cr(H_2O)_4 Cl_2]^+$ b) $[Pt(NH_3)_3 Cl]$ c) $[Co(H_2O)_6]^{3+}$ d) $[Co(CN)_4 (NC)]^{3-}$**	
Ans:	a) $[Cr(H_2O)_4 Cl_2]^+$ OR a) OR $[Cr(H_2O)_4 Cl_2]^+$	**1**
11)	**Which of the following has highest melting point?** **a) o-dichlorobenzene b) m-dichlorobenzene** **c) p-dichlorobenzene d) chlorobenzene**	
Ans:	c) p-dichlorobenzene OR c) OR p-dichlorobenzene	**1**
12)	**The IUPAC name of wood spirit is** **a) Methanol b) ethanol c) methanol d) ethanal**	
Ans:	a) Methanol OR a) OR Methanol	**1**
13)	**Which of the following is more acidic?** **a) CH_3COOH b) $ClCH_2COOH$ c) $Br CH_2COOH$ d) FCH_2COOH**	
Ans:	d) FCH_2COOH OR a) OR FCH_2COOH	**1**
14)	**The hybridised state of Nitrogen in trimethylamine is** **a) sp b) sp^2 c) sp^3 d) dsp^2**	
Ans:	c) sp^3 OR c) OR sp^3	**1**
15)	**The hormone which increases the blood glucose level is** **a) glucocorticoids b) glucagon c) Progesterone d) Thyroxine**	
Ans:	b) glucagon OR b) OR glucagon	**1**
II.	**Fill in the blanks by choosing the appropriate word from those given in the brackets: [Activation energy, Dettol, Grignard, XeO_3, Anoxia**	**5 X 1 = 05**
16)	**Low blood oxygen causes climbers to become weak and unable to think clearly, symptoms of a condition known as**	
Ans:	Anoxia	**1**
17)	**The criteria for an effective collision of molecules are proper orientation and**	
Ans:	Activation energy	**1**
18)	**Complete hydrolysis of XeF_6 with gives**	
Ans:	XeO_3	**1**
19)	**Alkyl magnesium halides are known as _____ reagents.**	
Ans:	Grignard	**1**
20)	**A mixture of chloroxylenol and terpineol is called**	
Ans:	Dettol	**1**

PART - B			
III.	**ANSWER ANY FOUR OF THE FOLLOWING. EACH QUESTION CARRIES TWO MARKS.**		**5 X 2 = 10**
21)	**Write any two differences between Schottky defect and Frenkel defect.**		
Ans:	Frenkel defect	Schottky defect	(Any two correct answer) **ONE MARK**
	the dislocation of cation from its normal site to the interstitial site.	missing of both cation and anion from the crystal lattice.	
	Density remains same.	Density decreases.	
	Shown by ionic substance, a large difference the size of ions.	Shown by ionic substance, almost same size of ions.	
22)	**What are Fuel cells? Write the electrode reaction taking place at cathode of H_2 - O_2 fuel cell.**		
Ans:	Galvanic cell converts the energy of combustion of fuels like hydrogen, methane, methanol etc directly into electrical energy. **At cathode:** $O_{2(g)} + 2H_2O_{(l)} + 4e^- \rightarrow 4OH^-_{(aq)}$		**1** **1**
23)	**A first order reaction is found to have a rate constant k = 5.5 X $10^{-14}S^{-1}$. Find the half-life of the reaction.**		
Ans:	$k = \frac{0.693}{t_{1/2}}$ OR $t_{½} = \frac{0.693}{K}$ $t_{½} = \frac{0.693}{\mathbf{5.5\ X\ 10^{-14}}} = \mathbf{1.26\ X\ 10^{+13}}$		**1** **1**
24)	**Write any two consequences of Lanthanoid contraction.**		
Ans:	1. The separation of lanthanoids in pure state becomes difficult. **OR** Difficulty in separation of lanthanoids due to similar chemical properties. 2. The atomic radii of 3rd row transition series elements are almost similar to that of 2nd row transition series elements. **OR** The identical radii of Zirconium (Zr) and Hafnium (Hf).		**1** **1**
25)	**Explain Williamson Synthesis of ether with an example.**		
Ans:	When alkyl halides are allowed to react with sodium alkoxide gives ethers. $R-X + R'-O\ Na \longrightarrow R-O-R' + NaX$ Alkyl halide; Sodium alkoxide; Ether **Equation = 1M & Explanation =1M** OR **Self-explanatory equation: 2M**		**1** **1**

26)	**What is Hell – Volhard – Zelinsky reaction. Write equation.**	
Ans:	Carboxylic acids having an α-hydrogen on treated with chlorine or bromine in the presence of red Phosphorus gives α-halocarboxylic acid. $R-CH_2-COOH \xrightarrow[2.\ H_2O]{1.\ X_2/\text{Red phosphorus}} R-\underset{X}{CH}-COOH + HX$ Carboxylic acid X = Cl, Br α-Halocarboxylic acid **Equation = 1M & Explanation =1M** OR **Self-explanatory equation: 2M**	**1** **1**
27)	**What are Tranquilizers? Give an example.**	
Ans:	The chemicals which are used for the treatment of stress and mental diseases are called tranquilisers. Example: Iproniazid, phenelzine, Chlordiazepoxide, meprobamate and equanil (Any one correct example)	**1** **1**
28)	**Why soap does not work in hard water?**	
Ans:	Hard water contains calcium and magnesium ions. When soaps are dissolved in hard water, these ions displace sodium or potassium from their salts and form insoluble calcium or magnesium salts of fatty acids. These insoluble salts separate as scum. $2C_{17}H_{35}COONa + CaCl_2 \longrightarrow 2NaCl + (C_{17}H_{35}COO)_2\,Ca$ Soap — Insoluble calcium stearate (scum) **Explanation without equation:** 2Marks **& Only Equation:** 1Mark	**1** **1**
	PART - C	
IV.	**ANSWER ANY FOUR OF THE FOLLOWING. EACH QUESTION CARRIES 3 MARKS.**	**5 X 3 = 15**
29)	**Write the chemical equations involved in the leaching of pure alumina from ore.**	
Ans:	$Al_2O_{3(s)} + 2NaOH_{(aq)} + 3H_2O_{(l)} \xrightarrow[35-36\ bar]{473-523K} 2Na[Al(OH)_4]_{(aq)}$ $2Na[Al(OH)_4]_{(aq)} + CO_{2(g)} \longrightarrow Al_2O_3 \cdot xH_2O_{(s)} + 2NaHCO_{3(aq)}$ $Al_2O_3 \cdot xH_2O_{(s)} \xrightarrow{1470\ K} Al_2O_{3(s)} + xH_2O_{(g)}$ OR $Al_2O_3 + 2NaOH + 3H_2O \longrightarrow 2Na[Al(OH)_4]$ $2Na[Al(OH)_4] + CO_2 \longrightarrow Al_2O_3 \cdot xH_2O + 2NaHCO_3$ $Al_2O_3 \cdot xH_2O \xrightarrow{1470K} Al_2O_3 + xH_2O$ (where x = 3) One mark for each step	**1** **1** **1** **1** **1** **1**

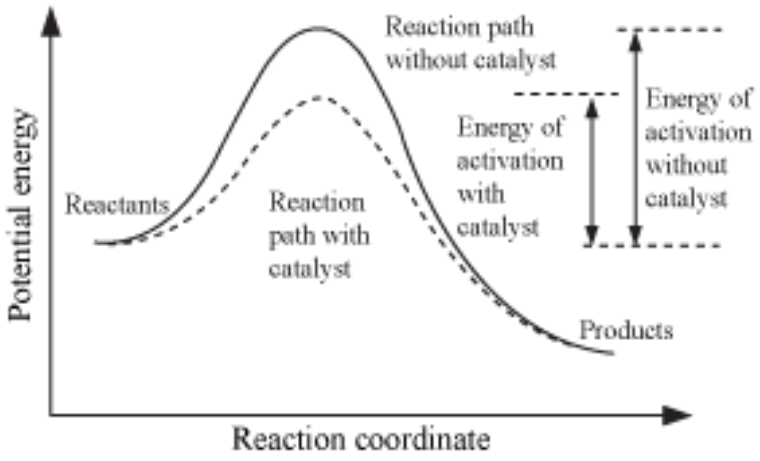
30)	**In the manufacture of ammonia by Haber's process, write the balanced chemical equation with any two conditions to get maximum yield**	
Ans:	$N_{2(g)} + 3H_{2(g)} \underset{\text{Fe catalyst}}{\overset{700K\ 200atm}{\rightleftharpoons}} 2NH_{3(g)}$ 1. High temperature about $550^{\circ}C$ or 823K 2. High pressure 200×10^5 Pa (about 200 atm) 3. Catalyst: Iron or Iron oxide. 4. K_2O and Al_2O_3 are used as catalytic promoter. (Any two correct answers)	**1** **1** **1**
31) **a)** **b)** **c)**	**Complete the following reaction:** $4Al + 3O_2 \rightarrow$ $2SO_2 + O_2 \xrightarrow{V_2O_5}$ $CaO + H_2O \rightarrow$	
Ans: a) b) c)	$2Al_2O_3$ OR Aluminium trioxide OR Alumina $2SO_3$ OR Sulphur trioxide $Ca(OH)_2$ OR Calcium hydroxide.	**1** **1** **1**
32. a) **b)**	**Write any two anomalous behavior of fluorine** **Interhalogen compounds are more reactive than halogens. Give one reason.**	
Ans: a) b)	1. Ionisation enthalpy, electronegativity and electrode potentials are higher for fluorine than expected from the trends shown by other halogens. 2. Ionic and covalent radii, m.p and b.p and electron gain enthalpy of fluorine are quite lower than expected. 3. Low F−F dissociation enthalpy 4. Most of the reactions of fluorine are exothermic. 5. HF is a liquid (b.p. = 293 K) while all other hydrogen halides are gases 6. Forms only one oxoacid while other halogens form a number of oxoacids. **(Any two correct answers)** $X-X'$ covalent bond in interhalogens is weaker than X − X bond in halogens.	(Any two correct answers) **1 + 1** **1**
33.	**Write the balanced chemical equations in the manufacture of potassium dichromate ($K_2Cr_2O_7$) from chromite ore.**	
Ans:	Step 1: $4\ FeCr_2O_4 + 8\ Na_2CO_3 + 7\ O_2 \rightarrow 8\ Na_2CrO_4 + 2\ Fe_2O_3 + 8\ CO_2$ Step 2: $2Na_2CrO_4 + H_2SO_4 \rightarrow Na_2Cr_2O_7 + Na_2SO_4 + H_2O$ or $2Na_2CrO_4 + 2H^+ \rightarrow Na_2Cr_2O_7 + 2Na^+ + H_2O$ Step 3: $Na_2Cr_2O_7 + 2KCl \rightarrow K_2Cr_2O_7 + 2NaCl$ **One mark for each step**	**1** **1** **1**

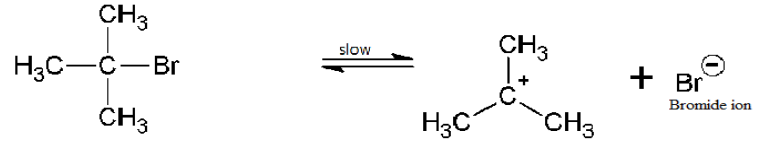
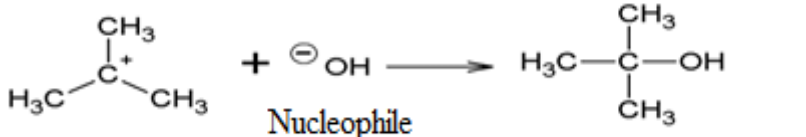
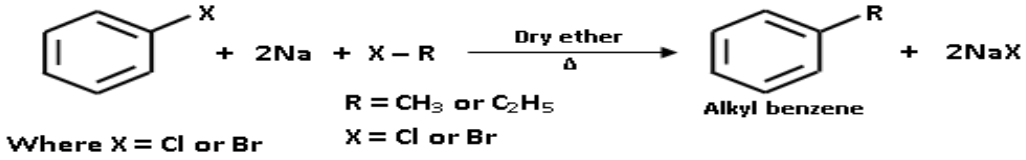
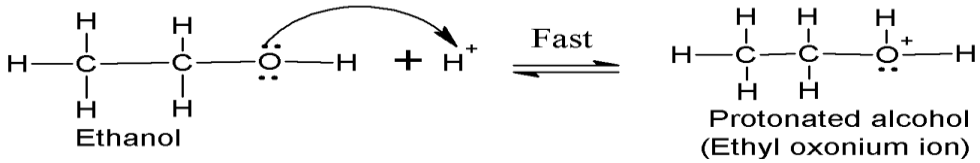
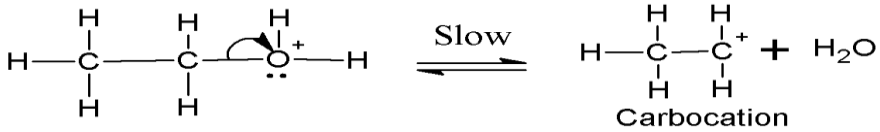
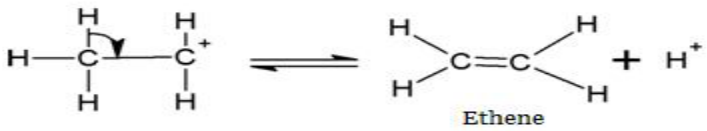
34. a) **b)**	**The transition metals and their compounds are known for their catalytic activity. Give two reasons.** **Between Sc^{3+} and Cu^{2+} ion, which is colourless?**	
Ans: a)	1) Due to variable (multiple) oxidation states. 2) Large surface area for adsorption of reactant. 3) Formation of intermediate compounds. (Bonds between reactant and atoms of the surface of the catalyst). 4) Due to their ability to form complexes **(Any two correct answers)**	**1 + 1** (Any two correct answers)
b)	Sc^{3+}	**1**
35)	**Using Valence Bond Theory [VBT], explain geometry, hybridisation and magnetic property of $[CoF_6]^{-3}$ ion. [Atomic number of Cobalt is 27].**	
Ans: a) b)	In this complex, the oxidation state of Co is +3. F^- ion provides a weak ligand field. Electronic configuration of Co^{+3} is [Ar] $3d^6\ 4s^0$.  one 4s, three 4p & two outer 4d-orbitals hybridised to yield six sp^3d^2 hybrid orbitals pointing towards the six corners of an octahedron.  Six sp^3d^2 hybrid orbitals with six pairs of electrons from F^- ligands:  Thus, the complex has octahedral geometry. This complex is paramagnetic due to presence of unpaired electrons. **Hybridisation: sp^3d^2; Geometry: Octahedral;** **Magnetic property: Paramagnetic**	**1** **1** **1**
36) a) **b)**	**Draw the figure to show splitting of d-orbitals in an octahedral crystal field.** **Write the IUPAC name $[Cr(NH_3)_3(H_2O)_3]Cl_3$**	

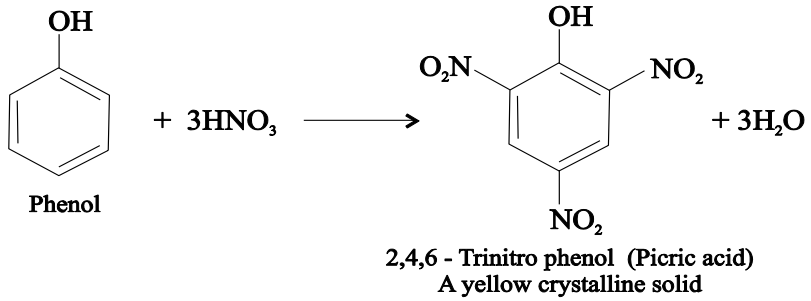
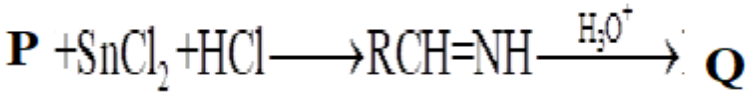
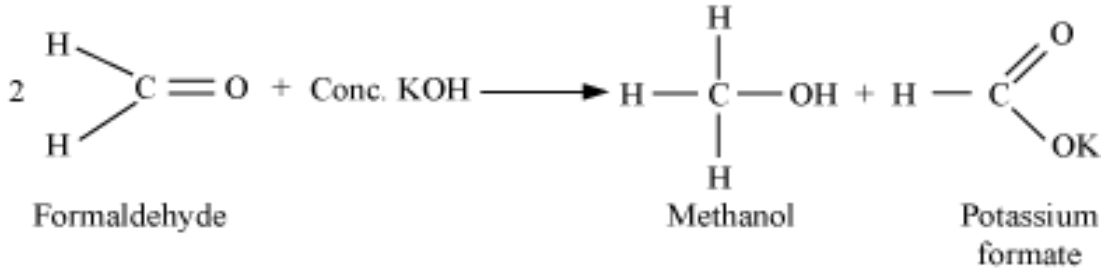
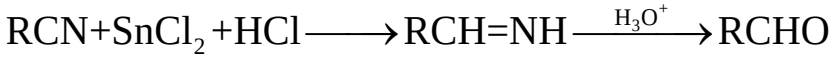
Ans: a)	 **OR**  	**2**
b)	Triamminetriaquachromium(III)chloride	**1**
	PART - D	
V.	**ANSWER ANY THREE OF THE FOLLOWING. EACH QUESTION CARRIES FIVE MARKS.**	**3 X 5 = 15**
37) a) **b)**	**Calculate the packing efficiency in Simple Cubic Lattice.** **Silver forms CCP lattice and X-ray studies of crystals show that the edge length of its unit cell is 408.6pm. Calculate the density of silver. (Atomic mass of silver = 107.9u, N_A = 6.022 X 10^{23}).**	
Ans: a)	 The edge length or side of the cube 'a' and the radius of each particle 'r' are related as $a = 2r$ Volume of the cubic unit cell = $a^3 = (2r)^3 = 8r^3$ Since a simple cubic unit cell contains only 1 atom. **The volume of the occupied sphere** $= \frac{4}{3}\pi r^3$ $\therefore$ Packing efficiency $= \frac{\text{Volume of one sphere (atom)}}{\text{Total volume of the unit cell}} \times 100\%$ $\text{Packing efficiency} = \frac{\frac{4}{3}\pi r^3}{8r^3} \times 100 = \frac{\pi}{6} \times 100 = 52.4\%$	**1** **1** **1**
b)	$d = \frac{z \times M}{a^3 \times N_A}$ $= \frac{4 \text{ X } 107.9}{(408.6 \text{ X } 10^{-10})^3 \text{ X } 6.022 \text{ X } 10^{23}} = 10.5 gcm^{-3}$	1 1

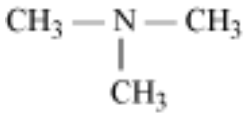
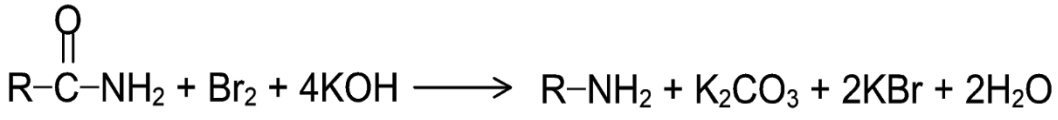
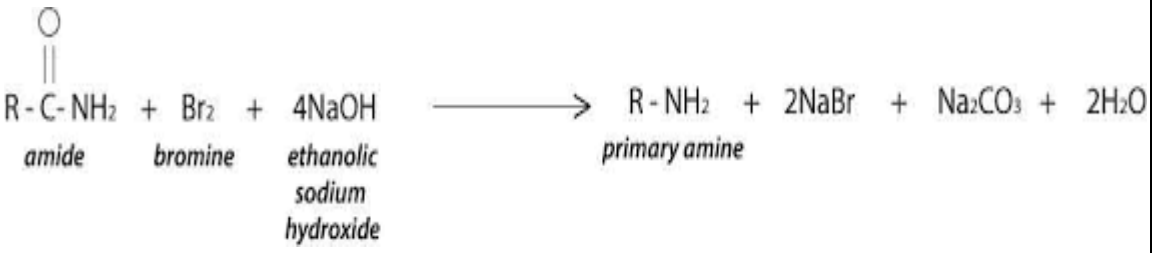
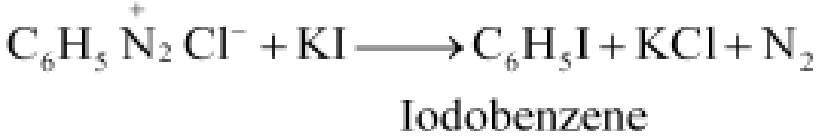
38) a)	**1.00g of a non-electrolyte solute dissolved in 50g of benzene lowered the freezing point of benzene by 0.40K. the freezing point depression constant of benzene is 5.12Kkgmol^{-1}. Find the molar mass of the solute.**	
b)	**Define Van't Hoff factor (i). give the value of 'I' for complete dimerization of all the molecules of ethanoic acid in benzene.**	
Ans: a)	$M_2 = \frac{1000 \times w_2 \times K_b}{\Delta T_b \times w_1}$ $M_2 = \frac{K_b \times 1000 \times w_2}{\Delta T_b \times w_1}$. **or**	**1**
	$M_2 = \frac{5 \cdot 12 \times 1 \times 1000}{0 \cdot 4 \times 50}$	**1**
	$M_2 = 256 \text{ g mol}^{-1}$	**1**
b)	"Van't Hoff's factor is defined as the ratio of the experimental value of the colligative property to the calculated value of the colligative property". **OR**	
	$i = \frac{\text{Normal molar mass}}{\text{Abnormal molar mass}} = \frac{\text{Observed colligative property}}{\text{Calculated colligative property}} = \frac{\text{Total number of moles of particles after association/dissociation}}{\text{Number of moles of particles before association/dissociation}}$	**1**
	(any one correct equation)	
	Van't Hoff's factor = i = 2	**1**
39) a)	**Calculate the emf of the cell in which the following reaction take place, at 298 K: $Mg_{(s)} + 2Ag^+_{(0.0001M)} \rightarrow Mg^{2+}_{(0.130M)} + 2Ag_{(s)}$; Given: $E^o_{cell} = 3.17V$**	
b)	**State Kohlrausch law of independent migration of ions. Mention one application of it.**	
Ans: a)	The Nernst equation is	
	$E_{(cell)} = E^\circ_{cell} - \frac{RT}{nF} \ln \frac{[Mg^{2+}]}{[Ag^+]}$	**1**
	$E_{cell} = 3.17\,V - \frac{0.059\,V}{n} \log \left[\frac{0.130}{(0.0001)^2} \right]$	**1**
	$E_{cell} = 3.17\,V - \frac{0.059\,V}{2} \times 7.114$	
	$E_{cell} = 3.17\,V - 0.21\,V$	**1**
	$E_{cell} = +2.96\,V.$	

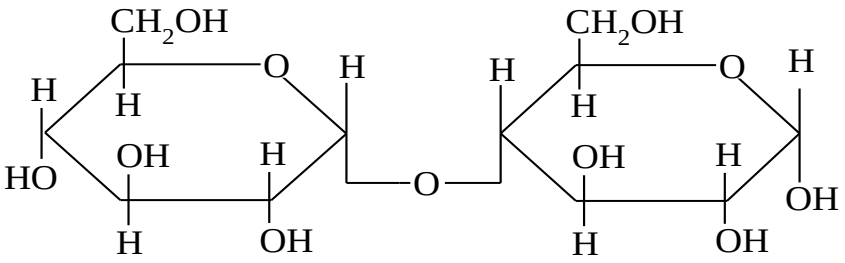
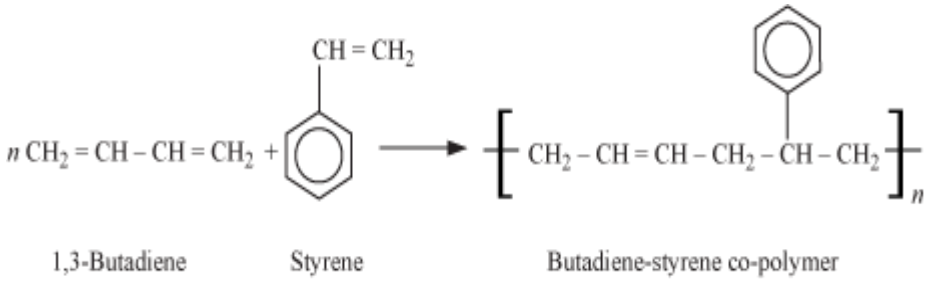
Ans: b)	"At infinite dilution when the dissociation of the ions is complete each ion makes a definite contribution to the total molar conductance irrespective of the nature of the other ion". **Application**: In the calculation of 1. molar conductivity at infinite dilution (Λ_0) for weak electrolytes. 2. Degree of Dissociation (α) 3. Dissociation Constant K (Any one correct answer)	**1** **1**
40) a) b)	**Derive integrated rate equation for the rate constant of a zero-order reaction. Draw a graph of potential energy v/s reaction coordinate show the effect of catalyst on activation energy.**	
Ans: a)	Consider a first order reaction, R → P $[R]_0$ = Initial concentration of the reactant. [R] = Concentration of the reactant at any time. $$\text{Rate} = -\frac{d[R]}{dt} = k[R]^0$$ Where k is rate constant of a zero order reaction $$\therefore -\frac{d[R]}{dt} = k[R]^0$$ $$-\frac{d[R]}{dt} = k \times 1$$ $$d[R] = -k[dt]$$ Integrating both sides: $[R] = -kt + I$ … (i) (I or C= Integration constant) When $t = 0$, $[R] = [R]_0$; Substituting $[R] = [R]_0$ in equation (i), $[R]_0 = -k \times 0 + I$ $[R]_0 = I$ Substituting value of 'I' in equation (i), $[R] = -kt + [R]_0$ $$k = \frac{[R]_0 - [R]}{t}$$	**1** **1** **1**

Ans: b)		**2**
41. a) **b)** **c)**	**Give any two characteristics of chemisorption.** **What is homogeneous catalysis? Give an example.** **Define peptization.**	
Ans: a)	1. Arises because of chemical forces (bonds). 2. Chemisorptions are Highly specific in nature occurs only by the possibility of formation of chemical bond. 3. The process is Irreversible in nature. 4. Gases which can react with adsorbent show chemisorption. 5. Enthalpy of Chemisorptions is high. i.e., 80KJ- 240KJmol^{-1}. 6. Chemisorptions require high activation energy. 7. Chemisorptions Results into uni-molecular layer. 8. High temperature is favourable for Chemisorptions. 9. Chemisorptions increases with increase in surface area. (Any two correct answers)	**1 + 1** (Any two correct answers)
b)	A catalytic reaction in which the catalyst and the reactants are present in the same phase (Physical state) are known as homogeneous catalysis.	**1**
	Example: $2SO_{2(g)} + O_{2(g)} \xrightarrow{NO_{(g)}} 2SO_{2(g)}$	
	$CH_3COOC_2H_5 + \underset{Excess}{H_2O} \xrightarrow{H^+} CH_3COOH + C_2H_5OH$ **OR**	**1**
	Acid hydrolysis of esters (Any one correct example)	
c)	When a freshly prepared precipitate is shaken with the mediums and a small amount of suitable electrolyte, the precipitate gets dispersed giving colloidal solution. This phenomenon is known as peptization. **OR** The process of conversion of freshly prepared precipitate into a colloidal solution by adding an electrolyte containing the common ion is called peptisation.	**1**

VI.	**ANSWER ANY FOUR OF THE FOLLOWING. EACH QUESTION CARRIES 5 MARKS.**	**4X5 =20**
42) a)	**Explain S_N1 mechanism of conversion of tert-butyl bromide to tert-butyl alcohol.**	
b)	**Explain Wurtz – fittig reaction with equation.**	
c)	**What are freons?**	
Ans: a)	 Tertiary butyl bromide tertiary butyl carbocation **I Step:**	**1**
	 tertiary butyl alcohol **II Step:**	**1**
b)	When alkyl halide is treated with aryl halide & sodium metal in the presence of dry ether forms alkylbenzene.	**1**
		**1**
	Equation = 1M & Explanation =1M OR **Self-explanatory equation: 2M**	
c)	Chlorofluorocarbon compounds of methane and ethane are called freons.	**1**
43) a)	**Write the three reactions involved in the mechanism of acid catalysed dehydration of ethanol to ethene.**	
b)	**How is picric acid prepared from phenol? Give equation.**	
Ans: a)	Step1:	
		**1**
	Step2:	
		**1**
	Step3:	
		**1**
	One mark for each step	

b)	Phenol reacts with conc. HNO_3 in the presence of conc. H_2SO_4 to give 2,4,6-trinitro phenol (picric acid).  Phenol 2,4,6 - Trinitro phenol (Picric acid) A yellow crystalline solid **Equation = 1M & Explanation =1M** OR **Self-explanatory equation: 2M**	**1** **1**
44) a)	**How does formaldehyde react with concentrated alkali on heating? Give equation.**	
b)	 **Identify P and Q**	
c)	**The lower members of aldehydes and ketones are miscible with water. Give reason.**	
Ans: a)	, formaldehyde is heating with concentrated alkali undergo self-oxidation and reduction reaction, one molecule of the formaldehyde is reduced to methanol & another is oxidised to formic acid salt (potassium formate).  **Equation = 1M & Explanation =1M** OR **Self-explanatory equation: 2M**	**1** **1**
b)	P = RCN and Q = RCHO **OR**  	**1 + 1** **1**
c)	They form hydrogen bond with water.	

45) a) **b)** **c)**	**Explain Hoffmann - Bromamide degradation reaction with equation** **How do you convert a diazonium salt solution into iodobenzene? Give equation** **Write the IUPAC name of** 	
Ans: a)	Amide on treating with bromine in aqueous or alcoholic NaOH solution gives primary amines.  **OR**  **Equation = 1M & Explanation =1M** OR **Self-explanatory equation: 2M**	**1** **1**
b)	When diazonium salt solutions are treated with potassium iodide solution gives iodobenzene**.**  Iodobenzene **Equation = 1M & Explanation =1M** OR **Self-explanatory equation: 2M**	**1** **1**
c)	N, N – Dimethylmethanamine	**1**
46) a) **b)** **c)**	**Write the Haworth's structure of maltose.** **What are essential amino acids? Give an example** **Name the disease caused by the deficiency of Vitamin-D**	

Ans: a)	 α-D-Glucose unit α-D-Glucose unit Maltose	**2**
b)	The amino acids which are not synthesized in the body but provided in the diet are called essential amino acids.	**1**
c)	*Example*: Lysine, Valine Rickets (bone deformities in children) OR Osteomalacia (soft bones and joint pain in adults)	**1**
47) a) **b)** **c)**	**What are the monomeric repeating units of Nylon-6,6?** **Explain the preparation of Buna-S with equation** **Give an example of a biodegradable aliphatic polyester**	
Ans: a)	i) Adipic acid and ii) Hexamethylene diamine	**1 + 1**
b)	Buna-S is formed by polymerisation of 1, 3 butadiene and styrene.  1,3-Butadiene Styrene Butadiene-styrene co-polymer **Equation = 1M & Explanation =1M** OR **Self-explanatory equation: 2M**	**1** **1**
c)	PHBV OR poly β- hydroxybutyrate-co-β-hydroxy valerate	**1**