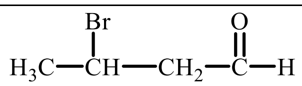
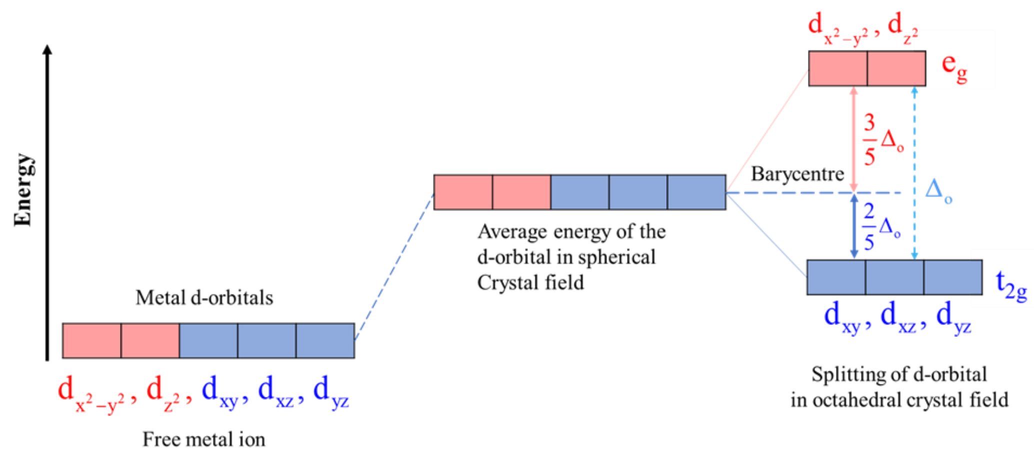
KARNATAKA SCHOOL EXAMINATION & ASSESSMENT BOARD
II PUC EXAMINATION–1; MARCH–2025

SUBJECT: 34-CHEMISTRY   MODEL ANSWERS   MAX.MARKS: 70

	PART-A	
I.	**Select the correct option from the given choices:**	**15 × 1=15**
1)	Incorrect statement regarding vitamins, a) Excess vitamin intake is harmful b) Most of the vitamins contain amino groups c) Vitamins can be produced by plants d) Vitamin deficiency causes diseases	
Ans:	**b) Most of the vitamins contain amino groups (or)** **Most of the vitamins contain amino groups (or) b)**	**1**
2)	Camphor in nitrogen gas, is an example of __________. a) liquid Solutions b) solid Solutions c) gaseous Solutions d) aqueous solution	
Ans:	**c) gaseous Solutions (or) gaseous Solutions (or) c)**	**1**
3)	Which of the following is not a subdivision of structural isomerism? a) Coordination isomerism b) Linkage isomerism c) Ionisation isomerism d) Geometrical isomerism	
Ans:	**d) Geometrical isomerism (or) Geometrical isomerism (or) d)**	**1**
4)	Cumene hydroperoxide on hydrolysis with dilute acid gives _________. a) alcohol and phenol b) only phenol c) phenol and acetone d) alcohol and acetone	
Ans:	**c) phenol and acetone (or) phenol and acetone (or) c)**	**1**
5)	An example of a pseudo first-order reaction is, a) The decomposition of gaseous ammonia on a hot platinum surface b) Photochemical reaction between hydrogen and chlorine c) Inversion of cane sugar d) Hydrogenation of ethene	
Ans:	**c) Inversion of cane sugar (or) Inversion of cane sugar (or) c)**	**1**
6)	The hybridisation of 'N' atom in trimethyl amine is, a) sp^3 b) sp^2 c) sp d) dsp^2	
Ans:	**a) sp^3 (or) sp^3 (or) a)**	**1**
7)	The IUPAC name of  a) 3-bromobutyraldehyde b) 2-bromopropanaldehyde c) 3-bromobutanal d) 2-bromobutanal	
Ans:	**c) 3-bromobutanal (or) 3-bromobutanal (or) c)**	**1**
8)	Select non-semiconductor from the following, a) silicon b) carbon-black c) gallium arsenide d) doped silicon	
Ans:	**b) carbon-black (or) carbon-black (or) b)**	**1**
9)	**Statement I:** Ammonolysis of alkyl halides has the disadvantage of yielding a mixture of primary, secondary and tertiary amines and also a quaternary ammonium salt. **Statement II:** Tertiary amine is obtained as a major product by taking large excess of ammonia in ammonolysis of alkyl halides. In the light of the above statements, choose the appropriate answer from the options given below: a) Statement I is incorrect but Statement II is correct b) Both Statement I and Statement II are correct c) Both Statement I and Statement II are incorrect d) Statement I is correct but Statement II is incorrect	

Ans:	**d) Statement I is correct but Statement II is incorrect (or)** **Statement I is correct but Statement II is incorrect (or) d)**	**1**
10)	The structure of pentacarbonyliron(0) is, a) tetrahedral b) trigonal bipyramidal c) octahedral d) square pyramidal	
Ans:	**b) trigonal bipyramidal (or) trigonal bipyramidal (or) b)**	**1**
11)	Two compounds 'A' and 'B' were being tested for their boiling points. It was observed that 'A' started boiling after 'B', when both were subjected to same conditions. If the compound 'B' is acetone, which of the following can be compound 'A'? a) Propanal b) Propan-1-ol c) Methoxyethane d) n-Butane	
Ans:	**b) Propan-1-ol (or) Propan-1-ol (or) b)**	**1**
12)	Select the correct order of melting points of isomeric dichlorobenzenes. a) o-dichlorobenzene > m-dichlorobenzene > p-dichlorobenzene b) p-dichlorobenzene > m-dichlorobenzene > o-dichlorobenzene c) p-dichlorobenzene > o-dichlorobenzene > m-dichlorobenzene d) m-dichlorobenzene > o-dichlorobenzene > p-dichlorobenzene	
Ans:	**c) p-dichlorobenzene > o-dichlorobenzene > m-dichlorobenzene (or)** **p-dichlorobenzene > o-dichlorobenzene > m-dichlorobenzene (or) c)**	**1**
13)	Match the following given in List I with List II: **List I** / **List II** i) V_2O_5 — A) Oxidation of ethyne to ethanal ii) $TiCl_4$ with $Al(CH_3)_3$ — B) Polymerisation of alkynes iii) $PdCl_2$ — C) Oxidation of SO_2 in the manufacture of sulphuric acid iv) Nickel complexes — D) Manufacture polyethylene Choose the correct option: a) i-C, ii-D, iii-A, iv-B b) i-A, ii-B, iii-C, iv-D c) i-A, ii-C, iii-B, iv-D d) i-C, ii-A, iii-D, iv-B	
Ans:	**a) i-C, ii-D, iii-A, iv-B (or) i-C, ii-D, iii-A, iv-B (or) a)**	**1**
14)	Which of the following explains the increase in the reaction rate by a catalyst? a) Catalyst decreases the rate of backward reaction so that rate of forward reaction increases b) Catalyst provides extra energy to reacting molecules, so that they produce effective collisions c) Catalyst provides an alternative pathway by reducing the activation energy between the reactants and products d) Catalyst increases the number of collisions between the reacting molecules	
Ans:	**c) Catalyst provides an alternative pathway by reducing the activation energy between the reactants and products (or)** **Catalyst provides an alternative pathway by reducing the activation energy between the reactants and products (or) c)**	**1**
15)	Sufficient amount of 2-methylpropan-2-ol heated with 20% phosphoric acid at 358 K gives main product 'X' with the elimination of water and tert-butyl alcohol undergoes dehydration when it is passed over heated copper at 573 K gives 'Y' Pick the correct statement regarding X and Y. a) The boiling points of 'X' and 'Y' are equal b) The boiling point of 'X' is greater than the boiling point of 'Y' c) The boiling point of 'X' is lesser than the boiling point of 'Y' d) At room temperature both 'X' and 'Y' exists as a solids	
Ans:	**a) The boiling points of 'X' and 'Y' are equal** **(or) The boiling points of 'X' and 'Y' are equal (or) a)**	**1**

II.	**Fill in the blanks by choosing the appropriate word from those given in the brackets: [carbocation, pre-exponential, exponential, unpaired, carbohydrate, CCl_2F_2]**	**5×1=5**	
16)	Arrhenius factor is also called _________ factor.		
Ans:	**pre-exponential**		**1**
17)	Paramagnetism arised from the presence of ________ electrons.		
Ans:	**unpaired**		**1**
18)	_________ is one of the most common freon in industrial use.		
Ans:	**CCl_2F_2**		**1**
19)	The electrophilic attack of $H_3O^{\oplus}$ on alkene forms __________.		
Ans:	**carbocation**		**1**
20)	The hormone glucorticoids control the __________ metabolism.		
Ans:	**carbohydrate**		**1**
	PART - B		
III.	**Answer any three of the following. Each question carries 2 marks.**	**3 × 2 = 6**	
21)	**Explain Wurtz reaction with suitable chemical equation.**		
Ans:	Alkyl halides react with sodium in dry ether to give hydrocarbons. $2RX + 2Na \longrightarrow RR + 2NaX$ **(or)** $\underset{\text{Alkyl halide}}{2\,R{-}X} + 2\,Na \xrightarrow{\text{Dry ether}} \underset{\text{Alkane}}{R{-}R} + 2\,NaX$ **(Any suitable chemical equation; statement 1 mark and equation 1 mark (or) self-explanatory equation 2 mark)**		**1** **1** **(or)** **2** **(or)** **2**
22)	**Molarity (M), molality (m) and mole fraction (χ) are some methods for expressing concentration of solutions.** **Which of these are temperature dependent? Give reason.**		
Ans:	**Molarity (M)** is temperature dependent. **Reason:** Molarity is a function of temperature. This is because volume depends on temperature. **(or)** Volume of the solution varies with the change in temperature. **(or)** $\text{Molarity} \propto \dfrac{1}{\text{Volume of the solution}}$ **(or)** $\text{Molarity} \propto \dfrac{1}{\text{Temperature}}$		**1** **1**
23)	**What are non-essential amino acids? Name an optically inactive naturally occurring α-amino acid.**		
Ans:	The amino acids, which **can be synthesised in the body**, are known as non-essential amino acids. Optically inactive naturally occurring α-amino acid: **Glycine (or) Gly**		**1** **1**
24)	**Write any two characteristic properties of interstitial compounds.**		
Ans:	(i) They have high melting points, higher than those of pure metals. (ii) They are very hard. (iii) They retain metallic conductivity. (iv) They are chemically inert. **(Any Two; 1 mark for each)**		**2**

25)	**While separating a mixture of ortho and para nitrophenols by steam distillation, name the isomer which will be steam volatile. Give reason.**	
Ans:	o-Nitrophenol **Reason:** Due to the presence of **intramolecular hydrogen bonding** of o-Nitrophenol. **(or)** Absence of intermolecular hydrogen bonding.	1 1
	PART - C	
IV.	**Answer any three of the following. Each question carries 3 marks.**	**3 × 3 = 9**
26)	**State any three postulates of Werner's theory of coordination compounds**	
Ans:	1. In co-ordination compounds metals show **two types of valences (linkages)** a) Primary valency b) Secondary valency 2. Primary valency ionisable, satisfied by negative ions. 3.Secondary valency non-ionisable, satisfied by negative ions or neutral molecules. 4. Secondary valency is equal to coordination number. 5. Secondary valency is directional in nature. **(Any Three; 1 mark for each)**	3
27)	**Write the balanced chemical equations involved in the manufacture of potassium dichromate ($K_2Cr_2O_7$) from chromite ore ($FeCr_2O_4$).**	
Ans:	**Step-1:** $\mathbf{4}\ FeCr_2O_4 + \mathbf{8}\ Na_2CO_3 + \mathbf{7}\ O_2 \rightarrow \mathbf{8}\ Na_2CrO_4 + \mathbf{2}\ Fe_2O_3 + \mathbf{8}\ CO_2$ **Step-2:** $\mathbf{2}\ Na_2CrO_4 + \mathbf{2}\ H^+ \rightarrow Na_2Cr_2O_7 + \mathbf{2}\ Na^+ + H_2O$ **(or)** $\mathbf{2}\ Na_2CrO_4 + H_2SO_4 \rightarrow Na_2Cr_2O_7 + Na_2SO_4 + H_2O$ **Step-3:** $Na_2Cr_2O_7 + \mathbf{2}\ KCl \rightarrow K_2Cr_2O_7 + \mathbf{2}\ NaCl$ **(1 mark for each step)** [Note: $FeCr_2O_4$ can also be written as $FeO.Cr_2O_3$]	1 1 1
28)	**$[Co(NH_3)_5Br]SO_4$ is an octahedral coordination compound. Write its IUPAC name and draw the diagram which indicates the splitting of d-orbitals in above complex with respect to CFT (Crystal Field Theory).**	
Ans:	IUPAC name: pentaamminebromidocobalt(III) sulphate.	1
	Splitting of d-orbitals in above complex with respect to CFT (Crystal Field Theory): 	2
29)	**What is lanthanoid contraction? Write one comparison and one difference between lanthanoids and actinoids with respect to oxidation states shown by them.**	

Ans: The overall **decrease in atomic and ionic radii** from lanthanum to lutetium is called lanthanoid contraction. **1**

Comparison: Both exhibit common oxidation state of **+3**. **1**

Difference:

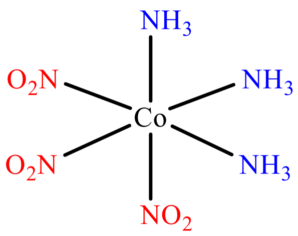
Lanthanoids	Actinoids
Lanthanoids **not show** greater range (variable oxidation states) of oxidation states.	Actinoids **show** greater range (variable oxidation states) of oxidation states.
Show maximum oxidation state is **+4**	Show maximum oxidation state **+7**

1

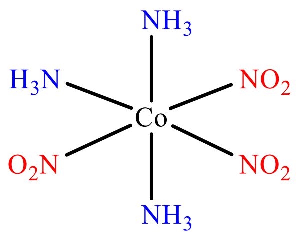
(Any one difference; for each 1 mark)

30) Write the facial (fac) and meridional (mer) isomeric structures of $[Co(NH_3)_3(NO_2)_3]$. Mention the coordination number of a metal ion in an above complex.

Ans:



Fac isomer



Mer isomer

(1 mark for each isomeric structure) **2**

Coordination number: **6 (or) Six** **1**

V Answer any two of the folowing. Each question carries 3 marks: **2 × 3 = 6**

31) Derive an integrated rate equation for the rate constant of zero-order reaction.

Ans: Consider a zero-order reaction, $R \rightarrow P$

Let $[R]_0$ be initial concentration of the reactant and

[R] be concentration of the reactant at any time "t".

$$\text{Rate} = \frac{-d[R]}{dt} = k[R]^0$$ **1**

Where k is rate constant of a zero-order reaction

$$\text{Rate} = \frac{-d[R]}{dt} = k \times 1$$

$$d[R] = -k\,dt$$

Integrating both sides: $[R] = -kt + I$ ………….. (i) (I = Integration constant)

When $t = 0$, $[R] = [R]_0$; Substituting in equation (i),

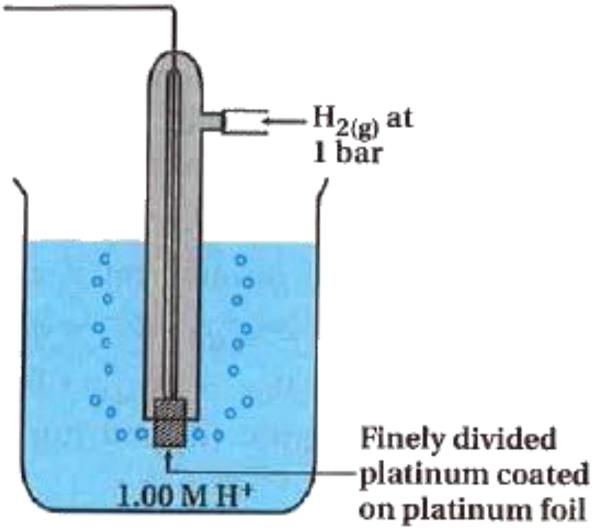
$$[R]_0 = -k \times 0 + I$$

$$[R]_0 = I$$ **1**

Substituting value of 'I' in equation (i), $[R] = -kt + [R]_0$

$$k = \frac{[R]_0 - [R]}{t}$$ **1**

(Any correct alternate derivations marks should be awarded)

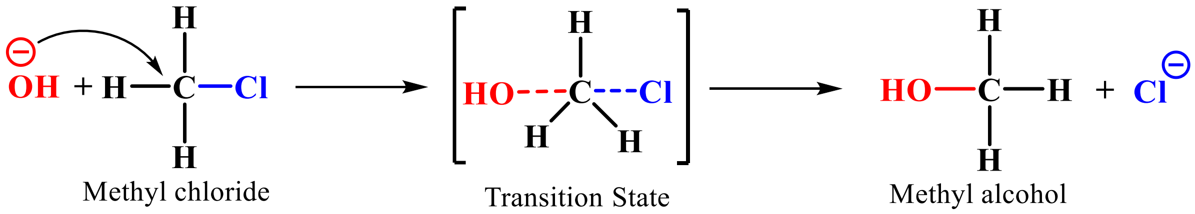
32)	**Write a neat labelled diagram, cell representation and half-cell reaction of Standard Hydrogen Electrode (S.H.E.).**	
Ans:	 **(Any two labelling 1 mark)**	**1**
	Cell representation: $Pt(s)\|H_2(g)\|H^+(aq)$	**1**
	Half-cell reaction: **At anode:** $\frac{1}{2}H_{2\,(g)} \rightarrow H^+_{(aq)} + e^-$ **(or)** **At cathode:** $H^+_{(aq)} + e^- \rightarrow \frac{1}{2}H_{2\,(g)}$ **(or)** $\frac{1}{2}H_{2\,(g)} \rightleftharpoons H^+_{(aq)} + e^-$ **(Any one cell reaction; 1 mark)**	**1**
33)	**Define azeotropes. What type of azeotropes are formed by solutions with negative deviation from Raoult's law? Give an example for it.**	
Ans:	It is defined as the "binary mixtures having the same composition in liquid and vapour phase and boil at a constant temperature".	**1**
	Maximum boiling azeotropes	**1**
	Example: 68% nitric acid and 32% water **(or)** 80% H_2O and 20%HCl **(or)** Chloroform and acetone **(or)** **(Any suitable example)**	**1**
34)	**Lead storage battery is commonly used as a secondary cell in automobiles. What is secondary cell? Write down the reactions occurs at anode and cathode during discharging of the lead storage battery.**	
Ans:	Rechargeable cell is called secondary cell.	**1**
	Anode: $Pb(s) + SO_4^{2-}(aq) \longrightarrow PbSO_4(s) + 2e^-$	**1**
	Cathode: $PbO_2(s) + SO_4^{2-}(aq) + 4H^+(aq) + 2e^- \longrightarrow PbSO_4(s) + 2H_2O\,(l)$	**1**

PART - D

VI. **Answer any four of the following. Each question carries 5 marks.** **4 × 5 = 20**

35) a) **Write the S_N2 mechanism for conversion of chloromethane to methanol. Mention its order.**
b) **What is racemic mixture? Represent the butan-2-ol in racemic mixture form.**

Ans:
a)



(One mark for each step) **2**

Order: 2 (or) Two **1**

b) Equimolar mixture of ***d*** and ***l*** isomers is called racemic mixture.

(or)

Mixture of 50% ***d*** and 50% ***l*** isomers is called racemic mixture. **1**

Represent the butan-2-ol in racemic mixture form:
dl-butan-2-ol **(or)** (±) butan-2-ol **1**

36) a) **Amylose and Amylopectin are two components starch. Write any two differences between them.**
b) **List the any two nitrogenous bases commonly found in both RNA and DNA.**
c) **Name the enzyme that catalyses hydrolysis of maltose into glucose.**

Ans: a)

Amylase	Amylopectin
It is water **soluble** component.	It is water **insoluble** component.
It constitutes about **15-20%** of starch.	It constitutes about **80-85%** of starch.
Amylose is **unbranched** chain polymer.	Amylopectin is **branched** chain polymer.
α-D-glucose units held together by C_1–C_4 glycosidic linkage.	α-D-glucose units held together by C_1–C_4 and C_1–C_6 glycosidic linkage.

(Any other suitable answer, Any two; for each 1 mark**)** **2**

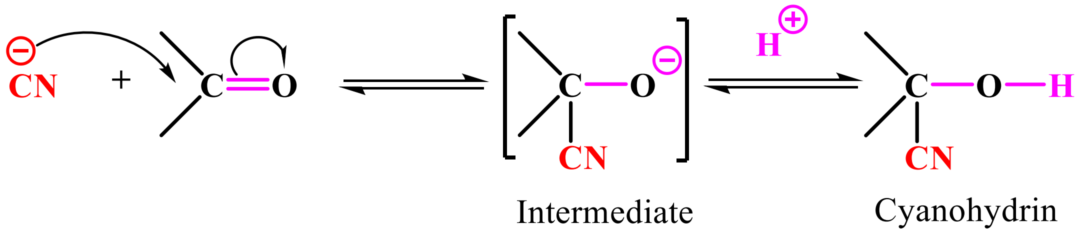
b) Adenine (A), Guanine (G) and Cytosine (C) **(Any two; for each 1 mark)** **2**

c) Maltase **1**

37) a) **Write the mechanism of addition of HCN to carbonyl group in presence of a base.**
b) **Explain Rosenmund reduction with chemical equation.**

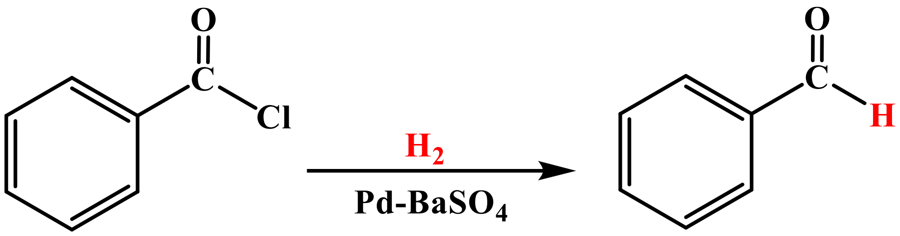
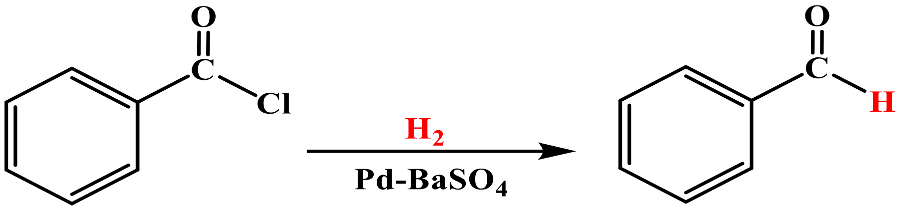
Ans: a)

$$H{-}CN + \overset{\ominus}{OH} \rightleftharpoons \overset{\ominus}{CN} + H_2O$$ **1**



2

(One mark for each step)

b)	Hydrogenation of acyl chloride over palladium on barium sulphate gives aldehyde. This reaction is called Rosenmund reduction.  **(or)**  Benzoyl chloride Benzaldehyde **(Statement 1 mark and equation 1 mark (or) self-explanatory equation 2 mark)**	**1** **1** **(or)** **2**
38) a) **b)** **c)**	**Describe carbylamine reaction with suitable chemical equation.** **Explain the conversion of aniline to benzene diazonium chloride with chemical equation.** **Among aryl amines and ammonia which is more basic?**	
Ans: a)	Aliphatic and aromatic primary amines on heating with chloroform and ethanolic potassium hydroxide form isocyanides or carbylamines. This reaction is known as carbylamine reaction. $R{-}NH_2 + CHCl_3 + 3\,KOH \xrightarrow{\text{Heat}} R{-}NC + 3\,KCl + 3\,H_2O$ **(or)** $\underset{\text{Amine}}{R{-}NH_2} + \underset{\text{Chloroform}}{CHCl_3} + 3\,KOH \xrightarrow{\text{Heat}} \underset{\text{Carbylamine}}{R{-}NC} + 3\,KCl + 3\,H_2O$ **(Any suitable chemical equation; statement 1 mark and equation 1 mark (or) self-explanatory equation 2 mark)**	**1** **1** **(or)** **2**
b)	Benzene diazonium chloride is prepared by the reaction of aniline with nitrous acid (HNO_2 **(or)** $NaNO_2$+HCl) at 273-278K. $C_6H_5{-}NH_2 \xrightarrow[\text{273-278 K}]{NaNO_2\ +\ 2HCl} C_6H_5{-}\overset{+}{N_2}\overset{-}{Cl} + NaCl + 2\,H_2O$ **(or)** $\underset{\text{Aniline}}{C_6H_5{-}NH_2} \xrightarrow[\text{273-278 K}]{NaNO_2\ +\ 2HCl} \underset{\text{Benzenediazonium chloride}}{C_6H_5{-}\overset{+}{N_2}\overset{-}{Cl}} + NaCl + 2\,H_2O$ **(Statement 1 mark and equation 1 mark (or) self-explanatory equation 2 mark)**	**1** **1** **(or)** **2**
c)	Ammonia is more basic than aryl amines.	**1**

39 a) **Lucas reagent is an important reagent which helps to distinguish between three classes of alcohols.**
Write the chemical composition of the Lucas reagent and explain how the above reagent helps to distinguish 1^0 and 3^0-alcohols?

b) **Illustrate preparation of ether by Williamson synthesis with a general chemical equation.**

Ans: a) **Chemical composition of the Lucas reagent:**

Conc. HCl and Anhyd. $ZnCl_2$ **(or)** Conc. HCl and $ZnCl_2$ — **1**

With Lucas reagent: Primary alcohols do not gives turbidity at room temperature. — **1**

Tertiary alcohols gives immediate turbidity. — **1**

b) Alkyl halide and sodium alkoxide reacts to gives ether. This reaction is called Williamson's ether synthesis. — **1**

$$R—X + R'—ONa \longrightarrow R—O—R' + NaX$$ — **1**

(or) — **(or)**

$$\underset{\text{Alkyl halide}}{R—X} + \underset{\text{Sodium alkoxide}}{R'—ONa} \longrightarrow \underset{\text{Ether}}{R—O—R'} + NaX$$ — **2**

(Statement 1 mark and equation 1 mark (or) self-explanatory equation 2 mark)

40) **An organic compound 'A' on treatment with ethanoic acid in the presence of hydrochloric acid gas as a catalyst produces an ester 'B'. 'A' on oxidation with CrO_3 in an anhydrous medium gives 'C'. 'C' is heated with concentrated KOH followed by acidification with dilute HCl generates 'A' and 'D'. Three moles of 'D' reacts with PCl_3 gives three moles of compound with molecular formula HCOCl and 'E'. 'D' is reduced to 'A' by lithium aluminium hydride followed by hydrolysis. Write the molecular formulas of the compound 'A', 'B', 'C', 'D' and 'E'.**

Ans:

		Marks
'A'	CH_3OH (or) $H_3C—OH$ (or) CH_4O	1
'B'	CH_3COOCH_3 (or) $H_3C—\overset{\overset{O}{\parallel}}{C}—O—CH_3$ (or) $C_3H_6O_2$	1
'C'	HCHO (or) $H—\overset{\overset{O}{\parallel}}{C}—H$ (or) CH_2O (or) H_2CO	1
'D'	HCOOH (or) $H—\overset{\overset{O}{\parallel}}{C}—O—H$ (or) CH_2O_2	1
'E'	H_3PO_3	1

PART – E (PROBLEMS)

VII. **Answer any three of the following. Each question carries 3 marks.** **3 × 3 = 9**

41) **The initial concentration of N_2O_5 in the following first order reaction**

$N_2O_5(g) \longrightarrow 2NO_2(g) + \frac{1}{2}O_2(g)$ **was 1.24×10^{-2} mol L^{-1} at 318 K. The concentration of N_2O_5 after 60 minutes was 0.20×10^{-2} mol L^{-1}. Calculate the rate constant of the reaction at 318 K.**

Ans:	Given; $[R]_0 = 1.24\times10^{-2}$ mol L^{-1} $[R] = 0.20\times10^{-2}$ mol L^{-1} k = ? $k=\frac{2.303}{t}\log\frac{[R]_0}{[R]}$ $k=\frac{2.303}{60}\log\frac{1.24\times10^{-2}}{0.20\times10^{-2}}$ $k=\frac{2.303}{60}\log 6.2=\frac{2.303}{60}\times0.7924$ **(or)** $k=\frac{2.303}{3600}\times0.7924$ $k=0.0304\,\text{min}^{-1}$ **(or)** $k=3.04\times10^{-2}\,\text{min}^{-1}$ **(or)** $k=0.000506\,\text{s}^{-1}$ **(or)** $k=5.06\times10^{-4}\,\text{s}^{-1}$	**1** **1** **1**
42)	**Calculate the osmotic pressure in pascals exerted by a solution prepared by dissolving 1.0 g of polymer of molar mass 185,000 in 450 mL of water at 37°C. [R = 8.314 ×10^3 Pa LK^{-1}mol^{-1}]**	
Ans:	W_2 = l g, M_2 =185000 V = 450 mL = 0.45L $\pi=\frac{W_2RT}{M_2V}$ **(or)** $\pi=\frac{nRT}{V}$ $\pi=\frac{1\times8.314\times10^3\times310}{185000\times0.45}$ $\pi=0.03096\times10^3$ $\pi=30.96\,\text{Pa}$	**1** **1** **1**
43)	**The standard electrode potential for Daniel cell is 1.1V. Calculate the standard Gibbs energy for the reaction: Zn(s) + Cu^{2+}(aq) $\longrightarrow$ Zn^{2+}(aq) + Cu(s)**	
Ans:	$\Delta_rG^o=-nFE^o_{Cell}$ n =2, F = 96487 C mol^{-1} **(or)** F = 96500 C mol^{-1} and $E^o_{Cell}=1.1V$ $\therefore\Delta_rG^o=-2\times96487\times1.1$ **(or)** $\therefore\Delta_rG^o=-2\times96500\times1.1$ $\Delta_rG^o=-21227\,\text{J mol}^{-1}$ **(or)** $\Delta_rG^o=-212.27\,\text{kJ mol}^{-1}$ **(or)** $\Delta_rG^o=-212.30\,\text{kJ mol}^{-1}$	**1** **1** **1**
44)	**The vapour pressure of pure liquids A and B are 450 and 700 mm Hg respectively, at 350 K. Find out the composition of the liquid mixture if total vapour pressure is 600 mm Hg.**	
Ans:	$p_A^o=450$ mm Hg and $p_B^o=700$ mm Hg $p_{total}=p_B^o+(p_A^o-p_B^o)\chi_A$ $600=700+(450-700)\chi_A$ $\therefore\chi_A=\frac{100}{250}=0.40$ $\therefore\chi_B=1-0.40=0.60$	**1** **1** **1**

45)	**The rate constant of a first order reaction increases from $2\times10^{-2}\ s^{-1}$ to $4\times10^{-2}\ s^{-1}$ when the temperature changes from 300 K to 310 K. Calculate the energy of activation (E_a).** **[log 2 = 0.3010, log 2.5 = 0.3979, log 4 = 0.6020, R = 8.314 $JK^{-1}mol^{-1}$]**	
Ans:	$\log\frac{k_2}{k_1}=\frac{E_a}{2.303R}\left(\frac{T_2-T_1}{T_1T_2}\right)$ T_1 = 300 K, T_2 = 310 K, $k_1 = 2\times10^{-2}$ and $k_2 = 4\times10^{-2}$ $\log\frac{4\times10^{-2}}{2\times10^{-2}}=\frac{E_a}{2.303\times8.314}\left(\frac{310-300}{300\times310}\right)$ $\therefore E_a=\frac{\log 2\times2.303\times8.314\times300\times310}{10}$ $E_a=53598.594\,J\,mol^{-1}$ **(or)** $E_a=53.59\,kJ\,mol^{-1}$ **(or)** $E_a=53.60\,kJ\,mol^{-1}$	**1** **1** **1**
46)	**The conductivity of 0.001028 mol L^{-1} acetic acid is 4.95×10^{-5} S cm^{-1}. Calculate its dissociation constant if Λ^o_m for acetic acid is 390.5 S cm^2 mol^{-1}.**	
Ans:	$\Lambda_m=\frac{\kappa\times1000}{c}=\frac{4.95\times10^{-5}\times1000}{0.001028}=48.15\ S\ cm^2\ mol^{-1}$ $\alpha=\frac{\Lambda_m}{\Lambda_m^o}=\frac{48.15}{390.5}=0.1233$ $k=\frac{c\alpha^2}{(1-\alpha)}=\frac{0.001028\times(0.1233)^2}{(1-0.1233)}=1.78\times10^{-5}\ mol\ L^{-1}$	**1** **1** **1**

*******END*******