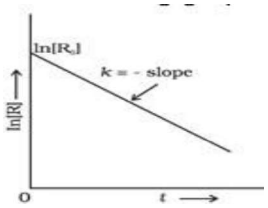
KENDRIYA VIDYALAYA SANGATHAN, BHOPAL FIRST
PRE BOARD 2025-26
CLASS XII
CHEMISTRY (SET 1)

Time: 3 hours **Max.Marks:70**

GENERAL INSTRUCTIONS:

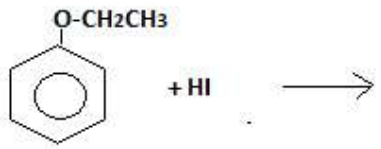
Read the following instructions carefully.

1. There are **33** questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 short answer questions carrying 2 marks each.
4. SECTION C consists of 7 short answer questions carrying 3 marks each.
5. SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. All questions are compulsory.
8. Use of log tables and calculators is not allowed.
9.

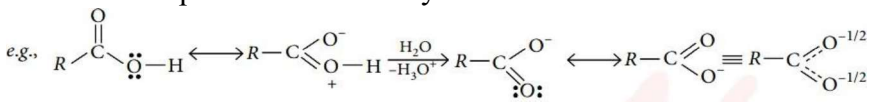
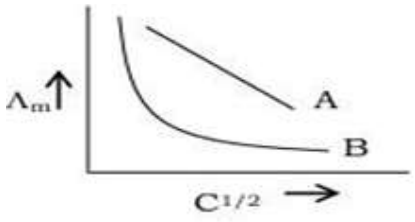
	Section-A **Question no. 1to16 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.**	
1	Which of the following ions possesses magnetic moment equal to that of Ni^{3+} ion? (a) Mn^{3+} (b) Cr^{3+} (c) Fe^{3+} (d) Cu^{2+}	1
2	To what order of a reaction does the following graph belong to?  (a) Zero order reaction (b) First order reaction (c) Second order reaction (d) Third order reaction	1
3	For the reaction $2A + B \rightarrow A_2B$, the order with respect to each reactant is 1. What will be the effect on the reaction rate if the concentration of reactant A is doubled and the concentration of reactant B is decreased by half? (a) increases 2 times (b) increases 4 times (c) decreases 2 times (d) remains the same	1
4	Which of the following is an example of a non-ideal solution showing positive deviation? (a) Acetone + Carbon disulphide (b) Chlorobenzene + Bromobenzene (c) Chloroform + Benzene (d) Acetone + Aniline	1
5	What is the general electronic configuration of the lanthanoides? (a) $(n-2)f^{1-14}\ (n-1)d^{1-10}\ ns^2$	1

	(b) $(n-2)f^{1-14}\ (n-1)d^{1-2}\ ns^2$ (c) $(n-2)f^{1-14}\ (n-1)d^{0-1}\ ns^2$ (d) $(n-2)f^{1-14}\ (n-1)d^{0}\ ns^2$	
6	Which of the following will give maximum number of isomers? (a) $[Ni(C_2O_4)(en)_2]^{2-}$ (b) $[Ni(en)(NH_3)_4]^{2+}$ (c) $[Cr(SCN)_2\ (NH_3)_4]^{+}$ (d) $[Co(NH_3)_4Cl_2]^{+}$	1
7	Match Column I (Compounds) with Column II (Uses), and mark the appropriate option: (a) (A) = (ii), (B) = (iii), (C) = (i), (D) = (iv) (b) (A) = (iv), (B) = (iii), (C) = (ii), (D) = (i) (c) (A) = (i), (B) = (ii), (C) = (iii), (D) = (iv) (d) (A) = (iii), (B) = (i), (C) = (iv), (D) = (ii) Column I (Compounds) / Column II (Uses) (A) Carbon tetrachloride / (i) Paint remover (B) Methylene chloride / (ii) Refrigerators and air conditioners (C) DDT / (iii) Fire extinguisher (D) Freons / (iv) Non-biodegradable insecticide	1
8	Arrange the following compounds in increasing order of boiling point. **Propan-1-ol, butan-1-ol, butan-2-ol, neo-pentyl alcohol** (a) Propan-1-ol < butan-2-ol < butan-1-ol < neo-pentyl alcohol (b) Propan-1-ol < butan-1-ol < butan-2-ol < neo-pentyl alcohol (c) neo-pentyl alcohol < butan-2-ol < butan-1-ol < propan-1-ol (d) neo-pentyl alcohol < butan-1-ol < butan-2-ol < propan-1-ol	1
9	1- Propanol and 2-propanol can be best distinguished by- (a) Oxidation with $KMnO_4$ followed by reaction with Fehling solution? (b) Oxidation with acidic dichromate followed by reaction with Fehling solution. (c) Oxidation by heating with copper followed by reaction with Fehling solution. (d) Oxidation with cone. H_2SO4 followed by reaction with Fehling solution.	1
10	Identify the false statement about amines. (a) Alkyl amines are stronger bases than aryl amines. (b) Alkyl amines react with nitrous acid to produce alcohols. (c) Alkyl amines are stronger bases than ammonia. (d) Aryl amines react with nitrous acid to produce phenols	1

11	Which of the following B group vitamins can be stored in our body? (a) Vitamin B1 (b) Vitamin B2 (c) Vitamin B6 (d) Vitamin B12	1
12	Which of the following base is not present in RNA? (a) Adenine (b) Uracil (c) Thymine (d) Cytosine	1
	Question no. 13 to 16 **Select the most appropriate answer from the options given below:** a) **Assertion is correct, reason is correct; reason is a correct explanation for assertion.** b) **Assertion is correct, reason is correct; reason is not a correct explanation for assertion** c) **Assertion is correct, reason is incorrect** d) **Assertion is incorrect, reason is correct**	
13	**Assertion (A):** On increasing dilution, the molar conductance of weak electrolytes keeps on increasing. **Reason (R):** On increasing dilution, degree of ionization of weak electrolyte increases and mobility of ions also increases.	1
14	**Assertion (A):** $[Ti(H_2O)_6]^{3+}$ is coloured while $[Sc(H_2O)_6]^{3+}$ is colourless. **Reason(R):** d-d transition is not possible in $[Sc(H_2O)_6]^{3+}$.	1
15	**Assertion (A):** Williamson's synthesis method cannot be used for preparing Diphenyl ether. **Reason (R):** Aryl halides do not undergo nucleophilic substitution easily.	1
16	**Assertion:** The pKa of acetic acid is lower than that of phenol. **Reason:** Phenoxide ion is more resonance stabilized than acetate ion.	1
	SECTION B **Question No.17 to 21are short answer questions, carrying 2 marks each.**	
17	Explain why- (i) People at high altitude suffer from deficiency of oxygen. (ii) Intravenous injection is diluted with normal saline, not with distilled water. **OR** I. Which colligative property is the most preferred to calculate molecular masses of proteins? And why? II. 0.1 molal aqueous solution of glucose and 0.03 molal solution of Potassium chloride are separated by a semi-permeable membrane. To which direction solvent molecules will flow? Justify.	2x1 2x1
18	(i) Write the IUPAC name and find secondary valence of the central metal species in the following complex: $[Co(H_2O)_2F_2(ox)]^{1-}$ (ii) Write the electronic configuration of Mn^{+2} ions bonded when- (a) $\Delta_o < PE$ (b) $\Delta_o > PE$	2x1
19	Which compound in each of the following pairs will react faster towards SN^2 reaction and why?	2x1

	I. CH_3Br or CH_3I II. $C_6H_5CH_2Cl$ or $C_6H_5CH(CH3)Cl$	
20	Write the balanced chemical equations of the following reactions- a) Hofmann bromamide degradation reaction b) Diazotization of Primary aliphatic amine	2x1
21	Answer the following- I. Proteins lose their biological activity on boiling or reaction with acids. II. Justify that the two strands of DNA are not identical but complementary.	2
	Section-C **Question No.22 to 28are short answer questions, carrying 3 marks each.**	
22	(a) Calculate the standard cell potential and Δ_rG° and of the galvanic cell in which the following reaction takes place. $Fe^{2+}_{(aq)} + Ag^{+}_{(aq)} \rightarrow Fe^{3+}_{(aq)} + Ag_{(s)}$ (Given $E^\circ (Ag^+/Ag) = + 0.80V$, $E^\circ (Fe^{3+}/ Fe^{2+}) = -0.77V$) (b) To which direction electricity will flow if an external potential greater than standard cell potential is applied on it.	3
23	(i) Explain why- Aq. Solution of copper sulphate mixed with ammonia in 1:4 ratio does not give test of Cu^{+2} ions. Write relevant chemical equation also. (ii) Arrange the following complex ions in increasing order of wave length of the EMR absorbed by them- $[CrCl_6]^{-3}$, $[Cr(CN)_6]^{-3}$, $[Cr(NH_3)_6]^{-3}$ (iii) Which special phenomenon makes the metal carbonyls highly stable? Give brief explanation.	3
24	(i) Expain why vinyl chloride is reluctant towards hydrolysis by aq. NaOH in normal conditions? (ii) Identify A, B, C and D (Draw structures) A (C_4H_9Br) —alc. KOH→ B —HBr→ C (d- isomer) —Aq. NaOH (racemization)→ D (A and C are position isomers)	3
25	(i) Arrange the following in increasing order of the property indicated- Butan-1-ol, Butan-2-ol, 2-Methylpropan-1-ol, 2-Methylpropan-2-ol (Reactivity for reaction with Lucas Reagent) (ii) Complete the equation (only main products)  (III) Convert Phenol to salicylaldehyde. **Or** Convert Phenol to Picric acid.	3

26	(a) Convert the following- I. Ethanal to But-2-enal II. Toluene to Benzyl Alcohol (b) Give simple chemical tests to distinguish between the following pairs of compounds: Benzophenone and Acetophenone.	3
27	State reasons for the following: I. Hinsberg product of secondary amine is insoluble in alkali.. II. Secondary and Tertiary amines cannot be formed by Gabriel Phthalimide synthesis. III. Although $-NH_2$ group is o/p directing in electrophilic substitution reactions, yet aniline on nitration gives good yield of m-nitroaniline.	3x1
28	Answer the following- I. Give chemical equation of the reaction which determines 6 carbon atoms in straight chain of glucose. II. What is the difference between the structures of myosin and albumin? III. What are the products of hydrolysis of starch and cellulose?	3x1
	Section D **Question No.29 &30 are case-based /data-based questions carrying 4marks each.**	
29	**Read the following passage and answer the questions asked.** Colligative properties depend on the number of solute particles irrespective of their nature. Abnormal molecular weights and colligative properties are observed in some cases where the experimental and theoretical values differ considerably. Due to dissociation of solute in water, the number of solute particles increases, resulting in increase in experimental values, since colligative property is inversely proportional to the molecular weight. Due to association of solute in some solvents, number of solute particles decreases and experimental values are also decreased. **Answer the following questions-** (i). What will be the value of molecular mass of a solute that undergoes tetramerization in a solvent? Its normal molecular mass is 90. (ii) Calculate the elevation in boiling point of a 1 molal aq. solution of an electrolyte A_2B_3, if it is 60% ionized. (Given, for water $K_b = 0.52$ K kg/mol) **Or** (ii) Calculate the boiling point of a solution when 4 g of $MgSO_4$ (M. W. = 120), was dissolved in 100 g of water assuming that the solute is completely ionized. ($K_b = 0.52$ K kg mol^{-1})	1+2 +1

	(iii) Name the compound which is mixed in water to delay its freezing. What will be the effect of this compound on boiling point of water?	
30	**Read the following passage and answer the questions asked** Carboxylic acids dissociate in water to give carboxylate ion and hydronium ion. $RCOOH + H_2O \longrightarrow RCOO^- + H_3O^+$ The acidity of carboxyl group is due to the high electronegativity of oxygen which liberates proton. The carboxylate ion formed is resonance stabilised.  Carboxylic acids are stronger acids than phenols. Any effect that increases the stability of conjugate base of the acid, increases its acidic character also. **Questions:** (i) Why are carboxylic acids stronger acids than phenols? (ii) Arrange the following in the increasing order of the written property (a)CH_3COOH, $(CH_3)_2COOH$, $ClCH_2CH_2COOH$, $CH_3CH(Cl)COOH$ (pKa values) (b) Acetophenone, acetone, Ethanal, Methanal (Reaction with HCN) **OR** (ii) The acidic strength of the given compounds follows the order:  (a) II > III > I (b) III > II > I (c) II > I > III (d) I > II > III (iii) Give a chemical distinguish test for Sodium acetate and Acetic acid.	
Section-E **Question No. 31to33 are long answer type question carrying 5 marks each.**		
31	A. By observing the given graph for 2 electrolytes, answer the following questions-  (i) Predict the nature of electrolytes A and B. (ii) What happens on extrapolation of Λ_m to concentration approaching zero for electrolytes A and B?	

B. Explain why the Zn-Cd cell produces constant potential throughout its life..

C. Prove that the corrosion of iron sets an electrochemical cell. (only Chemical equations of anode and cathode)

OR

(i) Calculate the $\Lambda°m$ acetic acid, Given that, $\Lambda°m$ (HCl)= 426 S cm^2 mol^{-1}; $\Lambda°m$ $(NaCl)$= 126 S cm^2 mol^{-1}; $\Lambda°m$ (CH_3COONa)= 91S cm^2 mol^{-1}

(ii) A lead acid battery is the most important type of secondary cell having a lead anode and a grid of lead packed with PbO_2 as cathode. A 38% of H_2SO_4 is used as electrolyte (density = 1.294 g /mL). The battery holds 3.5 L of acid. During the discharge of battery, the density of H_2SO_4 falls to 1.139 g/mL (20% H_2SO_4 by mass).

(a) How much electricity in Coulombs is required to carry out reduction of1 mol of PbO_2 on cathode?

(b) Write down chemical equations of the reactions take place at anode and cathode during discharge of the battery.

(c) What products will be formed if dilute sulphuric acid is electrolyzed using platinum electrodes?

32

(i) The rate constant for a first order reaction is 60 s^{-1}. How much time will it take to reduce the initial concentration of the reactant to its l/10th value?

(ii) A + B → AB

Write rate laws for the above equation according to the following mechanisms

Mechanism 1	Mechanism 2
A + B → C (fast) C + D → AB (slow)	A + B → C (slow) C + D → AB (fast)

OR

(i) At 300 K a certain first order reaction is 50% completed in 20 minutes. At 350 K, the same reaction is 50% completed in 5 minutes. Calculate the activation energy for the reaction.

(Given: log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021)

(ii) A reaction is 80% complete in 40 minutes. Calculate half-life if the reaction follows

(a) 1st order kinetics (b) Zero order kinetics (Log 5 = 0.7)

33

(a) Account for the following-(Any 3)

	(i) Separation of Zr and Hf is very difficult though they belong to different series of d- block elements? (ii) Transition elements exhibit very high enthalpy of atomization? (iii) Cu(I) oxidation state is not stable in aq. Solution? (iv) Zn, Cd and Hg are soft metals? (v) Highest oxidation state of transition metals is exhibited in oxides not in fluorides? (b) What happens when- (i) Dichromate ions react with H_2S gas in acidic medium? (ii) Permanganate ions react with I^- ions in acidic medium? **OR** I. When a chromite ore (A) is fused with sodium carbonate in free excess of air and the product is dissolved in water, a yellow solution of compound (B) is obtained. After treatment of this yellow solution with sulphuric acid, compound (C) can be crystallized from the solution. When compound (C) is treated with KCl, orange crystals of compound (D) crystallize out. Identify A to D and also explain the reactions. II. Name the following elements - (i) Lanthanoid stable in +4 Oxidation State.. (ii) Element having positive value of E° (M^{+2}/M). (iii) Element with highest third ionization enthalpy. (iv) Transition element which does not show variable valency and not form coloured ions.	3+ 2