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FIRST PRE-BOARD EXAMINATION (2025-26)

CLASS – XII

CHEMISTRY (043)

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

Read the following Instructions carefully.

(a) There are **33** questions in this question paper with internal choice.

(b) SECTION A consists of 16 multiple -choice questions carrying 1 mark each.

(c) SECTION B consists of 5 short answer questions carrying 2 marks each.

(d) SECTION C consists of 7 short answer questions carrying 3 marks each.

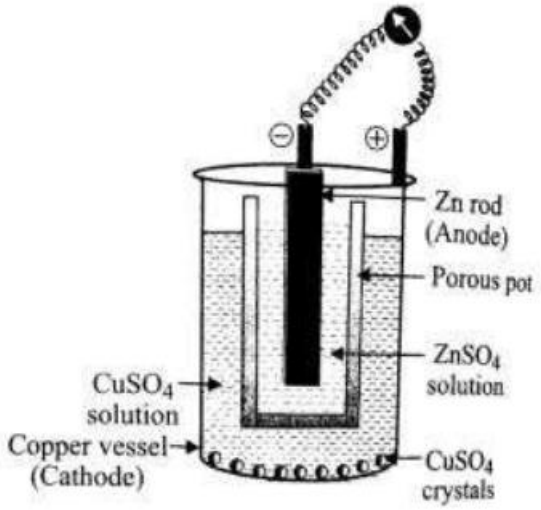
(e) SECTION D consists of 2 case - based questions carrying 4 marks each.

(f) SECTION E consists of 3 long answer questions carrying 5 marks each.

(g) All questions are compulsory.

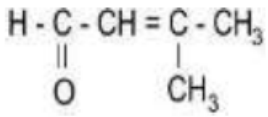
(h) Use of log tables and calculators is not allowed.

	SECTION-A The following questions are multiple -choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.	
1	Which of the following aldehyde does **not** undergo Cannizzaro's reaction ? (a) C_6H_5CHO (b) $(CH_3)_3$ C CHO (c) HCHO (d) $(CH_3)_2CH$ CHO	**[1]**
2	Out of Cu+, Cr^{3+}, Mn^{2+} and Fe^{2+} ions, the one which has the highest magnetic moment is : (a) Cu+ (b) Cr^{3+} (c) Mn^{2+} (d) Fe^{2+} [Atomic number : Cu = 29, Cr = 24, Mn = 25, Fe = 26]	**[1]**
3	Which of the following is a **false** statement ? (a) Order of reaction may be fractional. (b) Half life of a first order reaction is directly proportional to the initial concentration of reactant. (c) Rate of Zero order reaction is independent to the concentration of reactant. (d) The unit of rate constant of a zero order reaction is mol lt-1 sec.	**[1]**
4	The role of a catalyst is to change : (a) equilibrium contant (b) enthalpy of reaction (c) Gibbs energy of reaction (d) activation energy of reaction	**[1]**
5	Ethanal can be converted to ethanol by :	**[1]**

	(a) treatment with $LiAlH_4$ (b) treatment with PCC (c) treatment with $KMnO_4$ (d) heating with Cu at 573 K	
6	Arrange the following compounds in ***increasing order*** of ***pkb :*** CH_3NH_2, $(CH_3)_2$ NH, NH_3, $C_6H_5NH_2$ (a) $C_6H_5NH_2 < NH_3 < (CH_3)_2NH < CH_3NH_2$ (b) $(CH_3)_2NH < CH_3NH_2 < NH_3 < C_6H_5NH_2$ (c) $C_6H_5NH_2 < NH_3 < CH_3NH_2 < (CH_3)_2NH$ (d) $(CH_3)_2NH < CH_3NH_2 < C_6H_5NH_2 < NH_3$	**[1]**
7	Which of the following molecule will be chiral? (a) n-butyl chloride (b) tert^0-bulyl chloride (c) sec^0-butyl chloride (d) iso-butyl chloruide	**[1]**
8	The conversion of an alkyl halide into an alkene by ethanolic KOH is classified as (a) a dehydration reaction (b) a nucleophilic substitution reaction (C) an addition reaction (d) a dehydrohalogenation reaction	**[1]**
9	The electrochemical cell made up of Zn and Cu half-cell is called Daniell cell. The emf of a Daniell cell is 1.10V.  When an external voltage greater than 1.10 V is applied to this cell, which of the following change will be observed in the cell? (a) Zn electrode will act as an anode. (b) Current will flow from Cu half cell to Zn half cell. (c) Electrochemical cell continue to work fast. (d) Cell will act as electrolytic cell.	**[1]**

10	Value of Henry's constant KH _____. (i) increases with increase in temperature. (ii) decreases with increase in temperature. (iii) greater for gases with higher solubility. (iv) greater for gases with lower solubility. Choose the correct option (a) (i) and (iii) (b) (i) and (iv) (c) (ii) and (iii) (d) (ii) and (iv)	**[1]**
11	Reagent than can not used to distinguish between Ethanal and Ethanoic acid. (a) Sodium bicarbonate (b) Neutral $FeCl_3$ (c) $NaOH + I_2$ (d) Tollens reagent	**[1]**
12	In which of the following pair both ions are diamagnetic : (a) Fe^{2+} and Cu^{+} (b) Sc^{3+} and Cu^{2+} (c) Ti^{4+} and Zn^{2+} (d) Mn^{2+} and Sc^{3+}	**[1]**
For question number 13 to 16 two statement are given – one labelled as Assertion (A) and the other lebelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion. (c) Assertion is correct statement but reason is wrong statement. (d) Assertion is wrong statement but reason is correct statement.		
13	**Assertion**: Nucleophilic substitution reaction of chlorobenzene is easier than that of chloroethane. **Reason**: C – Cl bond in chlorobenzene has partial double bond character due to S_N2 reactions	**[1]**
14	**Assertion :** When methyl alcohol is added to water, boiling point of water decreases.. **Reason :** Interaction between methyl alcohol and water are less than individual interaction between methyl alcohol and water	**[1]**
15	**Assertion**: p-nitrobenzoic acidic is more acidic than benzoic acid **Reason**: +I effect of nitro group increases acidic strength of carboxylic acids	**[1]**
16	**Assertion:** Molar conductivity of weak electrolytes increases on dilution. **Reason:** On dilution number of ions per unit volume decreases.	**[1]**
	SECTION B **This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.**	

17	Calculate the elevation of boiling point of a solution when 15 gm of NaCl (Molar mass = 57.5) was dissolved in 100 gm of water, Assuming that NaCl undergo complete dissociation. (Kb for water = 0.52 K kg mol–1) **Or** A solution containing 60 gm of glucose (Molar mass = 180 g mol-1) per litre of solution in water is isotonic with a solution of urea (Molar mass = 60 g mol-1) in water. Calculate the mass of urea present in one litre of its solution.	**[2]**
18	Write the reactions take place at cathode and anode for a battery used in inverters.	**[2]**
19	The rate of the chemical reaction quadruples for an increase of 20 K in absolute temperature from 300 K. Calculate activation energy (Ea). (log2 = 0.3010 log3 = 0.4771 log4 = 0.6020 log 5 = 0.6990 and Gas constant (R) =8.314 J/K/mol)	**[2]**
20	Write the mechanism of dehydration of ethyl alcohol with conc. H_2SO_4 at 443 K.	**[2]**
21	**Account for the following** : **a)** CH_3CHO is less reactive than HCHO towards reaction with HCN. **b)** Arrange the following compounds in increasing order of their boiling points. CH_3CHO, CH_3CH_2OH, CH_3OCH_3 , $CH_3CH_2CH_3$	**[2]**
	SECTION C This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.	
22	Reena mixed two liquids X and Y of 10 mL each. After mixing the temperature of the resulting solution found to be raised. (a) Why was there a temperature change after mixing two liquids? (b) Will there be increase or decrease in the resulting volume after mixing? (c) Give one example of this type of solution. **Or** (a) What do you expect to happen when red blood corpuscles (RBC's) are placed in 0.5% NaCl solution. (b) Which one of the following will have higher osmotic pressure in 1 M KCl or 1 M $CaCl_2$ solution in water? Justify your answer. (c) Why does aquatic species are more comfortable in cold water than warm water?	**[3]**

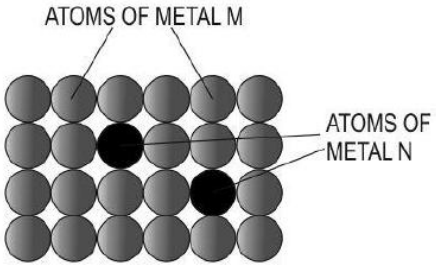
23	The following data were obtained during the first order thermal decomposition of N_2O_5 (g) at constant volume : $2N_2O_5\ (g) \rightarrow 2N_2O_4\ (g) + O_2\ (g)$ **S.No. Time/s Total Pressure/atm** **1 0 0.5** **2 100 0.625** Calculate rate constant. (Given log 10 = 1 and Log 2 = 0.3010)	**[3]**
24	(a) Draw the possible isomers of $[Co(NH_3)_3(NO_2)_3]$. (b) Why $[Co(en)_3]^{3+}$ is more stable complex than $[Co(NH_3)_6]^{3+}$? (c) Predict the hybridization of $[Ni(CN)_4]$ on the basis of valence bond theory. [Atomic number : Ni = 28	**[3]**
25	(a) Give ***reason*** for the following: **(i)** The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride. (ii) Grignard reagent should be prepared under anhydrous conditions. (b) (+) 2-bromobutane react with aq NaOH to form racemic mixture of Butan-2-ol. What will be the effect on rate of this reaction when concentration of NaOH is reduced to half?	**[3]**
26	What happens when (a) Phenol is treated with $CHCl_3$ and Aq KOH ? (b) Anisole is treated with HI ? (c) Propanone is treated with methyl magnesium bromide followed by hydrolysis ?	**[3]**
27	(a) How will you convert the followings. (i) Propanone into propane (ii) Benzoic acid to benzaldehyde (b) One of the products of an aldol reaction is given below.  write the structures of the reactants.	**[3]**
28	(a) What are the hydrolysis products of sucrose? (b) How will you prove that glucose contain one aldehyde functional group ? (c) What are the product of hydrolysis of a nucleotide of RNA containing adenine base?	**[3]**

	SECTION D **The following questions are case -based questions. Each question has an internal choice and carries 4 (1+1+2) marks each. Read the passage carefully and answer the questions that follow.**	
29	Proteins are high molecular mass complex biomolecules of amino acids. The important proteins required for our body are enzymes, hormones, antibodies, transport proteins, structural proteins, contractile proteins etc. Except for glycine, all α-amino acids have chiral carbon atom and most of them have L-configuration. The amino acids exists as dipolar ion called zwitter ion, in which a proton goes from the carboxyl group to the amino group. A large number of α-amino acids are joined by peptide bonds forming polypeptides. The pep tides having very large molecular mass (more than 10,000) are called proteins. The structure of proteins is described as primary structure giving sequence of linking of amino acids; secondary structure giving manner in which polypeptide chains are arranged and folded; tertiary structure giving folding, coiling or bonding polypeptide chains producing three dimensional structures and quaternary structure giving arrangement of sub-units in an aggregate protein molecule. Answer the following questions: **(a)**. Amino acids have high melting and boiling points **(b)** Give two differences between globular protein and fibrous protein. **OR** Give two differences between α-helix and β-pleated structure of protein. **(c)** What do you understand by the term denaturation of protein.	**[4]**
30	The chemistry of coordination compounds is an important and challenging area of modern inorganic chemistry. During the last fifty years, advances in this area, have provided development of new concepts and models of bonding and molecular structure, novel breakthroughs in chemical industry and vital insights into the functioning of critical components of biological systems. The first systematic attempt at explaining the formation, reactions, structure and bonding of a coordination compound was made by A. Werner. His theory postulated the use of two types of linkages (primary and secondary) by a metal atom/ion in a coordination compound. In the modern language of chemistry these linkages are recognised as the ionisable (ionic) and non-ionisable (covalent) bonds, respectively. Using the property of isomerism, Werner predicted the geometrical shapes of a large number of coordination entities. The Valence Bond Theory (VBT) explains with reasonable success, the formation, magnetic behaviour and geometrical shapes of coordination compounds. It, however, fails to provide a quantitative interpretation of magnetic behaviour and has nothing to say about the optical properties of these compounds. Answer the following questions: (a) When a co-ordination compound $CrCl_3.5H_2O$ is mixed with $AgNO_3$, 2 mole of AgCl precipitated per mole of compound. Write the IUPAC name of the compound. (b) Write the electronic configuration for d5 ion if $\Delta_o < P$.	**[4]**

	(c) On the basis of CFT, explain why $[Ti(H_2O)_6]Cl_3$ complex is coloured ? What happens on heating the complex $[Ti(H_2O)_6]Cl_3$? Give reason. Or (c) Draw the possible optical isomers of compound $[PtCl_2(en)_2]^+$	
	SECTION E **The following questions are long answer type and carry 5 marks each. All questions have an internal choice.**	
31	(a) Give chemical test to distinguish between ethanamine and aniline (b) How will you convert the followings (i) Ethanoic acid into methanamine (ii) Anilene into phenol (c) Give plausible explanation for each of the following: (i) Why do primary amines have higher boiling point than tertiary amines of same molecular mass ? (ii) Why is an alkyl amines is stronger bases than ammonia ? **Or** (a) Arrange the following in the increasing order of boiling point C_2H_5OH, $(CH_3)_2NH$, $C_2H_5NH_2$, (b) Write the structure of A and B in the followings (i) $CH_3CN \xrightarrow[.]{LiALH4} A \xrightarrow[.]{CHCl3 + alc.KOH} B$ (ii) $C_6H_5CONH_2 \xrightarrow[.]{Br2 + alc.\ KOH} A \xrightarrow[273\ K]{NaNO2 + HCl} B$ (c) Account for the followings (i) Aniline on nitration form appreciable amount of meta-nitro aniline, although anilene is ortho and para directing in nature. (ii) Aniline does not undergo Friedel-Crafts reaction	**[5]**
32	(a) Two elements X and Y have electronic configurations as follows: X= $3d^5\ 4s^1$; Y= $3d^7\ 4s^2$ Out of X and Y, which will have high enthalpy of atomization and why? (b) Complete the following equations: **(i)** $Cr_2O_7^{2-} + Sn^{2+} + H^+ \rightarrow$ **(ii)** $CrO_4^{2-} + H^+ \rightarrow$ **(c)** Give reason for the followings: **(i)** d-block elements exibits variable oxidation states. **(ii)** Cu^{2+} (aq) is more stable than Cu^+ (aq)	**[5]**

OR

(a) Given below is an image showing a specific property of transition metals.



Which property of transition metals is shown in the image?

(b) When MnO_2 is fused with KOH in the presence KNO_2, an oxidizing agent, It gives a dark green compound (P). Compound (A) disproportionate in acidic medium to give purple compound (Q). An alkaline solution of compound (Q) oxidises KI to compound (R) whereas an acidified solution of compound (Q) oxidises KI to (S). Identify (P) (Q) (R) and (S)

(c) Name an important alloy which contains some of the lanthanoid metals. Mention its uses.

33 (a) Define Kohlrausch law of independent migration of ions. Why does the conductivity of a solution decreases with dilution **[5]**

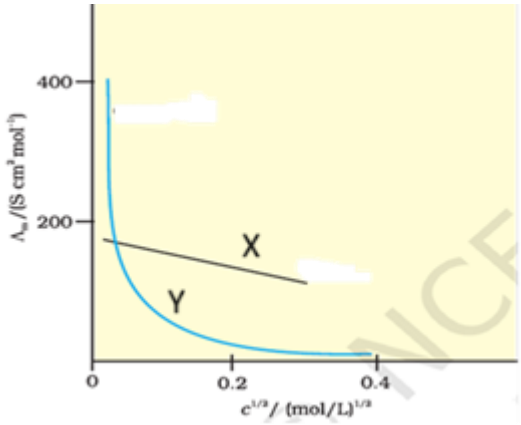
(b) Calculate the emf of the following cell at 25°C.

$$Zn(s) \mid Zn^{2+}(0.001M) \parallel Ag^{+}(0.01M) \mid Ag\ (s)$$

Given: $E^{O}(Zn^{2+}/Zn) = -0.76$ V $\qquad$ $E^{O}(Ag^{+}/Ag) = 0.80$ V

Or

(a) In the plot of molar conductivity vs square root of concentration following curves are obtained for two electrolyte X and Y.



	Answer the following : (i) Predict the nature of electrolyte X and Y (ii) Why does the molar conductivity of Y increases slightly and approaches to a limiting value? (b) Calculate the standard Gibb's energy (ΔG^{O}) of the following reaction at 25°C. $Al(s) + Cd^{2+}(1M) \rightarrow Al^{3+}(1M) + Cd(s)$ $E^{O}(Al^{3+}/Al) = -1.66V$ and $E^{O(}Cd^{2+}/Cd) = -0.40V$ (c) How many Faraday are required to reduce permanganate ion in neutral medium ?	