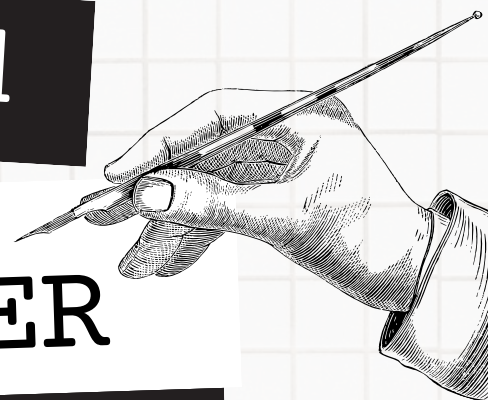


2024

Pre-Board

SAMPLE PAPER



CBSE BOARD / STATE
BOARDS

NCERT Based Syllabus



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SAMPLE QUESTION PAPER
1st PRE-BOARD (2023-24)
CHEMISTRY THEORY (043)

Class – XII
Time: 3 Hours

Subject: Chemistry
Max. Marks 70

General Instructions:

Read the following instructions carefully.

- a) There are **34** questions in this question paper with internal choice.
- b) SECTION A consists of 12 MCQ's & 4 Assertions and Reasons carrying 1 mark each.
- c) SECTION B consists of 8 very short answer questions carrying 2 marks each.
- d) SECTION C consists of 5 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

S.No.	SECTION – A	Marks
1.	The difference between the electrode potentials of two electrodes when no current is drawn through the cell is called (i) Cell potential (ii) Cell emf (iii) Potential difference (iv) Cell voltage	1
2.	$E^\circ \text{Cr}_2\text{O}_7^{2-}/\text{Cr}^{3+} = 1.33\text{V}$, $E^\circ \text{MnO}_4^-/\text{Mn}^{2+} = 1.51\text{V}$ $E^\circ \text{Cl}_2/\text{Cl}^- = 1.36\text{V}$, $E^\circ \text{Cr}^{3+}/\text{Cr} = -0.74\text{V}$ Using the given data, which option is correct to the order of reducing power. (i) $\text{Cr}^{3+} < \text{Cl}^- < \text{Mn}^{2+} < \text{Cr}$ (ii) $\text{Mn}^{2+} < \text{Cl}^- < \text{Cr}^{3+} < \text{Cr}$ (iii) $\text{Cr}^{3+} < \text{Cl}^- < \text{Cr}_2\text{O}_7^{2-} < \text{MnO}_4^-$ (iv) $\text{Mn}^{2+} < \text{Cr}^{3+} < \text{Cl}^- < \text{Cr}$	1
3.	Activation energy of a chemical reaction can be determined by (i) determining the rate constant at standard temperature. (ii) determining the rate constants at two temperatures. (iii) determining the probability of collision. (iv) using catalyst.	1
4.	The rate law for the reaction $\text{A} + 2\text{B} \rightarrow \text{C}$ is found to be $\text{Rate} = k [\text{A}][\text{B}]$. The concentration of reactant 'B' is doubled, keeping the concentration of 'A' constant, the value of rate constant will be (i) the same (ii) doubled (iii) quadrupled (iv) halved	1
5.	Electronic configuration of a transition element X in +3 oxidation state is $[\text{Ar}]3d^5$. What is X?	1

	(i) Manganese (ii) Iron (iii) Cobalt (iv) Chromium	
6.	The correct IUPAC name of $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ is (i) Diamminedichloridoplatinum (II) (ii) Diamminedichloridoplatinum (IV) (iii) Dichloridodiammineplatinum (II) (iv) Dichloridodiammineplatinum (IV)	1
7.	Indicate the complex ion which shows geometrical isomerism. (i) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]^+$ (ii) $[\text{Pt}(\text{NH}_3)_3\text{Cl}]$ (iii) $[\text{Co}(\text{NH}_3)_6]^{3+}$ (iv) $[\text{Co}(\text{CN})_5(\text{NC})]^{3-}$	1
8.	The order of reactivity of following alcohols with halogen acids is A = Propan-1-ol, B = Butan-2-ol, C = 2-methylbutan-2-ol (i) $(\text{A}) > (\text{B}) > (\text{C})$ (ii) $(\text{C}) > (\text{B}) > (\text{A})$ (iii) $(\text{B}) > (\text{A}) > (\text{C})$ (iv) $(\text{A}) > (\text{C}) > (\text{B})$	1
9.	Which type of the reaction involves in the process of converting alkyl halides into alcohols. (i) addition reaction (ii) substitution reaction (iii) dehydrohalogenation reaction (iv) rearrangement reaction	1
10.	Which of the following products are obtained when methylamine reacts with nitrous acid. (i) $\text{CH}_3\text{—O—N=O}$, NH_3 (ii) $\text{CH}_3\text{—O—CH}_3$, H_2 (iii) CH_3OH , N_2 (iv) CH_3CHO , C_2H_6	1
11.	which of the following reagent is not correct for the reduction of nitrobenzene gives aniline? (i) Sn/HCl (ii) Fe/HCl (iii) $\text{H}_2\text{—Pd}$ (iv) $\text{Sn}/\text{NH}_4\text{OH}$	1
12.	Which of the following acid is present in vitamin C? (i) Aspartic acid (ii) Ascorbic acid (iii) Adipic acid (iv) Saccharic acid	1
	Q. No. 13 – 16, two statements are given—one labelled Assertion (A) and the other labelled Reason (R). Select the correct option as given below: (a) Both (A) and (R) are correct and (R) is correct explanation of (A). (b) Both (A) and (R) are correct but (R) is not correct explanation of (A).	

	(c) (A) is correct, but (R) is incorrect statement. (d) (A) is incorrect, but (R) is correct statement.	
13.	Assertion (A): In transition elements ns orbital is filled up first and (n – 1) d afterwards, during ionization ns electrons are lost prior to (n–1) d electrons. Reason (R): The effective nuclear charge felt by (n – 1) d electrons is higher as compared to that by ns electrons.	1
14.	Assertion (A): KCN reacts with methyl chloride to give methyl isocyanide. Reason (R): CN [–] is an ambident nucleophile.	1
15.	Assertion (A): The boiling point of ethanol is higher than methoxymethane. Reason (R): There is intramolecular hydrogen bonding in ethanol.	1
16.	Assertion (A): Aromatic primary amines cannot be prepared by Gabriel phthalimide synthesis. Reason (R): Aryl halides do not undergo nucleophilic substitution with the anion formed by phthalimide.	1
	SECTION - B	
17.	Calculate $\Delta_r G^\circ$ and log K _c for the following reaction: $\text{Cd}^{2+}(\text{aq}) + \text{Zn}(\text{s}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{Cd}(\text{s})$ Given: $E^\circ \text{Cd}^{2+}/\text{Cd} = -0.403 \text{ V}$, $E^\circ \text{Zn}^{2+}/\text{Zn} = -0.763 \text{ V}$	2
18.	After 24 hrs, only 0.125 gm out of the initial quantity of 1 gm of a radioactive isotope remains behind. What is its half-life period?	2
19.	When a coordination compound $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$ is mixed with AgNO_3 , 2 moles of AgCl are precipitated per mole of the compound. Write (i) structural formula of the complex. (ii) IUPAC name of the complex.	2
20.	Give reasons for the following: (i) Chloroethane is insoluble in water. (ii) Thionyl chloride method is preferred for preparing alkyl chlorides from alcohols.	2
21.	(i) Which alkyl halide from the following pair is chiral and undergoes faster S_N^2 reaction? (a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$ (b) $\text{CH}_2\text{CH}(\text{Br})\text{CH}_2\text{CH}_3$ (ii) Out of S_N^1 and S_N^2 , which reaction occurs with (a) Inversion of configuration (b) Racemisation	2
22.	Answer the followings: (i) Among HI, HBr, HCl, HI is most reactive towards alcohols. Why? (ii) Of the two alcohols; (a) $\text{CH}_2=\text{CH}-\text{CH}_2\text{OH}$ and (b) $\text{CH}_2=\text{CH}-\text{CH}_2-\text{CH}_2\text{OH}$, which one will react more easily with conc. HCl in the presence of ZnCl_2 ?	2
23.	Write the mechanism of the following reaction: $2\text{CH}_3\text{CH}_2\text{OH} \xrightarrow[\text{413K}]{\text{Conc. H}_2\text{SO}_4} \text{CH}_3\text{CH}_2-\text{O}-\text{CH}_2\text{CH}_3$	2
24.	(i) What type of linkage is present in nucleic acids? (ii) Give one example each for fibrous protein and globular protein.	2
	SECTION - C	
25.	A solution containing 1.9 g per 100 mL of KCl ($M = 74.5 \text{ g mol}^{-1}$) is isotonic with a solution containing 3 g per 100 mL of urea ($M = 60 \text{ g mol}^{-1}$). Calculate the	3

	degree of dissociation of KCl solution. Assume that both the solutions have same temperature.	
26.	(a) Define order of reaction. (b) The rate of reaction, $2\text{NO} + \text{Cl}_2 \rightarrow 2\text{NOCl}$ is doubled when concentration of Cl_2 is doubled and it becomes eight times when concentration of both NO and Cl_2 are doubled. Deduce the order of the reaction.	3
27.	Using valence bond theory, predict the hybridisation and magnetic character of the following: (i) $[\text{Co F}_6]^{3-}$ (ii) $[\text{Ni}(\text{CN})_4]^{2-}$ (iii) $[\text{Fe}(\text{CN})_6]^{4-}$ [Atomic numbers: Fe = 26, Co = 27, Ni = 28]	3
28.	(i) Account for the following: (a) $\text{Cl}-\text{CH}_2\text{COOH}$ is a stronger acid than CH_3COOH . (b) Carboxylic acids do not give reactions of carbonyl group. (ii) Out of $\text{CH}_3\text{CH}_2-\text{CO}-\text{CH}_2-\text{CH}_3$ and $\text{CH}_3\text{CH}_2-\text{CH}_2-\text{CO}-\text{CH}_3$, which gives iodoform test? OR (i) Give reasons: (a) The α -hydrogen of aldehydes and ketones are acidic in nature. (b) Propanone is less reactive than ethanal towards addition of HCN. (ii) Give a simple chemical test to distinguish between propanal and propanone.	3
29.	(i) Which of the following biomolecules is insoluble in water? Justify. Insulin, Haemoglobin, Keratin. (ii) Name the protein and its shape present in oxygen carrier in human body. (iii) Write chemical reaction to show that glucose contains aldehyde as carbonyl group.	3
	SECTION - D	
30.	Read the given passages and answer the questions that follow. The spontaneous flow of the solvent through a semipermeable membrane from a pure solvent to a solution or from a dilute solution to a concentrated solution is called osmosis. The phenomenon of osmosis can be demonstrated by taking two eggs of the same size. In an egg, the membrane below the shell and around the egg material is semi-permeable. The outer hard shell can be removed by putting the egg in dilute hydrochloric acid. After removing the hard shell, one egg is placed in distilled water and the other in a saturated salt solution. After some time, the egg placed in distilled water swells-up while the egg placed in salt solution shrinks. The external pressure applied to stop the osmosis is termed as osmotic pressure (a Colligative property). Reverse osmosis takes place when the applied external pressure becomes larger than the osmotic pressure. 1. What happen when red blood corpuscles are placed in 0.5% NaCl solution? 2. Name one SPM which can be used in the process of reverse osmosis. 3. What are isotonic solutions? Which one of the following will have higher osmotic pressure in 1 M KCl or 1 M urea solution?	4

31.	Read the given passages and answer the questions that follow. The most abundant biomolecules of the living system are proteins. They are polymers of α-amino acids connected to each other by peptide linkage. Amino acids contain amino ($-\text{NH}_2$) and carboxyl ($-\text{COOH}$) group. Amino acids are classified as acidic, basic or neutral depending upon the relative number of amino and carboxyl groups in their molecule. They behave like salts rather than simple amines or carboxylic acids. In aqueous solution, the carboxyl group can lose a proton and amino group can accept a proton, giving rise to a dipolar ion known as Zwitter ion. The amino acids, which can be synthesised in the body, are known as non-essential amino acids. On the other hand, those which cannot be synthesised in the body and must be obtained through diet, are known as essential amino acids. 1. The K_a and K_b values of α-amino acid are very low. Why? 2. Draw the structure of Zwitter ion. 3. Name the alpha amino acid which is optically inactive and give any two properties of amino acids.	4
	SECTION - E	
32.	(i) Represent the cell in which the following reaction takes place: $2\text{Al (s)} + 3\text{Ni}^{2+} (0.1\text{M}) \rightarrow 2\text{Al}^{3+} (0.01\text{M}) + 3\text{Ni (s)}$ Calculate the emf if $E^\circ_{\text{cell}} = 1.41 \text{ V}$. (ii) How does molar conductivity vary with increase in concentration for strong electrolyte and weak electrolyte? How can you obtain limiting molar conductivity (Λ°_m) for weak electrolyte? OR (i) Calculate E°_{cell} for the following reaction at 298 K: $2\text{Al (s)} + 3\text{Cu}^{2+} (0.1\text{M}) \rightarrow 2\text{Al}^{3+} (0.01\text{M}) + 3\text{Cu (s)}$, Given: $E_{\text{cell}} = 1.98 \text{ V}$ (ii) Define the following terms: (a) Limiting molar conductivity (b) Fuel cell and State two advantages over ordinary cell.	5
33.	Assign reasons for the following: (i) The enthalpies of atomisation of transition elements are high. (ii) The transition metals and many of their compounds act as good catalysts. (iii) From element to element, the actinoid contraction is greater than the lanthanoid contraction. (iv) The E° value for the $\text{Mn}^{3+}/\text{Mn}^{2+}$ couple is much more positive than that of $\text{Cr}^{3+}/\text{Cr}^{2+}$. (v) Scandium ($Z = 21$) does not exhibit variable oxidation states and yet it is regarded as a transition element. OR (i) Account for the following: (a) Transition metals form large number of complex compounds.	5

	(b) The lowest oxide of transition metal is basic whereas the highest oxide is amphoteric or acidic. (c) Why is Cu^{2+} ion coloured while Zn^{2+} ion is colourless in aqueous solution? (ii) Describe the preparation of potassium permanganate from pyrolusite ore. Write balanced chemical equation for one reaction to show the oxidizing nature of potassium permanganate.	
34.	(i) A ketone 'A' which undergoes haloform reaction gives compound 'B' on reduction. 'B' on heating with sulphuric acid gives compound 'C', which forms mono-ozonide 'D'. The compound 'D' on hydrolysis in presence of zinc dust gives only acetaldehyde. Write the structures and IUPAC names of A, B and C. Write down the reactions involved. (ii) Predict the products formed when cyclohexane carbaldehyde reacts with following reagents. (a) PhMgBr and then H_3O^+ (b) Tollens' reagent. OR (i) Carry out the following conversions: (a) p-nitrotoluene to 2-bromobenzoic acid (b) Propanoic acid to acetic acid (ii) An alkene 'A' with molecular formula C_5H_{10} on ozonolysis gives a mixture of two compounds, 'B' and 'C'. Compound 'B' gives positive Fehling test and also reacts with iodine and NaOH solution. Compound 'C' does not give Fehling solution test but forms iodoform. Identify the compounds A, B and C.	5