

CLASS: XII
SUBJECT- CHEMISTRY (043)

General Instructions: Read the following instructions carefully.

- There are 33 questions in this question paper with internal choice.
- Section-A: Consists of 16 multiple choice questions and carrying 1 mark each.
- Section-B: Consists of 5 very short answer questions and carry 2 marks each.
- Section-C: Consists of 7 short answer questions and carry 3 marks each.
- Section-D: Consists of 2 case based questions carrying 4 marks.
- Section-E: Consists of 3 long answer questions and carry 5 marks each.
- All questions are compulsory.
- Use of Log table and calculator are not allowed.

SECTION-A : MULTIPLE CHOICE QUESTIONS		
Q.1	For the reaction $\text{N}_{2(g)} + 3\text{H}_{2(g)} \rightarrow 2\text{NH}_{3(g)}$, If the $\Delta[\text{NH}_3]/\Delta t = 4 \times 10^{-8} \text{ mol L}^{-1} \text{ s}^{-1}$, what is the value of $-\Delta[\text{H}_2]/\Delta t$	1
	a) $2 \times 10^{-8} \text{ mol L}^{-1} \text{ s}^{-1}$ b) $4 \times 10^{-8} \text{ mol L}^{-1} \text{ s}^{-1}$ c) $6 \times 10^{-8} \text{ mol L}^{-1} \text{ s}^{-1}$ d) $8 \times 10^{-8} \text{ mol L}^{-1} \text{ s}^{-1}$	
Q.2	Chronic chloroform exposure may cause damage to liver and kidneys due to formation of-	1
	(a) methylene chloride (b) phosgene gas (c) methyl chloride (d) carbon tetrachloride	
Q.3	In DNA, the complimentary bases are	1
	(a) adenine and guanine; thymine and cytosine (b) uracil and adenine; cytosine and guanine (c) adenine and thymine; guanine and cytosine (d) adenine and thymine; guanine and uracil.	
Q.4	Which of the following ion has a magnetic moment of 5.93 BM?	1
	a) Mn^{2+} b) Fe^{2+} c) Cr^{2+} d) Co^{3+}	
Q.5	Which of the following alkyl halides will undergo $\text{S}_{\text{N}}2$ reaction most readily?	1

	(A) $(\text{CH}_3)_3\text{C}-\text{F}$ (C) $(\text{CH}_3)_3\text{C}-\text{Br}$	(B) $(\text{CH}_3)_3\text{C}-\text{Cl}$ (D) $(\text{CH}_3)_3\text{C}-\text{I}$	
Q.6	Which of the following compounds is formed when benzyl alcohol is oxidized with KMnO_4 ? a) CO_2 and H_2O c) Benzaldehyde		1
	b) Benzoic acid d) Benzophenone		
Q.7	Which of the following pair can not be distinguished by Iodoform test: (a) Ethanol and Propanol (b) Ethanal and Propanal (c) Acetophenone and Benzophenone (d) Acetaldehyde and Acetophenone		1
Q.8	What should be the correct IUPAC name for diethylbromomethane is- (a) 1-bromo-1,1-diethylmethane (b) 1-bromo-1-ethylpropane (c) 3-bromopentane (d) 1-bromopentane		1
Q.9	The product of reaction of benzaldehyde with dilute NaOH is: (a) Benzoic acid (b) Benzyl alcohol and sodium benzoate (c) Benzophenone (d) Benzene		1
Q.10	Which element is having lowest melting and boiling point : (A) Ti (B) Cu (C) Zn (D) Mn		1
Q.11	Which of the following compounds is most basic in aqueous solution: a) NH_3 b) CH_3NH_2 c) $(\text{CH}_3)_2\text{NH}$ d) $(\text{CH}_3)_3\text{N}$		1
Q.12	$\text{CH}_3\text{CH}_2\text{OH}$ can be converted into CH_3CHO by _____. (a) Catalytic hydrogenation (b) Treatment with LiAlH_4 (c) Pyridinium chloro chromate (d) Treatment with KMnO_4		1
Instructions for Q.13-Q.16 (a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true and R is the incorrect explanation of A. (c) A is true but R is false (d) A is false but R is true			

Q.13	Assertion: Kohlrausch law helps to find the molar conductivity of weak electrolyte at infinite dilution. Reason: Molar conductivity of a weak electrolyte at infinite dilution cannot be determined experimentally.	1
Q.14	Assertion : Vitamin C can not be stored in our body. Reason : Vitamin C is soluble in water in the body.	1
Q.15	Assertion (A): Molecularity has no meaning for a complex reaction. Reason (R): The overall molecularity of a complex reaction is equal to the molecularity of the slowest	1
Q.16	Assertion(A): Coordination compounds are useful in medicine for treating diseases. Reason (R): Some coordination compounds, like cisplatin, are used as anticancer agents due to their ability to interact with DNA.	1
<p style="text-align: center;">SECTION-B :</p> <p style="text-align: center;">This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.</p>		
Q.17	Differentiate between hexaquo manganese (II) ion and hexacyano manganese (II) ion on the basis of unpaired electrons & configuration of t_{2g} and e_g orbitals using Crystal Field Theory.	2
Q.18	Describe the following: i. Hell-Volhard-Zelinsky reaction (ii) Clemmenson Reduction <p style="text-align: center;">OR</p> (I) Write the structure of the product formed when acetone reacts with 2,4 DNP reagent. (II) What happens when benzaldehyde and acetaldehyde react in presence of conc. NaOH.	1+ 1 1 1
Q.19	Arrange each set of compounds in the decreasing order of property indicated a) Methanol, ethanol, diethyl ether, ethylene glycol. (Boiling point)	1+ 1

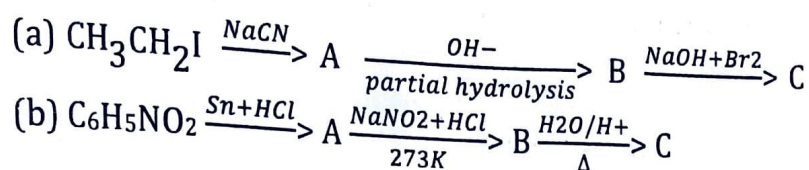
	b) Ethanol, isopropanol, tertiary butyl alcohol (reactivity towards Lucas reagent)	
Q.20	(a) For a reaction $A + B \rightarrow P$, the rate law is given by $r = k [A]^{1/2} [B]^2$. What is the order of reaction? (b) Define Pseudo first order reaction with an example.	1 1
Q.21	(i) What is the difference between a nucleoside and nucleotide? (ii) What are peptide linkages?	1 1
	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.	
Q.22	The rate of a reaction doubles for an increase of 10K in absolute temperature from 298 K. Calculate its activation energy. ($R=8.314 \text{ J K}^{-1} \text{ mol}^{-1}$)	3
Q.23	On dissolving 19.5 g of FCH_2COOH in 500 g of water, a depression of 1°C in freezing point of water is observed. Calculate Vant-Hoff's Factor and dissociation constant for the fluoro acetic acid. (given $K_f = 1.86 \text{ K kg mol}^{-1}$)	3
Q.24	Convert the following: (Any three) (i) Ethylbenzene into Benzoic acid (ii) Acetic acid into Acetaldehyde (iii) Ethanal into 3-Hydroxybutanal (iv) Benzaldehyde into Benzophenone	3
Q.25	Represent the cell in which the following reaction takes place $\text{Mg(s)} + 2\text{Ag}^+(0.0001\text{M}) \rightarrow \text{Mg}^{2+}(0.10\text{M}) + 2\text{Ag(s)}$ Calculate its E_{cell} if $E^\circ_{\text{cell}} = 3.17 \text{ V}$.	3
Q.26	Complete the following reaction: (a) $\text{CH}_3\text{CH}=\text{CH}_2 + \text{HBr} \rightarrow$ (b) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl} + \text{KOH(alc)} \rightarrow$ (c) $\text{CH}_3\text{CH}_2\text{Cl} + \text{AgF} \rightarrow$	3
Q.27	i) What is the basic structural difference between starch and cellulose? ii) What is the effect of denaturation on the structure of proteins?	3

	iii) What happens when D-glucose is treated with the HI?	
Q.28	<p>(a) Write the mechanism of acid catalysed dehydration of ethanol to ethene.</p> <p>(b) How will you convert phenol to picric acid? Write the reaction.</p>	<p>2</p> <p>1</p>
	<p style="text-align: center;">SECTION D</p> <p style="text-align: center;">The following questions are case-based questions. Read the passage carefully and answer the questions that follow</p>	
Q.29	<p>One of the most important studies about coordination compounds is the type of bonding present in them. Alfred Werner was the first to study the bonding in coordination compounds. He introduced the concept of primary valency of metal atom which is same as oxidation state and secondary valency of metal atom which is same as coordination number. Primary valencies are satisfied by negative ions whereas secondary valencies by neutral and negative ligands. Further, primary valencies are ionizable and non-directional whereas secondary valencies are ionisable and directional and decide the geometry of the complex. However, some of the characteristics of coordination compounds could not be explained by Werner's theory. Hence, many new approaches were put forward. One of these is the Valence Bond Theory (VBT). According to this theory, the metal atom or ion under the influence of ligands can use its $(n - 1) d$, ns and np or ns, np and nd orbitals for hybridisation to yield an equivalent number of hybrid orbitals. Ligands donate electron pairs crystal field split into these empty hybrid orbitals forming bonds. The type of hybridisation involved decides the geometry of the complex. This theory satisfactorily explains the magnetic properties of the coordination compounds.</p> <p>Based on the above paragraph write the answers of following questions:</p> <p>(i) The compound $\text{CoCl}_4 \cdot 3\text{NH}_3$ gives 1 mole precipitate of AgCl when treated with AgNO_3 solution. Write the formula of the coordination compound and its IUPAC name.</p> <p>(ii) What type of isomerism is shown by the complex $[\text{Co}(\text{NH}_3)_5\text{NO}_2]^+?$ Define that also.</p> <p>(iii) Why is $[\text{Ni}(\text{Cl})_4]^{2-}$ paramagnetic while $[\text{Ni}(\text{CN})_4]^{2-}$ is diamagnetic?</p> <p style="text-align: center;">OR</p> <p>(iii) $[\text{Fe}(\text{CN})_6]^{4-}$ and $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ are of different colours, why?</p>	<p>1</p> <p>1</p> <p>2</p> <p>2</p>
Q.30	Solution play a very important role in our daily life. Alloys, homogeneous mixture of metal are solution of solid in solid. 1 ppm (parts per million) of fluoride ions prevent tooth decay. All intravenous injections must be	

	<p>isotonic with our body fluids, i.e. should have same concentration as blood plasma. Diabetic patients are more likely to have heart attack and high blood pressure due to higher glucose level in blood. Common salt increase blood pressure because Na^+ mixes up with blood. Aquatic species are more comfortable in cold water than warm water.</p> <p>Now answer the following questions</p> <p>(a) 0.1 M glucose is not isotonic with 0.1 M KCl solutions. Why?</p> <p>(b) What will happen if pressure applied on solution side is more than osmotic pressure, when solvent and solution are separated by semi-permeable membrane</p> <p>(c) Calculate the molality of ethanol solution in which mole fraction of water is 0.88.</p> <p style="text-align: center;">OR</p> <p>(c) At 300 K, 36 g of glucose present in a litre of its solution has an osmotic pressure of 4.98 bar. If the osmotic pressure of the solution is 1.52 bars at the same temperature, what would be its concentration?</p>	<p>1</p> <p>1</p> <p>2</p>
	<p>SECTION E</p> <p>The following questions are long answer type and carry 5 marks each. All questions have an internal choice.</p>	
Q.31	<p>Describe the preparation of potassium dichromate from iron chromite ore. Write the ionic equations for its reaction with following in acidic medium.</p> <p>(i) iodide ion (ii) iron(II) solution and (iii) H_2S</p> <p style="text-align: center;">OR</p> <p>Give reason:</p> <p>a) Both O_2 and F_2 stabilize high oxidation states of transition metals but the ability of oxygen to do so exceeds that of fluorine.</p> <p>b) The lowest oxide of a transition metal is basic, the highest is amphoteric/acidic.</p> <p>c) The enthalpies of atomisation of transition elements are high.</p> <p>d) The transition metals and many of their compounds act as good catalysts.</p> <p>e) Scandium ($Z = 21$) does not exhibit variable oxidation states and yet it is regarded as a transition element.</p>	<p>2+</p> <p>3</p> <p>1x 5</p>
Q.32	(i) Distinguish between the following pairs of compounds by a chemical test:	2

- (a) Aniline and ethylamine
(b) Methylamine and Dimethyl amine

(ii) Complete the following reactions:



OR

(i) Account for the following:

(a) Aniline does not undergo Friedel Crafts alkylation

(b) Although -NH₂ group is an ortho and para-directing group, nitration of aniline gives meta-derivative along with ortho & para derivative also.

(c) Aniline has more value of pK_b than methylamine.

(ii) Explain the following reactions

(a) Haffmann-Bromamide Reaction

(b) Carbylamine Reaction.

Q.33 A. A current of 2 amperes is passed through an aqueous copper sulfate solution. Calculate the time (in seconds) required to deposit 1.27 g of copper Cu at the cathode.

(Given: Molar mass of Cu = 63.5 g/mol)

33.b. Name the most appropriate type of electrochemical cell used for each of the following applications, and briefly state a key characteristic that makes it suitable:

- (i) Hearing Aids
- (ii) Apollo Space Programme
- (iii) Automobiles & Inverters

OR

- A. State the law that is used for quantitative analysis of electrolysis
B. Define fuel cell with an example. What advantages do the fuel cells have over primary and secondary batteries?

	C. How much copper metal will be deposited when 2A current is passed through CuSO_4 solution for 10 minutes? (Atomic mass of Cu = 63.5 g/mol)	1+ 1+ 2
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