

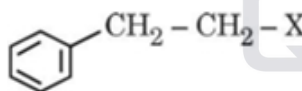
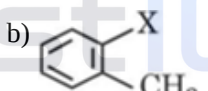
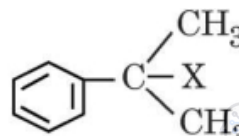
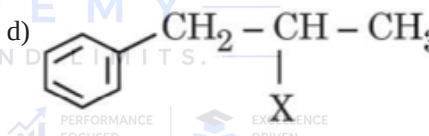
Class XII | Session 2026-27
Subject - Chemistry
Sample Question Paper - Set 6

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 very 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.**

Section A

1. Which of the following is a benzylic halide? [1]
 - a) 
 - b) 
 - c) 
 - d) 
2. **Night-Blindness** is caused by the deficiency of Vitamin: [1]
 - a) C
 - b) K
 - c) A
 - d) B
3. $\text{CH}_3 - \text{O} - \text{CH}_3$ when treated with excess HI gives: [1]
 - a) $\text{CH}_3 - \text{OH} + \text{CH}_3 - \text{I}$
 - b) $\text{CH}_3 - \text{I} + \text{CH}_4$
 - c) $2\text{CH}_3 - \text{OH}$
 - d) $2\text{CH}_3 - \text{I}$
4. Which of the following compounds will undergo self-condensation in the presence of dilute NaOH solution? [1]
 - a) $\text{CH}_3\text{CH}_2\text{CHO}$
 - b) $\text{C}_6\text{H}_5\text{CHO}$
 - c) $\text{H}-\text{CHO}$
 - d) $(\text{CH}_3)_3\text{C} - \text{CHO}$
5. Rate of reaction does not remain constant throughout because [1]
 - a) The density of reactants keep on changing
 - b) Volume of reactants keep on changing

- c) Concentration of reactants keep on changing d) Temperature of reactants keep on changing

6. Match the items of column I with appropriate entries of column II. [1]

Column I	Column II
(a) For electrolyte CaSO_4	(i) $i = 5$
(b) For ideal Solution	(ii) $i = 2$
(c) For electrolyte $\text{Al}_2(\text{SO}_4)_3$	(iii) $i = 4$
(d) For electrolyte Na_3PO_4	(iv) $i = 1$

- a) (a) - (i), (b) - (ii), (c) - (iii), (d) - (iv). b) (a) - (iv), (b) - (i), (c) - (ii), (d) - (iii).
 c) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii). d) (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i).

7. Which of the following belongs to the class of Vinyl halides? [1]

- a) $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{Br}$ b) $\text{CH}_2 = \underset{\text{Br}}{\text{C}} - \text{CH}_3$
 c) $\text{CH}_2 = \text{CHCH}_2\text{CH}_2\text{Cl}$ d) $\text{CH} \equiv \text{C} - \text{Br}$

8. The magnetic nature of elements depends on the presence of unpaired electrons. Identify the configuration of transition element, which shows highest magnetic moment. [1]

- a) $3d^7$ b) $3d^8$
 c) $3d^2$ d) $3d^5$

9. The half-life periods of a reaction at initial concentration of 0.1 mol/L and 0.5 mol/L are 200 s and 40 s respectively. The order of the reaction is [1]

- a) 0 b) 1
 c) 2 d) $\frac{1}{2}$

10. The compound which forms acetaldehyde when heated with dilute NaOH is: [1]

- a) 1 chloroethane b) 1, 1, 1 trichloroethane
 c) 1, 2 dichloroethane d) 1, 1 dichloroethane

11. $(\text{CH}_3)_2\text{CH}-\text{O}-\text{CH}_3$ reacts with HI to give: [1]

- a) $(\text{CH}_3)_2\text{CH}-\text{I} + \text{CH}_3-\text{OH}$ b) $(\text{CH}_3)_2\text{CH}-\text{OH} + \text{CH}_3-\text{I}$
 c) $(\text{CH}_3)_2\text{CH}-\text{I} + \text{CH}_3-\text{I}$ d) $(\text{CH}_3)_2\text{CH}-\text{OH} + \text{CH}_3-\text{OH}$

12. In order to prepare a 1° amine from an alkyl halide with simultaneous addition of one CH_2 group in the carbon chain, the reagent used as source of nitrogen is _____. [1]

- a) Potassium phthalimide, $\text{C}_6\text{H}_4(\text{CO})_2\text{N}^-\text{K}^+$ b) Ethanolic NaCN
 c) Sodium amide, NaNH_2 d) Sodium azide, NaN_3

13. **Assertion (A):** Uracil base is present in DNA. [1]

Reason (R): DNA undergoes self-replication.

- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false. d) A is false but R is true.

14. **Assertion (A):** Carbonyl compounds do not show intermolecular hydrogen bonding. [1]

Reason (R): Boiling points of carbonyl compounds are lower than alkanes.

- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false. d) A is false but R is true.

15. **Assertion (A):** Chlorobenzene is resistant to nucleophilic substitution reaction at room temperature. [1]

Reason (R): C–Cl bond gets weaker due to resonance.

- a) Both (A) and (R) are true and (R) is the correct explanation of (A). b) Both (A) and (R) are true, but (R) is not the correct explanation of (A).
- c) (A) is true, but (R) is false. d) (A) is false, but (R) is true.

16. **Assertion (A):** Boiling point of butan-1-ol is higher than that of butan-1-amine. [1]

Reason (R): Being more polar, butan-1-ol forms stronger intermolecular hydrogen bonds as compared to butan-1-amine

- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false. d) A is false but R is true.

Section B

17. 4% solution of sucrose is isotonic with 3% solution of an unknown organic substance. Calculate the molecular mass of unknown substance. [2]

OR

Amongst the following compounds, identify which are insoluble, partially soluble and highly soluble in water?

- Phenol
- Toluene
- Formic acid
- ethylene glycol
- chloroform
- pentanol



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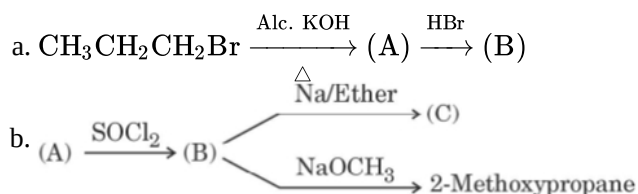
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18. Complete the following reactions: [2]



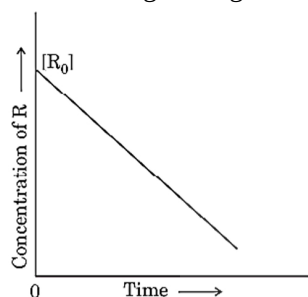
19. Give reasons for the following: [2]

- The only oxidation state shown by Scandium is +3.
- $[\text{Ti}(\text{H}_2\text{O})_6]^{4+}$ is colourless.
- MnO is basic while Mn_2O_7 is acidic.

20. **Answer the following:** [2]
 (a) If the rate equation is given below: [1]
 $\text{Rate} = k[A]^2[B]$
 then what will be the unit of its rate and rate constant?
 (b) Define half life period of a reaction. [1]
21. Give a test to distinguish between propan-2-one and pentan-3-one. [2]

Section C

22. On the basis of the following data, explain why Co^{3+} is not stable in aqueous solution? [3]
 $\text{Co}^{3+} + e^- \rightarrow \text{Co}^{2+}, E^0 = +1.82\text{V}$
 $2\text{H}_2\text{O} \rightarrow \text{O}_2 + 4\text{H}^+ + 4e^-, E^0 = 1.23\text{V}$
23. The variation in the concentration (R) vs. time (t) plot is given below. Answer the following questions on the basis of the given figure: [3]

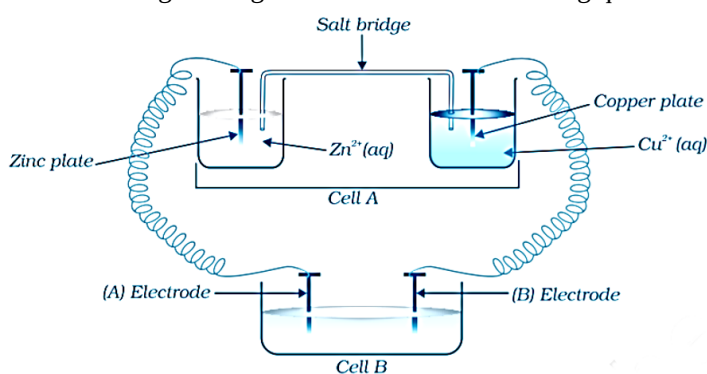


- Predict the order of the reaction.
 - What is the slope of the curve indicate?
 - What are the units of the rate constant k ?
24. How the following conversions can be carried out? [3]
- Toluene to benzyl alcohol
 - Benzene to 4-bromonitrobenzene
 - Benzyl alcohol to 2-phenylethanoic acid

What is meant by hydroboration-oxidation reaction? Illustrate it with an example.

25. Write the structures of the following compounds: [3]
- α - methoxypropionaldehyde
 - 3-Hydroxylbutanol
 - 2-Hydroxycyclopentane carbaldehyde
 - 4-Oxopentanal
 - Di-Sec. butyl ketone

26. Consider the given Figure and answer the following questions. [3]



- i. Cell **A** has $E_{\text{Cell}} = 2\text{V}$ and Cell **B** has $E_{\text{Cell}} = 1.1\text{V}$. Which of the two cells **A** or **B** will act as an electrolytic cell? Which electrode reactions will occur in this cell?
- ii. If cell **A** has $E_{\text{Cell}} = 0.5\text{V}$ and cell **B** has $E_{\text{Cell}} = 1.1\text{V}$ then what will be the reactions at anode and cathode?
27. What are haloarenes? How are they classified? Give one method each for the preparation of nuclear and side chain substituted haloarenes. [3]
28. a. The standard Gibbs energy ($\Delta_r G^\circ$) for the following cell reaction is -300 kJ mol^{-1} : [3]
- $$\text{Zn(s)} + 2\text{Ag}^+(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + 2\text{Ag(s)}$$
- Calculate E_{cell}° for the reaction. (Given: $1\text{F} = 96500\text{ mol}^{-1}$)
- b. Calculate λ_m° for MgCl_2 if λ° values for Mg^{2+} ion and Cl^- ion are $106\text{ S cm}^2\text{mol}^{-1}$ and $76.3\text{ S cm}^2\text{mol}^{-1}$ respectively.

Section D

29. Read the following text carefully and answer the questions that follow: [4]

The involvement of $(n - 1)d$ electrons in the behaviour of transition elements impart certain distinct characteristics to these elements. Thus, in addition to variable oxidation states, they exhibit paramagnetic behaviour, catalytic properties and tendency for the formation of coloured ions. The transition metals react with a number of non-metals like oxygen, nitrogen and halogens. KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$ are common examples. The two series of inner transition elements, lanthanoids and actinoids, constitute the f-block of the periodic table. In the lanthanoids, there is regular decrease in atomic size with increase in atomic number due to the imperfect shielding effect of $4f$ -orbital electrons which causes contraction.

Answer the following questions:

- Why do transition metals and their compounds act as good catalysts? (1)
- What is the cause of contraction in the atomic size of lanthanoids? (1)
- Define lanthanoid contraction. How does it affect the atomic radii of the third transition series and the second transition series? (2)

OR

- In aqueous media, which is a stronger reducing agent - Cr^{2+} or Fe^{2+} and why? (2)

30. Read the following text carefully and answer the questions that follow: [4]

The colligative properties of electrolytes require a slightly different approach than the one used for the colligative properties of non-electrolytes. The electrolytes dissociate into ions in solution. It is the number of solute particles that determines the colligative properties of a solution. The electrolyte solutions, therefore, show abnormal colligative properties. To account for this effect we define a quantity called the van't Hoff factor, given by

$$i = \frac{\text{Actual number of particles in solution after dissociation}}{\text{Number of formula units initially dissolved in solution}}$$

$i = 1$ (for non-electrolytes);

$i > 1$ (for electrolytes, undergoing dissociation)

$i < 1$ (for solutes, undergoing association).

- $0.1\text{M K}_4[\text{Fe}(\text{CN})_6]$ is 60% ionized. What will be its van't Hoff factor? (1)
- When a solution of benzoic acid dissolved in benzene such that it undergoes in molecular association and its molar mass approaches 244. In which form Benzoic molecules will exist? (1)

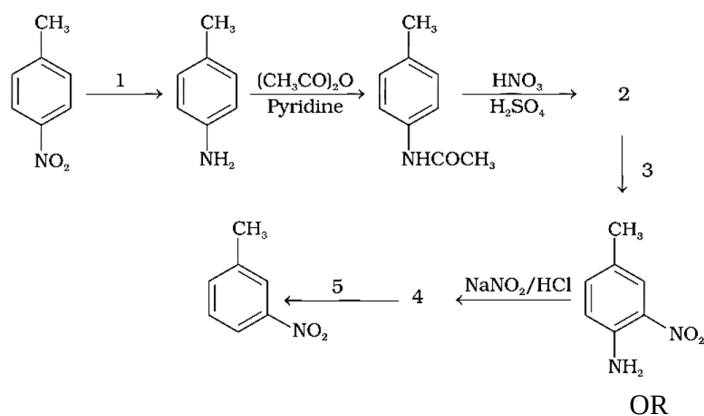
- iii. How does van't Hoff factor **i** and degree of association **a** are related if benzoic acid undergoes dimerisation in benzene solution? ($i = 1 - \frac{\alpha}{2}$ or $i = 1 + \alpha$) (2)

OR

What do you mean by colligative properties of solutions? (2)

Section E

31. **Attempt any five of the following:** [5]
- (a) Why are polysaccharides considered non-sugars? [1]
 - (b) What type of bonds hold a DNA double helix together? [1]
 - (c) The two strands in DNA are not identical but are complementary. Explain. [1]
 - (d) Which one of the following is a polysaccharide? [1]
Sucrose, Glucose, Starch, Fructose
 - (e) Define the following as related to proteins: [1]
 - a. Primary Structure
 - b. Denaturation
 - (f) What is anomeric carbon? [1]
 - (g) Give reaction of glucose with the following: [1]
 - a. HCN
 - b. Conc. HNO_3
32. Indicate the types of isomerism exhibited by the following complexes and draw the structures for these isomers: [5]
- i. $\text{k} [\text{Cr}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2]$
 - ii. $[\text{Co}(\text{en})_3] \text{Cl}_3$
 - iii. $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)(\text{NO}_3)_2]$
 - iv. $[\text{Pt}(\text{NH}_3)(\text{H}_2\text{O})\text{Cl}_2]$
- OR**
- a. A metal ion M^{n+} having d^4 valence electronic configuration combines with three bidentate ligands to form a complex compound. Assuming $\Delta_o > P$.
- i. Write the electronic configuration of d^4 ion.
 - ii. What type of hybridization will M^{n+} ion has?
 - iii. Name the type of isomerism exhibited by this complex.
- b. Using IUPAC norms, write the formula for the following complexes:
- i. Tetraaminediaquacobalt(III) chloride
 - ii. Dibromidobis(ethane-1, 2-diamine)platinum(IV) nitrate
33. Predict the reagent or the product in the following reaction sequence. [5]



Write short notes on the following:

- Carbylamine reaction
- Diazotisation
- Hofmann's bromamide reaction
- Coupling reaction
- Ammonolysis



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