

Class XII | Session 2026-27
Subject - Chemistry
Sample Question Paper - Set 10

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. Decreasing order of reactivity of hydrogen halide acids in the conversion of $\text{ROH} \rightarrow \text{RX}$ is: [1]
 - a) $\text{HI} > \text{HBr} > \text{HCl} > \text{HF}$
 - b) $\text{HF} > \text{HBr} > \text{HI} > \text{HCl}$
 - c) $\text{HCl} > \text{HBr} > \text{HI} > \text{HF}$
 - d) $\text{HF} > \text{HCl} > \text{HBr} > \text{HI}$
2. _____ are joined together by phosphodiester linkage between 5' and 3' carbon atoms of the pentose sugar. [1]
 - a) Nucleic acids
 - b) Nucleotides
 - c) Proteins
 - d) Nucleosides
3. The conversion of an alkyl halide into alcohol by aqueous NaOH is classified as [1]
 - a) a dehydrohalogenation reaction
 - b) a dehydration reaction
 - c) an addition reaction
 - d) a substitution reaction
4. Pentan-2-one and Pentan-3-one can be distinguished by: [1]
 - a) Tollens' test
 - b) Sodium bicarbonate test
 - c) Fehling's test
 - d) Iodoform test
5. The unit of the rate of reaction is the same as that of the rate constant for a: [1]
 - a) it cannot be same
 - b) second order reaction
 - c) zero order reaction
 - d) first order reaction
6. Match the column and choose correct option [1]

Vant'Hoff factor	Behaviour of compound
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(a) $i = 1$	(i) Impossible
(b) $i > 1$	(ii) Association is the solution
(c) $i < 1$	(iii) Dissociation in the solution
(d) $i = 0$	(iv) No dissociation or association

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

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

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

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

7. Racemisation occurs in

[1]

a) Neither S_N1 nor S_N2 reactions

b) S_N2 reaction

c) S_N1 reaction

d) S_N2 reaction as well as S_N1 reaction

8. The catalyst used in Deacon's process is:

[1]

a) Cu_2Cl_2

b) $CuCl_2$

c) $FeCl_3$

d) $FeCl_2$

9. The half-life for a zero order reaction equals:

[1]

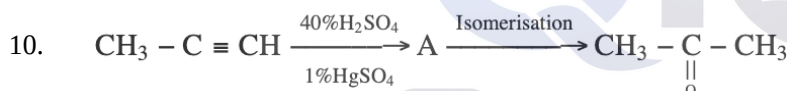
where R is the initial concentration.

a) $\frac{2k}{R}$

b) $\frac{R}{2k}$

c) $\frac{1}{2} \frac{k}{R^2}$

d) $\frac{R^2}{2k}$



[1]

The structure of A and type of isomerism in the above reaction are respectively.

a) Prop-2-en-2-ol, geometrical isomerism

b) Prop-1-en-2-ol, metamerism

c) Prop-1-en-2-ol, tautomerism

d) Prop-1-en-1-ol, tautomerism

11. The reaction $C_2H_5ONa + C_2H_5I \rightarrow C_2H_5OC_2H_5 + NaI$ is known as:

[1]

a) Williamson's synthesis

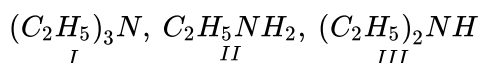
b) Grignard's synthesis

c) Kolbe's synthesis

d) Wurtz's synthesis

12. Three compounds are given below:

[1]



Identify the correct decreasing order of their basic strength in gas phase:

a) III > I > II

b) III > II > I

c) II > III > I

d) I > III > II

13. **Assertion (A):** Fructose is a reducing sugar.

[1]

Reason (R): Fructose does not reduce Fehling solution and Tollen's reagent.

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):** Acetaldehyde undergoes aldol condensation with dilute NaOH. [1]
Reason (R): Aldehydes which do not contain α -hydrogen undergo aldol condensation.
- 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):** 2-Chloro-3-methylbutane on treatment with alcoholic potash gives 2-methylbut-2-ene as major product. [1]
Reason (R): The reaction occurs according to Saytzeff rule.
- 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):** $(\text{CH}_3)_3\text{C}-\text{O}-\text{CH}_3$ gives $(\text{CH}_3)_3\text{C}-\text{I}$ and CH_3OH on treatment with HI. [1]
Reason (R): The reaction occurs by $\text{S}_{\text{N}}1$ mechanism.
- 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.

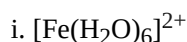
Section B

17. At 300 K, 30 g of glucose present in a litre of its solution has an osmotic pressure of 4.98 bar. If the osmotic pressure of a glucose solution is 1.52 bar at the same temperature, what would be its concentration? [2]

OR

State any two characteristics of ideal solution?

18. Write the hybridization and magnetic character of the following complexes: [2]



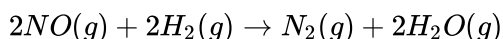
[Atomic number: Fe = 26, Ni = 28]

19. Though a transition element, scandium ($Z = 21$) does not exhibit variable oxidation states. Give reason. [2]

20. **Answer the following:** [2]

(a) Write the slope value obtained in the plot of $\ln[R]$ vs. time for a first order reaction. [1]

(b) Consider the following equation: [1]



The rate law for this reaction is first order with respect to H_2 and second order with respect to NO.

Write the rate law for this reaction.

21. Give the equations of reactions for the preparation of: (any **three**) [2]

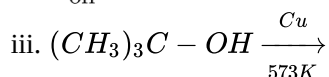
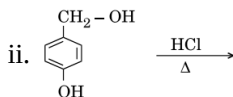
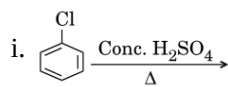
- Phenol from chlorobenzene
- Salicylaldehyde from phenol
- 2-Methoxyacetophenone from anisole
- Picric acid from phenol

Section C

22. State Kohlrausch's law of independent migration of ions. Why does the conductivity of a solution decreases with [3]

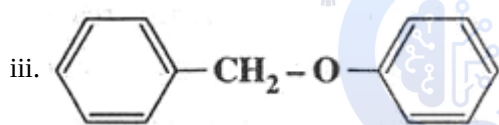
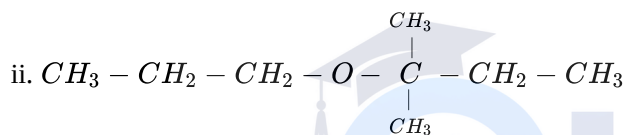
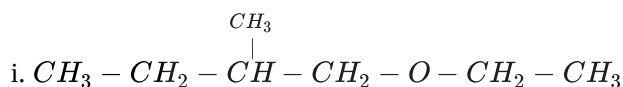
dilution?

23. A reaction is of first order in reactant A and of second order in reactant B. How is the rate of this reaction affected when [3]
- the concentration of B alone is increased to three times?
 - the concentrations of A as well as B are doubled?
24. Write the major product(s) of the following reactions: [3]



OR

Give the major products that are formed by heating each of the following ethers with HI.



25. Write the reactions involved in the following reactions: [3]
- Clemmensen reduction
 - Cannizzaro reaction
26. Determine the value of equilibrium constant (K_c) and ΔG^θ for the following reaction. [3]
- $$Ni(s) + 2Ag^+(aq) \rightarrow Ni^{2+}(aq) + 2Ag(s)$$
- $E^\theta = 1.05 V$ ($1 F = 96500 C mol^{-1}$)
27. An organic compound A on heating with NH_3 and cuprous oxide at high pressure gives compound B. The compound B on treatment with ice-cold solution of $NaNO_2$ and HCl gives C, which on heating with copper turning and HCl gives A again. Identify A, B & C. compound. [3]
28. Write the Nernst equation and calculate emf of the following cell at 298 K: [3]



Given : $E_{Cr^{3+}/Cr}^\ominus = -0.75 V$

$E_{Fe^{2+}/Fe}^\ominus = -0.45 V$

($\log 10 = 1$)

Section D

29. Read the following text carefully and answer the questions that follow: [4]
- The d-block of the periodic table contains the elements of the groups 3 to 12 and are known as transition elements. In general, the electronic configuration of these elements is $(n-1)d^{1-10} ns^{1-2}$. The d-orbitals of the penultimate energy level in their atoms receive electrons giving rise to the three rows of the transition metals i.e. 3d, 4d and 5d series. However, Zn, Cd and Hg are not regarded as transition elements. Transition elements

exhibit certain characteristic properties like variable oxidation states, complex formation, formation of coloured ions, alloys, catalytic activity etc. Transition metals are hard (except Zn, Cd and Hg) and have a high melting point.

- i. Why are Zn, Cd and Hg non-transition elements? (1)
- ii. Which transition metal of 3d series does not show variable oxidation state? (1)
- iii. Why do transition metals and their compounds show catalytic activity? (2)

OR

Why are melting points of transition metals high? (2)

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

Many chemical and biological processes depend on osmosis, the selective passage of solvent molecules through the porous membrane from a dilute solution to a more concentrated one. The osmotic pressure π depends on molar concentration of the solution ($\pi = CRT$). If two solutions are of equal solute concentration and, hence, have the same osmotic pressure, they are said to be isotonic. If two solutions are of unequal osmotic pressures, the more concentrated solution is said to be hypertonic and the more diluted solution is described as hypotonic. Osmosis is the major mechanism, for transporting water upward in the plants. Transpiration in the leaves supports the transport mechanism of water. The osmotic pressure of seawater is about 30 atm; this is the pressure that must be applied to the seawater (separated from pure water using a semi-permeable membrane) to get drinking water.

- i. What will happen if a plant cell kept in a hypertonic solution? (1)
- ii. Blood cells are isotonic with 0.9% sodium chloride solution. What happens if we place blood cells in a solution containing 1.2% sodium chloride solution? (1)
- iii. What happens when the external pressure applied becomes more than the osmotic pressure of solution? (2)

OR

Which mechanisms help in the transportation of water in a plant? (2)

Section E

31. **Attempt any five of the following:** [5]

- (a) What type of linkage is present in polysaccharides? [1]
- (b) What type of protein is present in keratin? [1]
- (c) Write the name of the component of starch which is water-soluble. [1]
- (d) Differentiate between: [1]
 - i. Peptide linkage and Glycosidic linkage
 - ii. Nucleoside and Nucleotide
- (e) Define the following terms: [1]
 - a. Denaturation of protein
 - b. Invert sugar
- (f) Define the following terms: [1]
 - i. Glycosidic linkage
 - ii. Native protein
- (g)
 - i. How are carbohydrates stored in animal body? Mention any one organ where they are present. [1]
 - ii. What is the basic structural difference between starch and cellulose?

32. Explain with two examples each of the following: Coordination entity, ligand coordination number, coordination [5]

polyhedron, homoleptic and heteroleptic.

OR

$\text{CoSO}_4\text{Cl}_5\text{NH}_3$ exists in two isomeric forms 'A' and 'B'. Isomer 'A' reacts with AgNO_3 to give white precipitate but does not react with BaCl_2 . Isomer 'B' gives a white precipitate with BaCl_2 but does not react with AgNO_3 . Answer the following questions.

- Identify 'A' and 'B' and write their structural formulas.
- Name the type of isomerism involved.
- Give the IUPAC name of 'A' and 'B'.

33. i. Give reasons: [5]

- Although $-\text{NH}_2$ group is o/p directing in electrophilic substitution reactions, yet aniline, on nitration gives good yield of m-nitroaniline.
 - $(\text{CH}_3)_2\text{NH}$ is more basic than $(\text{CH}_3)_3\text{N}$ in an aqueous solution.
 - Ammonolysis of alkyl halides is not a good method to prepare pure primary amines.
- ii. Distinguish between the following:
- $\text{CH}_3\text{CH}_2\text{NH}_2$ and $(\text{CH}_3\text{CH}_2)_2\text{NH}$
 - Aniline and CH_3NH_2

OR

Give one chemical test to distinguish between the following pairs of compounds:

- Methylamine and dimethylamine
- Secondary and tertiary amines
- Ethylamine and aniline
- Aniline and benzylamine
- Aniline and N-methyl aniline



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