

Class XII | Session 2026-27
Subject - Chemistry
Sample Question Paper - Set 7

General Instructions:

Read the following instructions carefully.

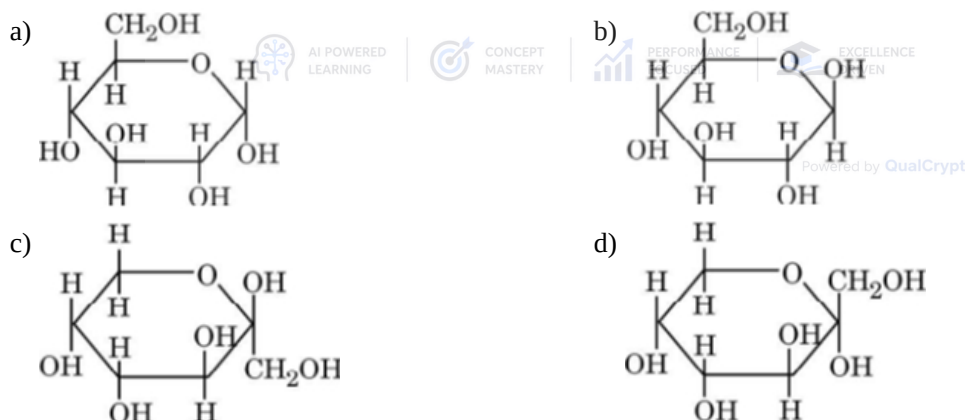
1. There are **33** questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 very short answer questions carrying 2 marks each.
4. SECTION C consists of 7 short answer questions carrying 3 marks each.
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. Butanenitrile may be prepared by heating: [1]

- | | |
|-----------------------------|----------------------------|
| a) propyl chloride with KCN | b) propyl alcohol with KCN |
| c) butyl alcohol with KCN | d) butyl chloride with KCN |

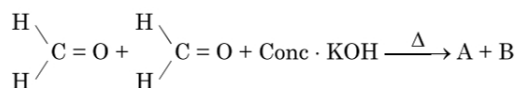
2. Which of the following structures represents α -D-glucose? [1]



3. The formation of cyanohydrin from an aldehyde is an example of: [1]

- | | |
|------------------------------|-------------------------------|
| a) nucleophilic substitution | b) electrophilic substitution |
| c) nucleophilic addition | d) electrophilic addition |

4. Consider the following reaction: [1]



Identify A and B from the given options:

a) A - Methanol, B - Potassium acetate

b) A - Ethanol, B - Potassium formate

c) A - Methanol, B - Potassium formate

d) A - Methanal, B - Ethanol

5. The half-life of a reaction is halved as the initial concentration of the reactant is doubled. The order of the reaction is: [1]

a) 3

b) 1

c) 2

d) 0

6. Match the items given in column I with that in column II: [1]

Column I	Column II
(a) The cell reaction $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$.	(i) Nickel-cadmium Storage Cell.
(b) Anodic Reaction is $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$.	(ii) Mercury Cell.
(c) Cathodic Reaction $\text{HgO}(\text{s}) + \text{H}_2\text{O} + 2\text{e}^- \rightarrow \text{Hg}(\text{l}) + 2\text{OH}^-$.	(iii) Bacon Cell.
(d) Anodic Reaction $\text{Cd}(\text{s}) + 2\text{OH}^-(\text{aq}) \rightarrow \text{Cd}(\text{OH})_2(\text{s}) + 2\text{e}^-$.	(iv) Leclanche cell.

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

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

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

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

7. Which one of the following compounds is more reactive towards $\text{S}_{\text{N}}1$ reaction? [1]

a) $\text{C}_6\text{H}_5\text{CH}_2\text{Br}$

b) $\text{C}_6\text{H}_5\text{CH}(\text{CH}_3)\text{Br}$

c) $\text{C}_6\text{H}_5\text{CH}(\text{C}_6\text{H}_5)\text{Br}$

d) $\text{CH}_2 = \text{CHCH}_2\text{Br}$

8. Deficiency of which of the following vitamins causes Pernicious anaemia? [1]

a) Vitamin B_2

b) Vitamin B_6

c) Vitamin B_1

d) Vitamin B_{12}

9. The expression which gives $3/4^{\text{th}}$ life of the first-order reaction is: [1]

a) $\frac{k}{2.303} \log 4/3$

b) $\frac{2.303}{k} \log 4$

c) $\frac{2.303}{k} \log 3$

d) $\frac{k}{2.303} \log 3/4$

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10. Which of the following compounds will give butanone on oxidation with alkaline KMnO_4 solution? [1]

a) Butan-2-ol

b) Butan-1-ol

c) Butan-3-ol

d) Both Butan-2-ol and Butan-1-ol

11. Which of the following is most acidic? [1]

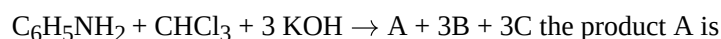
a) Benzyl alcohol

b) m - Chlorophenol

c) Phenol

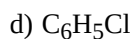
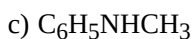
d) Cyclohexanol

12. In the reaction [1]



a) $\text{C}_6\text{H}_5\text{CN}$

b) $\text{C}_6\text{H}_5\text{NC}$



13. **Assertion (A):** Oils float on water. [1]

Reason (R): Oils are the naturally occurring compounds that belong to lipid.

- 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):** Nucleophilic substitution of iodoethane is easier than chloroethane. [1]

Reason (R): Bond enthalpy of C-I bond is less than that of C-Cl bond.

- 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):** Nucleophilic substitution of iodoethane is easier than chloroethane. [1]

Reason (R): Bond energy of C - Cl bond is less than C - I bond.

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

16. **Assertion (A):** p-nitrophenol is more acidic than phenol. [1]

Reason (R): Nitro group helps in the stabilization of the phenoxide ion by dispersal of negative charge 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.

Section B

17. Calculate Λ_m° for CaCl_2 and MgSO_4 from the following data : $\Lambda_m^\circ (\text{Ca}^{2+}) = 119.0$, $\text{Mg}^{2+} = 106.0$, $\text{Cl}^- = 76.3$ and $\text{SO}_4^{2-} = 160.05 \text{ cm}^2 \text{ mol}^{-1}$ [2]

OR

How much electricity in terms of Faraday is required to produce 40 grams of Al from Al_2O_3 ?

(Atomic mass of Al = 27 g/mol)

18. For a 5% solution of urea (Molar mass = 60 g/mol), calculate the osmotic pressure at 300 K. [R = 0.0821 L atm $\text{K}^{-1} \text{ mol}^{-1}$] [2]

19. Why is Cr^{2+} reducing and Mn^{3+} oxidising when both have d^4 configuration? [2]

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

- (a) The half-life of a first order reaction is 60 minutes. How long will it take to consume 90% of the reactant? [1]

[Given : $\log 2 = 0.3010$, $\log 3 = 0.4771$, $\log 10 = 1$]

- (b) Write units of rate constant k for zero, first, second and n^{th} order reactions. [1]

21. Write the steps for the conversion of Methanal to Ethanal. [2]

Section C

22. Consult the table of standard electrode potentials and suggest three substances that can oxidise ferrous ions under suitable conditions. [3]

23. a. On the basis of crystal field theory, write the electronic configuration for d^4 ion if $\Delta_0 < P$. [3]

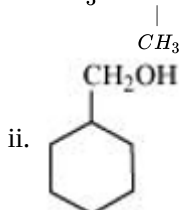
b. Using valence bond theory, predict the hybridization and magnetic character of $[\text{Ni}(\text{CN})_4]^{2-}$.

(Atomic number of Ni = 28)

c. Write the formula of the following complex using IUPAC norms:

Dichloridobis (ethane-1,2-diamine) cobalt (III)

24. Show how are the following alcohols prepared by the reaction of a suitable Grignard reagent on methanal? [3]



OR

Write the names of reagents and equations for the preparation of the following ethers by Williamson's synthesis:

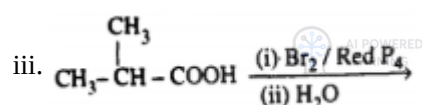
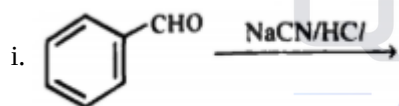
i. 1-Propoxypropane

ii. Ethoxybenzene

iii. 2-Methoxy-2-methylpropane

iv. 1-Methoxyethane

25. Complete the following reactions: [3]



26. What is understood by a normal hydrogen electrode? Give its significance? [3]

27. Out of $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$, and $\text{C}_6\text{H}_5\text{CHClC}_6\text{H}_5$, which is more easily hydrolysed by aqueous KOH? [3]

28. A reaction is second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is: [3]

a. doubled

b. reduced to half

Section D

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

Living system are made up of complex molecules called Biomolecules. Carbohydrate, proteins, enzymes, nucleic acids, lipids, hormones ATP, DNA and RNA play an important role in our daily life. Carbohydrates provide us energy. Protein help in growth and maintenance of body. Nucleic acids, RNA helps in protein synthesis, DNA helps in transfer of genetic characteristics. Fat are source of energy and protect our vital organs.

- i. Why are carbohydrates optically active? (1)
- ii. Name two acidic amino acids. (1)
- iii. Name a protein which has quarternary structure. (2)

OR

What are products of hydrolysis of fats? (2)

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

The coordination compounds are of great importance. These compounds are widely present in the mineral, plant and animal worlds and are known to play many important functions in the area of analytical chemistry, metallurgy, biological systems, industry and medicine. The selective estimation of these ions can be done due to the difference in the stability constants of calcium and magnesium complexes. Coordination compounds are of great importance in biological systems. The pigment responsible for photosynthesis, chlorophyll, is a coordination compound of magnesium. Among the other compounds of biological importance with coordinated metal ions are enzymes like carboxypeptidase and carbonic anhydrase (catalysts of biological systems). Coordination compounds are used as catalysts for many industrial processes. Articles can be electroplated with silver and gold much more smoothly and evenly from solutions of the complexes, $[\text{Ag}(\text{CN})_2]^-$ and $[\text{Au}(\text{CN})_2]^-$ than from a solution of simple metal ions.

- i. How can excess of copper and iron are removed? (1)
- ii. Purification of metals can be achieved through the formation and subsequent decomposition of their coordination compounds. Give one example. (1)
- iii. Coordination compounds find use in many qualitative and quantitative chemical analysis. Justify. (2)

OR

Gold is a co-ordinate compound. Justify. (2)

Section E

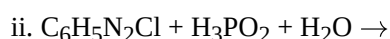
31. **Attempt any five of the following:** [5]

- (a) What is the composition of mischmetal? Give its one use. [1]
- (b) What is meant by disproportionation of an oxidation state? Give an example. [1]
- (c) Write the preparation of sodium dichromate from chromite ore. [1]
- (d) Actinoid series members exhibit a large number of oxidation states compared to their corresponding lanthanoids. Why? [1]
- (e) Draw and show manganate and permanganate ions, structurally? [1]
- (f) How would you account for the following? Among lanthanoids, Ln (III) compounds are predominant. However, occasionally in solutions or in solid compounds, +2 and +4 ions are also obtained. [1]
- (g) La^{3+} ($Z = 57$) and Lu^{3+} ($Z = 71$) do not show any colour in solutions. Give reason. [1]

32. a. An aromatic compound 'A' on treatment with aqueous ammonia and heating forms compound 'B' which on [5]

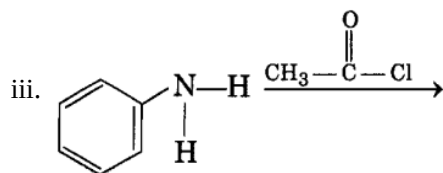
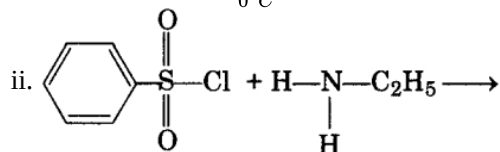
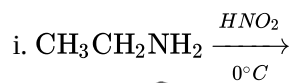
heating with Br_2 and KOH forms a compound 'C' of molecular formula $\text{C}_6\text{H}_7\text{N}$. Write the structures and IUPAC names of compounds A, B and C.

b. Complete the following reactions:



OR

Write the main products of the following reactions:



33. Benzene and toluene form ideal solution over the entire range of composition. The vapour pressure of pure benzene and naphthalene at 300 K are 50.71 mm Hg and 32.06 mm Hg respectively. Calculate the mole fraction of benzene in vapour phase if 80 g of benzene is mixed with 100 g of toluene. [5]

OR

- The depression in freezing point of water observed for the same molar concentrations of acetic acid, trichloroacetic acid and trifluoroacetic acid increases in the order as stated above. Explain.
- What mass of NaCl must be dissolved in 65.0 g of water to lower the freezing point of water by 7.50°C ? The freezing point depression constant (K_f) for water is $1.86^\circ\text{C}/m$. Assuming van't Hoff factor for NaCl is 1.87. (Molar mass of NaCl = 58.5 g mol^{-1})



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