

Sample Paper 04

Class XII 2025-26

Chemistry (043)

Time: 3 Hours

Max. Marks: 70

General Instructions:

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

Directions (Q. Nos. 1-16) : The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.

1. Which of the following statements about vitamin B_{12} is incorrect?
(a) It has a cobalt atom
(b) It also occurs in plants
(c) It is also present in rain water
(d) It is needed for human body in very small amounts
2. In a reversible reaction the energy of activation of the forward reaction is 50 kcal. The energy of activation for the reverse reaction will be :
(a) <50 kcal
(b) either greater than or less than 50 kcal
(c) 50 kcal
(d) >50 kcal
3. Match the following terms related to chemical kinetics with their correct definitions or examples:

	Column A (Term)		Column B (Definition/Example)
A	Rate of Reaction	i	Change in concentration of reactants or products per unit time.
B	Rate Law	ii	The time taken for the concentration of a reactant to reduce to half of its initial value. .
C	Activation Energy	iii	The minimum energy required for a reaction to occur.
D	Half-Life	iv	An equation that relates the rate of reaction to the concentration of reactants

- (a) A - i B - iv C - iii D - ii
- (b) A - ii B - i C - iii D - iv
- (c) A - i B - iv C - iii D - i
- (d) A - iii B - ii C - i D - iv

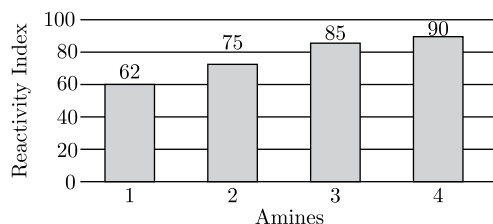
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4. Which of the following reactions will not give a primary amine ?



5. Study the graph showing the reactivity of primary amines with nitrous acid and identify the compounds:



(a) 1 = Methylamine, 2 = Ethylamine, 3 = Propylamine, 4 = Butylamine

(b) 1 = Butylamine, 2 = Methylamine, 3 = Ethylamine, 4 = Propylamine

(c) 1 = Ethylamine, 2 = Propylamine, 3 = Butylamine, 4 = Methylamine

(d) 1 = Propylamine, 2 = Butylamine, 3 = Methylamine, 4 = Ethylamine

6. Oxidation of primary alcohols with chlorine yields

(a) Acyl chloride

(b) Alkyl chloride

(c) Aldehyde

(d) Ketone

7. The activation energy for a simple chemical reaction $A \longrightarrow B$ is E_a in forward direction. The activation energy for reverse reaction

(a) is always double of E_a

(b) is negative of E_a

(c) is always less than E_a

(d) can be less than or more than E_a

8. Blood cells retain their normal shape in solution which are:

(a) hypotonic to blood

(b) isotonic to blood

(c) hypertonic to blood

(d) equinormal to blood

9. Coordination compounds have great importance in biological systems. In this context which of the following statements is incorrect?

(a) Cynacobalamin is B_{12} and contains cobalt

(b) Haemoglobin is the red pigment of blood and contains irons

(c) Chrolophylls are green pigments in plants and contain calcium

(d) Carboxyperptidase – A is an enzyme and contains zinc.

10. Butane-2-ol is

(a) Primary alcohol

(b) Secondary alcohol

(c) Tertiary alcohol

(d) Aldehyde

11. Fused NaCl on electrolysis gives on cathode.

(a) chlorine

(b) sodium

(c) sodium amalgam

(d) hydrogen



12. Sodium formate on heating yields
- | | |
|---------------------------|------------------------------|
| (a) Oxalic acid and H_2 | (b) Sodium oxalate and H_2 |
| (c) CO_2 and NaOH | (d) Sodium oxalate |

Directions (Q. No. 13-16) : Each of the following questions consists of two statements, one is Assertion and the other is Reason. Give answer :

13. **Assertion :** The $[Ni(en)_3]Cl_2$ (en = ethylenediamine) has lower stability than $[Ni(NH_3)_6]Cl_2$.
Reason : In $[Ni(en)_3]Cl_2$ the geometry of Ni is octahedral.
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Both the Assertion and Reason are incorrect.
14. **Assertion :** Acetylene on treatment with alkaline $KMnO_4$ produces acetaldehyde.
Reason : Alkaline $KMnO_4$ is a reducing agent.
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Both the Assertion and Reason are incorrect.
15. **Assertion :** The order of the reaction $CH_3COOC_2H_5 + H_2O \longrightarrow CH_3COOH + C_2H_5OH$ is 1.
Reason : The molecularity of this reactions is 2.
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Both the Assertion and Reason are incorrect.
16. **Assertion :** $ROCOl$, $(RCO)_2O$ and $RCOOR'$ all react with Grignard reagents to form 3° alcohols.
Reason : $ROCOl$ reacts with R_2Cd to form ketones but $(RCO)_2O$ and $RCOOR'$ do not react at all.
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.
(b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.
(c) Assertion is correct but Reason is incorrect.
(d) Both the Assertion and Reason are incorrect.

SECTION-B

Directions (Q. Nos. 17-21) : This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.

17. Draw the structure of
1. hex-1-en-3 ol
 2. 3-aminopentan-2-ol

OR

What is 'Wood spirit'?

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18. Explain with one example each the terms weak and strong electrolytes.
19. Define Vapour pressure.
20. Write the use of formaldehyde (HCHO).
21. Suggest a way to determine the Λ_m° value of water.

SECTION-C

Directions (Q. Nos. 22-28) : This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.

22. What is the difference between inner orbital or low spin complex and outer orbital or high spin complex?
23. Which one of the following has the highest dipole moment?
(i) CH_2Cl_2
(ii) CHCl_3
(iii) CCl_4
24. Give the dissimilarities between >C=O bond and $\text{—}\overset{\text{I}}{\underset{\text{I}}{\text{C}}}=\overset{\text{I}}{\underset{\text{I}}{\text{C}}}\text{—}$ Bond.
OR
Arrange the following compounds in increasing order of boiling points ?
1. Pentan-1-ol, butan-1-ol, butan-2-ol, propan-1-ol, methanol.
2. Pentan-1-ol, *n*-butane, pentanal, ethoxyethane.
25. The formation of alcohols but in presence of alcoholic KOH, alkenes are the major products. Explain why ?
26. Give the representation of a galvanic cell.
27. Write the IUPAC names of the following coordinate compounds:
1. $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]\text{Cl}_2$
2. $[\text{Cr}(\text{NH}_3)_4\text{Cl}_2]^+$
28. The treatment of alkyl chloride with aqueous KOH leads to Write main series of transition metals.

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SECTION-D

Directions (Q. Nos. 29-30) : The following questions are case-based questions. Each question has an internal choice and carries 4 marks each. Read the passage carefully and answer the questions that follow.

- 29.** Amines are alkyl or aryl derivatives of ammonia formed by replacement of one or more hydrogen atoms. Alkyl derivatives are called aliphatic amines and aryl derivatives are known as aromatic amines. The presence of aromatic amines can be identified by performing dye test. Aniline is the simplest example of aromatic amine. It undergoes electrophilic substitution reactions in which -NH_2 group strongly activates the aromatic ring through delocalisation of lone pair of electrons of N-atom. Aniline undergoes electrophilic substitution reactions. Ortho and para positions to the -NH_2 group become centres of high electron density. Thus, -NH_2 group is ortho and para-directing and powerful activating group.

Read the above passage and answer the following question:

- (a) What does oxidation of aniline in presence of MnO_2 , and, H_2SO_4 produce ?
- (b) How will you distinguish cyclohexylamine and aniline ?
- (c) What is the major product obtained by acetylation of aniline followed by nitration (conc. HNO_3 + conc. H_2SO_4) and then alkaline hydrolysis ?

OR

- (d) What does aniline produce in carbylamine reaction? Write chemical equation of the reaction involved.

- 30.** Colour may arise from an entirely different cause in ions with incomplete d or f shells. This source of colours is very important in most of the transition metal ions. In free isolated gaseous ion the five d orbitals are degenerate, i.e. they are identical in energy. In real life situations, the ion will be surrounded by solvent molecules if it is in solution; by other ligands if it is in a complex; or by other ions if it is in crystal lattice. The surrounding groups affect the energy of some orbitals more than others. Thus the d orbitals are no longer degenerate, and they form two groups of orbitals of different energies. Thus in transition element ions with a partly filled d shell, it is possible to promote electrons from d level to another d level of higher energy. This corresponds to a fairly small energy difference and so light is absorbed in the visible region. The colour of a transition metal complex is dependent on how big the energy difference is between the two d levels. This in turn depends on the nature of the ligand, and on the type of complex formed. Thus the octahedral complex $[\text{Ni}(\text{NH}_3)_6]^{2+}$ is blue, $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ is green and $[\text{Ni}(\text{NO}_2)_6]^{4-}$ is brown-red. The colour changes with the ligand, used the colour also depends on the Number of ligands and the shape of the complex formed.

Answer the following questions :

- (a) Account for the following : Copper(I) compounds are white whereas copper(II) compounds are coloured.
- (b) Cu^{2+} salts are coloured, while Zn^{2+} salts are white.
- (c) Which of the following cations are coloured in aqueous solutions and why ?
 Sc^{3+} , V^{3+} , Ti^{4+} , Mn^{2+}
(At. nos. $\text{Sc} = 21$, $\text{V} = 23$, $\text{Ti} = 22$, $\text{Mn} = 25$)

OR

- (d) How would you account for the following : Transition metals form coloured compounds ?

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CLICK HERE TO SEE ANSWERS



SECTION-E

Directions (Q. Nos. 31-33) : The following questions are long answer type and carry 5 marks each. Two questions have an internal choice.

- 31.** Amines are alkyl or aryl derivatives of ammonia formed by replacement of one or more hydrogen atoms. Alkyl derivatives are called aliphatic amines and aryl derivatives are known as aromatic amines. The presence of aromatic amines can be identified by performing dye test. Aniline is the simplest example of aromatic amine. It undergoes electrophilic substitution reactions in which -NH_2 group strongly activates the aromatic ring through delocalisation of lone pair of electrons of N-atom. Aniline undergoes electrophilic substitution reactions. Ortho and para positions to the -NH_2 group become centres of high electron density. Thus, -NH_2 group is ortho and para-directing and powerful activating group.

Read the above passage and answer the following question:

- (a) What does oxidation of aniline in presence of MnO_2 , and, H_2SO_4 produce ?
- (b) How will you distinguish cyclohexylamine and aniline ?
- (c) What is the major product obtained by acetylation of aniline followed by nitration (conc. HNO_3 + conc. H_2SO_4) and then alkaline hydrolysis ?

OR

- (d) What does aniline produce in carbylamine reaction? Write chemical equation of the reaction involved.

- 32.** What are carbohydrates ? How are they classified ?

OR

Define the following as related to proteins.

- (i) Peptide linkage
- (ii) Primary structure
- (iii) Denaturation

- 33.** Describe the general characteristics of transition elements with special reference to the following :

- (i) Formation of colour salt
- (ii) Variable oxidation state

OR

- (a) Account for the following;

- 1. Mn shows the highest oxidation state of +7 with oxygen but with fluorine, it shows the oxidation state of +4.
- 2. Cr^{2+} is a strong reducing agent.
- 3. Cu^{2+} salts are coloured, while Zn^{2+} salts are white.

- (b) Complete the following equations:

- 1. $2\text{MnO}_2 + 4\text{KOH} + \text{O}_2 \xrightarrow{\Delta} \text{ } s$
- 2. $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{I}^- \longrightarrow$

□□□□□□

