# CBSE EXAMINATION PAPER-2025

## CHEMISTRY

## (Solved)

Time allowed : 3 hours | Maximum Marks : 53

**General Instructions :**

Read the following instructions carefully and follow them :

i. This question paper contains **27 questions.** All questions are **compulsory.**

ii. This question paper is divided into **5 sections.**

iii. **Section A** – questions number **1 to 12** are multiple choice questions Each question carries **1 marks.**

iv. **Section B** – questions number **13 to 16** are very short answer Each question carries **2 marks.**

v. **Section C** – questions number **17 to 22** are short answer Each question carries **3 marks.**

vi. **Section D** – questions number **23 to 24** are case based questions

vii. **Section E** – questions number **25 to 27** are long answer Each question carries **5 marks.**

viii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

ix. Use of calculator is NOT allowed.

## Section A

**Question 1.**

Which of the following transition metal ion is not coloured?

[1 Marks]

(A) $Cu^{+}$

(B) $Ni^{2+}$

(C) $Co^{2+}$

(D) $V^{3+}$

**Question 2.**

Which of the following solutions will have the highest boiling point in water?

[1 Marks]

(A) 1% $CaCl_2$

(B) 1% KCl

(C) 1% urea

(D) 1% glucose

**Question 3.**

During electrolysis of dilute $H_2SO_4$, using platinum electrodes, the gas evolved at the anode is:

[1 Marks]

(A) $O_2$ gas

(B) $SO_3$ gas

(C) $SO_2$ gas

(D) $H_2$ gas

**Question 4.**

The activation energy ($E_a$) of a reaction can be determined from the slope of which of the following plots?

[1 Marks]

(A) ln k vs. T

(B) ln k /t vs. T

(C) T /ln k vs.1/ T

(D) In k vs. 1/T

**Question 5.**

The number of moles of AgCl precipitated when excess $AgNO_3$ solution is mixed with one mole of $[Co(NH_3)_3Cl_3]$ is:

[1 Marks]

(A) 0

(B) 3

(C) 1

(D) 2

**Question 6.**

The reaction $R - OH + Na \longrightarrow RO^-Na^+ + 1/2\ H_2\ (g)$ suggests that alcohols are:

[1 Marks]

(A) Amphoteric

(B) Basic

(C) Acidic

(D) Neutral

**Question 7.**

At low temperature, phenol reacts with $Br_2$ in $CS_2$ to form:

[1 Marks]

(A) p-bromophenol

(B) 2,4,6-tribromophenol

(C) 2,4-dibromophenol

(D) o-and p-bromophenol

**Question 8.**

When alkyl iodide is treated with large excess of ammonia, the major product obtained is:

[1 Marks]

(A) Secondary amine

(B) Primary amine

(C) Tertiary amine

(D) Quaternary ammonium salt

**Question 9.**

α-helix structure refers to:

[1 Marks]

(A) primary structure of protein

(B) quaternary structure of protein

(C) tertiary structure of protein

(D) secondary structure of protein

**Question 10.**

**Assertion (A)** : Cooking time is reduced in pressure cooker.

**Reason (R)** : Boiling point of water inside the pressure cooker is elevated.

[1 Marks]

(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 Assertio

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true

**Question 11.**

Assertion (A) : Actinoids show irregularities in their electronic configurations.

Reason (R) : Actinoids are radioactive in nature.

[1 Marks]

(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 false, but Reason (R) is true

(D) Assertion (A) is true, but Reason (R) is false.

**Question 12.**

Assertion (A) : Vitamin K can be stored in our body.

Reason (R) : Vitamin K is a water soluble vitamin.

[1 Marks]

(A) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(B) Both Assertion (A) and Reason (R) are true and Reason (R) is 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

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## Section B

**Question 13.**

What is meant by positive deviation from Raoult's law ? Give an example. What type of azeotrope is formed by positive deviation ?

[2 Marks]

**Question 14.**

State a condition under which a bimolecular reaction is kinetically first order reaction. Give an example. For which type of reactions, do order and molecularity have the same value ?

[2 Marks]

**Question 15.**

Why are haloarenes less reactive towards nucleophilic substitution reaction ? How does the presence of nitro (–NO2) group at ortho- and para-positions in haloarenes increase the reactivity towards nucleophilic substitution reaction ?

[2 Marks]

**Question 16.**

The two strands in DNA are not identical but complementary. Explain. What products would be formed when DNA is hydrolysed ?

[2 Marks]

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## Section C

**Question 17.**

0.3 g of acetic acid (Molar mass = 60 g $mol^{-1}$ ) dissolved in 30 g of benzene shows a depression in freezing point equal to 0.45°C. Calculate the percentage association of acid if it forms a dimer in the solution.

(Given : Kf for benzene = 5.12 K kg $mol^{-1}$)

[3 Marks]

**Question 18.**

Write the name of the cell which is generally used in inverters. Write the reactions taking place at anode and cathode of this cell, when it is in use.

[3 Marks]

**Question 19.**

Explain why electrolysis of an aqueous solution of NaCl gives H2gas at cathode and Cl2 gas at anode ? Write overall reaction.

(Given : $E°Na^{+}$ /Na + = – 2.71 V , $E°H_2O/H_2$=-0.83V ,

$E°Cl_2/2Cl$=1.36V , $E°H^{+}/O_2/H_2O$=+1.23V

[3 Marks]

**Question 20.**

A compound (A) with molecular formula $C_4H_9I$ which is a primary alkyl halide, reacts with alcoholic KOH to give compound (B). Compound (B) reacts with HI to give (C) which is an isomer of (A). When (A) reacts with Na metal in the presence of dry ether, it gives a compound (D), $C_8H_{18}$, which is different from the compound formed when n-butyl iodide reacts with sodium. Write the structures of (A), (B), (C) and (D). Write thechemical equation when compound (A) is reacted with alcoholic KOH.

[3 Marks]

**Question 21.**

Give reasons for the following :

(a) Benzoic acid does not undergo Friedel-Crafts reaction.

(b) HCHO is more reactive than $CH_3CHO$ towards addition of HCN.

(c) Vinyl group directly attached with carboxylic acid should decrease the acidity of corresponding carboxylic acid due to resonance, but on the contrary it increases the acidity.

[3 Marks]

**Question 22.**

Write the reaction of D-Glucose with the following :

(a) HCN (b) $Br_2$ water (c) $(CH_3CO)_2O$

[3 Marks]

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## Section D

**Question 23.** The Crystal Field Theory (CFT) of coordination compounds is based on the effect of different crystal fields (provided by the ligands taken as point charges) on the degeneracy of d-orbital energies of the central metal atom/ion. The splitting of the d-orbitals provides different electronic arrangements in strong and weak crystal fields. In tetrahedral coordination entity formation, the d-orbital splitting is smaller as compared to the octahedral entity.

**Question 24.**

The Crystal Field Theory (CFT) of coordination compounds is based on the effect of different crystal fields (provided by the ligands taken as point charges) on the

degeneracy of d-orbital energies of the central metal atom/ion. The splitting of the d-orbitals provides different electronic arrangements in strong and weak crystal fields. In tetrahedral coordination entity formation, the d-orbital splitting is smaller as compared to the octahedral entity.

Answer the following questions :

(1)

On the basis of CFT, explain why $[Ti(H_2O)_6]Cl_3$ complex iscoloured ? What happens on heating the complex $[Ti(H_2O)_6]Cl_3$ ?

Give reason.[Atomic no. : Ti = 22]

[2 Marks]

(2)

What is crystal field splitting energy ?

[1 Marks]

(3)

On the basis of $\Delta_0$ and P (pairing energy), how can youdifferentiate between a strong field ligand and a weak fieldligand ?

[1 Marks]

(4)

Why are low spin tetrahedral complexes rarely observed ?

[1 Marks]

## Section E

**Question 25.**

Account for the following:

(I) The $E^{o}\ Mn^{2+}/Mn$ value for manganese is highly negative, whereas $E^{o}\ Mn^{3+}/Mn^{2+}$ is highly positive.

(II) Actinoids show wide range of oxidation states.

(III) Transition metals have high melting points

Complete the following ionic equations:

(I) $5SO_3^{2-} + 2MnO_4^- + 6H^+ \longrightarrow$

(II) $2MnO_4^- + H_2O + I^- \longrightarrow$ .

[5 Marks]

**Question 26.**

(i) An organic compound (X) having molecular formula C5H10O can show various properties depending on its structures. Draw each of the structures if it :

(I) shows Cannizzaro reaction.

(II) reduces Tollens' reagent and has a chiral carbon.

(III) gives positive iodoform test.

(ii) Write the reaction involved in the following :

(I) Clemmensen reduction

(II) Etard reaction

[5 Marks]

**Question 27.**

Answer the following questions :

(i) Draw structure of the methyl hemiacetal of methanal.

(ii) There are two – NH2 groups in semicarbazide. However only one is involved in the formation of semicarbazones. Give reason.

(iii) How will you convert ethanol to 3-hydroxybutanal ?

(iv) Complete the following equation :

(v) Write the final product formed when phthalic acid is treated with NH3 followed by strong heating.

[5 Marks]