

CBSE EXAMINATION PAPER-2025

CHEMISTRY

(Solved)

Time allowed : 3 hours

Maximum Marks : 28

General Instructions :

Read the following instructions carefully and follow them :

- i. This question paper contains **22 questions**. All questions are **compulsory**.
- ii. This question paper is divided into **4 sections**.
- iii. **Section A** – questions number **1 to 13** are multiple choice questions Each question carries **1 marks**.
- iv. **Section B** – questions number **14 to 16** are very short answer Each question carries **2 marks**.
- v. **Section C** – questions number **17 to 19** are short answer Each question carries **3 marks**.
- vi. **Section D** – questions number **20 to 22** are case based questions
- vii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.
- viii. Use of calculator is NOT allowed.

Section A

Question 1.

The role of a catalyst is to change:

[1 Marks]

(A) Gibbs energy of reaction

(B) enthalpy of reaction

(C) activation energy of reaction

(D) equilibrium constant

Question 2.

Which of the following molecules is chiral in nature?

[1 Marks]

(A) 1-chlorobutane

(B) 2-chlorobutane

(C) 1-chloropropane

(D) 2-chloropropane

Question 3.

$\text{CH}_3\text{CH}_2\text{OH}$ can be converted to CH_3CHO by:

[1 Marks]

(A) treatment with PCC

(B) treatment with KMnO_4

(C) treatment with LiAlH_4

(D) catalytic hydrogenation

Question 4.

The IUPAC name for $\text{CH}_3\text{-CH}_2\text{-N(CH}_3\text{)-CH}_2\text{-CH}_2\text{-CH}_3$ is:

[1 Marks]

(A) N,N-dimethylpropan-1-amine

(B) N-ethyl-N-methylpropan-1-amine

(C) N,N-diethylpropan-1-amine

(D) N-methylpentan-2-amine

Question 5.

The treatment of ethyl bromide with alcoholic silver nitrite gives:

[1 Marks]

(A) ethyl nitrite

(B) nitromethane

(C) ethene

(D) nitroethane

Question 6.

Which of the following aqueous solutions will have the highest freezing point?

[1 Marks]

(A) 1.0 M Na_2SO_4

(B) 1.0 M KCl

(C) 1.0 M Glucose

(D) 1.0 M AlCl_3

Question 7.

In which of the following groups are both ions coloured in aqueous solution?

I. Cu^+ II. Ti^{4+} III. Co^{2+} IV. Fe^{2+}

[Atomic number : Cu = 29, Ti = 22, Co = 27, Fe = 26]

[1 Marks]

(A) I and IV

(B) II and III

(C) I and II

(D) III and IV

Question 8.

$\text{CH}_3\text{CH}_2\text{CHO}$ and $\text{CH}_3\text{CH}_2\text{COOH}$ can be distinguished by:

[1 Marks]

- (A) Iodoform test
- (B) Sodium bicarbonate test
- (C) Hinsberg test
- (D) Lucas test

Question 9.

While doing qualitative analysis in chemistry lab, Abhishek added yellow coloured potassium chromate solution into a test tube. He was surprised to see the colour of the solution changing immediately to orange. He realised that the test tube was not clean and contained a few drops of some liquid. Which of the following substances will be the most likely liquid to be present in the test tube before adding potassium chromate solution?

[1 Marks]

- (A) Sodium hydroxide solution
- (B) Methyl orange solution
- (C) HCl solution
- (D) Sodium hydrogen carbonate solution

Question 10.

Assertion (A) : For measuring resistance of an ionic solution an AC source is used.

Reason (R) : Concentration of ionic solution will change if DC source is used.

[1 Marks]

- (A) Assertion (A) is true, but Reason (R) is false.
- (B) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
- (C) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
- (D) Assertion (A) is false, but Reason (R) is true

Question 11.

Assertion (A) : Henry's law constant (KH) decreases with increase in temperature.

Reason (R) : As the temperature increases, solubility of gases in liquids decreases.

[1 Marks]

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

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

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

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

Question 12.

Assertion (A) : The solubility of aldehydes and ketones in water decreases with increase in size of the alkyl group.

Reason (R) : Aldehydes and ketones have dipole-dipole interaction.

[1 Marks]

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

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

(C) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

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

Question 13.

Assertion (A) : The boiling points of alkyl halides decrease in the order $RI > RBr > RCl > RF$.

Reason (R) : The van der Waals forces of attraction decrease in the order $RI > RBr > RCl > RF$

[1 Marks]

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

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

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

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

Section B

Question 14.

Calculate the elevation of boiling point of a solution when 3 g of CaCl_2 (Molar mass = 111 g mol^{-1}) was dissolved in 260 g of water, assuming that CaCl_2 undergoes complete dissociation. (K_b for water = 0.52 K kg mol^{-1})

[2 Marks]

Question 15.

Liquids 'X' and 'Y' form an ideal solution. The vapour pressure of pure 'X' and pure 'Y' are 120 mm Hg and 160 mm Hg respectively. Calculate the vapour pressure of the solution containing equal moles of 'X' and 'Y'.

[2 Marks]

Question 16.

Explain the mechanism of acid catalysed hydration of ethene.

[2 Marks]

Section C

Question 17.

Shweta mixed two liquids A and B of 10 mL each. After mixing, the volume of the solution was found to be 20.2 mL.

- (i) Why was there a volume change after mixing the liquids ?
- (ii) Will there be an increase or decrease of temperature after mixing ?
- (iii) Give one example for this type of solution.

[3 Marks]

Question 18.

- (i) How does sprinkling of salt help in clearing the snow covered roads in hilly areas ?
- (ii) What happens when red blood cells are kept in 0.5% (mass/vol) NaCl solution ? Justify your answer.
- (iii) Write an application of reverse osmosis.

[3 Marks]

Question 19.

An organic compound 'A' (molecular formula C_8H_8O) gives 2,4-DNP test. It does not give Tollen's test, but gives a yellow precipitate 'B' with NaOH and I_2 . On drastic oxidation, it gives a carboxylic acid 'C' with formula $C_7H_6O_2$. Identify 'A', 'B', 'C' and write the reactions involved.

[3 Marks]

Section D

Question 20. Carbohydrates are polyhydroxy aldehydes or ketones that represent enormous structural diversity in terms of the arrangement of atoms in space, resulting in hundreds of stereoisomers. Although the chemical properties of most stereoisomers may not be very different, their metabolic rate and utilization in biological systems is significantly different and known to influence the overall carbohydrate metabolism. Structural variants, which arise due to a different arrangement of atoms in three-dimensional space are known as stereoisomers. The number of stereoisomers can be theoretically estimated by using the formula 2^n , where 'n' is the number of stereocenters or asymmetric (chiral) carbon atoms in a molecule. Out of these stereoisomers, there are some structures, which are mirror images of each other, and they are referred to as enantiomers.

Question 21.

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in a molecule. Out of these stereoisomers, there are some structures, which are mirror images of each other, and they are referred to as enantiomers.

Answer the following questions :

(1)

Give chemical reactions to show the presence of an aldehydic group and straight chain in glucose.

[2 Marks]

(2)

Draw the structure of β -D-Glucopyranose.

[1 Marks]

(3)

Define anomers.

[1 Marks]

(4)

Sucrose is known as invert sugar. Explain.

[1 Marks]

Question 22.

Werner's coordination theory in 1893 was the first attempt to explain the bonding in coordination complexes. It must be remembered that this theory was put forward before the electron had been discovered by J.J. Thomson in 1897, and before the electronic theory of valency. Werner did not have any of the modern instrumental techniques and all his studies were made using simple experimental techniques. Werner was able to explain the nature of bonding in complexes and he concluded that in complexes, the metal shows two different sorts of valency : primary and secondary. Primary valences are normally ionisable whereas secondary valences are non ionisable.

Answer the following questions :

(1)

One mole of $\text{CrCl}_3 \cdot 4\text{H}_2\text{O}$ precipitates one mole of AgCl when treated with excess of AgNO_3 solution. Write (i) the structural formula of the complex, and (ii) the secondary valency of Cr.

[2 Marks]

(2)

What is the difference between a complex and a double salt ?

[1 Marks]

(3)

Arrange the following complexes in the increasing order of conductivity of their solution :

$[\text{Cr}(\text{NH}_3)_3\text{Cl}_3]$, $[\text{Cr}(\text{NH}_3)_6]\text{Cl}_3$, $[\text{Cr}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$

[1 Marks]

(4)

Write two differences between primary and secondary valences in coordination compounds.

[1 Marks]