

# CBSE EXAMINATION PAPER-2025

## CHEMISTRY

(Solved)

Time allowed : 3 hours

Maximum Marks : 55

### General Instructions :

Read the following instructions carefully and follow them :

- i. This question paper contains **30 questions**. All questions are **compulsory**.
- ii. This question paper is divided into **5 sections**.
- iii. **Section A** – questions number **1 to 15** are multiple choice questions Each question carries **1 marks**.
- iv. **Section B** – questions number **16 to 20** are very short answer Each question carries **2 marks**.
- v. **Section C** – questions number **21 to 25** are short answer Each question carries **3 marks**.
- vi. **Section D** – questions number **26 to 27** are case based questions
- vii. **Section E** – questions number **28 to 30** 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.

The charge required for the reduction of 1 mol of  $\text{MnO}_4^-$  to  $\text{MnO}_2$  is

[1 Marks]

(A) 5F

(B) 3F

(C) 1F

(D) 6F

### Question 2.

Which among the following is false statement?

[1 Marks]

(A) Half-life of a zero order reaction is inversely proportional to the rate constant.

(B) Molecularity of a reaction may be zero.

(C) Rate of zero order reaction is independent of initial concentration of reactant.

(D) For a first order reaction,  $t_{1/2} = 0.693/k$

### Question 3.

The number of molecules that react with each other in an elementary reaction is a measure of the:

[1 Marks]

(A) stoichiometry of the reaction

(B) order of the reaction

(C) activation energy of the reaction

(D) molecularity of the reaction

### Question 4.

The element having  $[\text{Ar}]3d^{10}4s^1$  electronic configuration is:

[1 Marks]

(A) Zn

(B) Cr

(C) Cu

(D) Mn

### Question 5.

The complex ions  $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)]^{2+}$  and  $[\text{Co}(\text{NH}_3)_5(\text{ONO})]^{2+}$  are called:

[1 Marks]

(A) Geometrical isomers

(B) Linkage isomers

(C) Co-ordination isomers

(D) Ionization isomers

### Question 6.

Which is the correct IUPAC name for

[1 Marks]

(A) 1-Chloro-4-Methylbenzene

(B) 1-Methyl-4-Chlorobenzene

(C) Methylchlorobenzene

(D) Toluene

### Question 7.

What will be formed after oxidation reaction of secondary alcohol with chromic anhydride ( $\text{CrO}_3$ )?

[1 Marks]

(A) Aldehyde

(B) Ketone

(C) Carboxylic acid

(D) Ester

**Question 8.**

The conversion of phenol to salicylic acid can be accomplished by:

[1 Marks]

- (A) Kolbe reaction
- (B) Friedel-Crafts reaction
- (C) Coupling reaction
- (D) Reimer-Tiemann reaction

**Question 9.**

Which of the following is/are examples of denaturation of protein?

[1 Marks]

- (A) Clotting of blood
- (B) Coagulation of egg white
- (C) Both Curdling of milk and Coagulation of egg white
- (D) Curdling of milk

**Question 10.**

Nucleotides are joined together by:

[1 Marks]

- (A) Peptide linkage
- (B) Hydrogen bonding
- (C) Glycosidic linkage
- (D) Phosphodiester linkage

**Question 11.**

Scurvy is caused due to deficiency of:

[1 Marks]

- (A) Vitamin B<sub>1</sub>

(B) Vitamin B<sub>2</sub>

(C) Glutamic acid

(D) Ascorbic acid

### Question 12.

Assertion (A) : In a first order reaction, if the concentration of the reactant is doubled, its half-life is also doubled.

Reason (R) : The half-life of a reaction does not depend upon the initial concentration of the reactant in a first order reaction.

[1 Marks]

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

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

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

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

### Question 13.

Assertion (A) : In a first order reaction, if the concentration of the reactant is doubled, its half-life is also doubled

Reason (R) : The half-life of a reaction does not depend upon the initial concentration of the reactant in a first order reaction.

[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 true, but Reason (R) is false

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

#### Question 14.

Assertion (A) : Aromatic primary amines cannot be prepared by Gabriel Phthalimide synthesis.

Reason (R) : Aryl halides do not undergo nucleophilic substitution reaction with the anion formed by phthalimide.

[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 false, but Reason (R) is true

(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 true, but Reason (R) is false.

#### Question 15.

Assertion (A) : Vitamin D cannot be stored in our body.

Reason (R) : Vitamin D is fat soluble vitamin and is not excreted from the body in urine.

[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 false, but Reason (R) is true

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

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## Section B

#### Question 16.

The rate constant for a zero order reaction  $A \rightarrow P$  is  $0.0030 \text{ mol L}^{-1}\text{s}^{-1}$ . How long will it take for the initial concentration of A to fall from 0.10 M to 0.075 M ?

[2 Marks]

### Question 17.

The decomposition of  $\text{NH}_3$  on platinum surface is zero order reaction. what are the rates of production of  $\text{N}_2$  and  $\text{H}_2$  if  $k = 2.5 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$  ?

[2 Marks]

### Question 18.

Define the following terms :

- (a) Pseudo first order reaction
- (b) Half-life period of reaction ( $t_{1/2}$ )

[2 Marks]

### Question 19.

Examine the following observations :

- (a) Transition elements generally form coloured compounds.
- (b) Zinc is not regarded as a transition element.

[2 Marks]

### Question 20.

Name the following coordination compounds according to IUPAC norms :

- (a)  $[\text{Co}(\text{NH}_3)_4(\text{H}_2\text{O})\text{Cl}]\text{Cl}_2$
- (b)  $[\text{CrCl}_2(\text{en})_2] \text{Cl}$

[3 Marks]

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## Section C

### Question 21.

At  $25^\circ\text{C}$  the saturated vapour pressure of water is 24 mm Hg. Find the saturated vapour pressure of a 5% aqueous solution of urea at the same temperature. (Molar mass of urea =  $60 \text{ g mol}^{-1}$ )

[3 Marks]

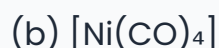
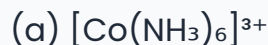
**Question 22.**

The electrical resistance of a column of 0.05 M NaOH solution of area 0.8 cm<sup>2</sup> and length 40 cm is  $5 \times 10^3$  ohm. Calculate its resistivity, conductivity and molar conductivity.

[3 Marks]

**Question 23.**

Using valence bond theory, explain the hybridization and magnetic character of the following :



[At. no. : Co = 27, Ni = 28]

[3 Marks]

**Question 24.**

(a) Define the following :

(i) Enantiomers

(ii) Racemic mixture

(b) Why is chlorobenzene resistant to nucleophilic substitution reaction ?

[3 Marks]

**Question 25.**

Define the following terms :

(a) Glycosidic linkage

(b) Invert sugar

(c) Oligosaccharides

[3 Marks]

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## Section D

**Question 26.** The spontaneous flow of the solvent through a semipermeable membrane from a pure solvent to a solution or from a dilute solution to a concentrated solution is

called osmosis. The phenomenon of osmosis can be demonstrated by taking two eggs of the same size. In an egg, the membrane below the shell and around the egg material is semipermeable. The outer hard shell can be removed by putting the egg in dilute hydrochloric acid. After removing the hard shell, one egg is placed in distilled water and the other in a saturated salt solution. After some time, the egg placed in distilled water swells-up while the egg placed in salt solution shrinks. The external pressure applied to stop the osmosis is termed as osmotic pressure (a colligative property). Reverse osmosis takes place when the applied external pressure becomes larger than the osmotic pressure.

### Question 27.

The spontaneous flow of the solvent through a semipermeable membrane from a pure solvent to a solution or from a dilute solution to a concentrated solution is called osmosis. The phenomenon of osmosis can be demonstrated by taking two eggs of the same size. In an egg, the membrane below the shell and around the egg material is semipermeable. The outer hard shell can be removed by putting the egg in dilute hydrochloric acid. After removing the hard shell, one egg is placed in distilled water and the other in a saturated salt solution. After some time, the egg placed in distilled water swells-up while the egg placed in salt solution shrinks. The external pressure applied to stop the osmosis is termed as osmotic pressure (a colligative property). Reverse osmosis takes place when the applied external pressure becomes larger than the osmotic pressure.

(1)

Define reverse osmosis. Name one SPM which can be used in the process of reverse osmosis .

[2 Marks]

(2)

Which one of the following will have higher osmotic pressure in 1 M KCl or 1 M urea solution. Justify your answer.

[1 Marks]

(3)

What do you expect to happen when red blood corpuscles (RBC's) are placed in 0.5% NaCl solution ?

(4)

Why osmotic pressure is a colligative property ?

[1 Marks]

## Section E

### Question 28.

- (a) Give the IUPAC name of  $\text{CH}_3\text{-CH=CH-CHO}$ .
- (b) Give a simple chemical test to distinguish between propanal and propanone.
- (c) How will you convert the following :
- (i) Toluene to benzoic acid
- (ii) Ethanol to propan-2-ol
- (iii) Propanal to 2-hydroxy propanoic acid

[5 Marks]

### Question 29.

An organic compound 'A', molecular formula  $\text{C}_2\text{H}_6\text{O}$  oxidises with  $\text{CrO}_3$  to form a compound 'B'. Compound 'B' on warming with iodine and aqueous solution of  $\text{NaOH}$  gives a yellow precipitate of compound 'C'. When compound 'A' is heated with conc.  $\text{H}_2\text{SO}_4$  at 413 K gives a compound 'D', which on reaction with excess  $\text{HI}$  gives compound 'E'. Identify compounds 'A', 'B', 'C', 'D' and 'E' and write chemical equations involved.

[5 Marks]

### Question 30.

- (a) Write chemical equations of the following reactions :
- (i) Phenol is treated with conc.  $\text{HNO}_3$
- (ii) Propene is treated with  $\text{B}_2\text{H}_6$  followed by oxidation by  $\text{H}_2\text{O}_2/\text{OH}^-$ .
- (iii) Sodium t-butoxide is treated with  $\text{CH}_3\text{Cl}$ .

(b) Give a simple chemical test to distinguish between butan-1-ol and butan-2-ol.

(c) Arrange the following in increasing order of acid strength : phenol, ethanol, water.

[5 Marks]

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