

CBSE EXAMINATION PAPER-2025

CHEMISTRY

(Solved)

Time allowed : 3 hours

Maximum Marks : 37

General Instructions :

Read the following instructions carefully and follow them :

- i. This question paper contains **26 questions**. All questions are **compulsory**.
- ii. This question paper is divided into **4 sections**.
- iii. **Section A** – questions number **1 to 14** are multiple choice questions Each question carries **1 marks**.
- iv. **Section B** – questions number **15 to 18** are very short answer Each question carries **2 marks**.
- v. **Section C** – questions number **19 to 23** are short answer Each question carries **3 marks**.
- vi. **Section D** – questions number **24 to 26** 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.

In an electrochemical cell, the following reaction takes place :



$$E^\circ_{\text{cell}} = 1.28 \text{ V}$$

As the reaction progresses, what will happen to the overall voltage of the cell?

[1 Marks]

- (A) It will decrease as $[Zn^{2+}]$ increases.
- (B) It will increase as $[Cu^+]$ increases.
- (C) Voltage will remain constant.
- (D) It will increase as $[Zn^{2+}]$ increases.

Question 2.

Out of Fe^{3+} , Sc^{3+} , Cr^{3+} and Co^{3+} ions, the one which is colourless in aqueous solution is:

[Atomic number : Fe = 26, Sc = 21, Cr = 24, Co = 27]

[1 Marks]

- (A) Sc^{3+}
- (B) Fe^{3+}
- (C) Cr^{3+}
- (D) Co^{3+}

Question 3.

Hoffmann Bromamide degradation reaction is given by:

[1 Marks]

- (A) $ArCH_2NH_2$
- (B) $ArNO_2$
- (C) $ArNH_2$
- (D) $ArCONH_2$

Question 4.

The value of Henry's constant K_h is:

[1 Marks]

- (A) greater for gases with higher solubility

(B) not related to the solubility of gases

(C) greater for gases with lower solubility

(D) constant for all gases

Question 5.

Out of the following statements, the incorrect statement is:

[1 Marks]

(A) Lanthanoids are radioactive in nature.

(B) La is actually an element of transition series.

(C) Ionic radius decreases from La^{3+} to Lu^{3+} ion.

(D) Zr and Hf have almost identical atomic radii because of lanthanoid contraction.

Question 6.

Out of 2-Bromobutane, 1-Bromobutane, 2-Bromopropane and 1-Bromopropane, the molecule which is chiral in nature is:

[1 Marks]

(A) 1-Bromobutane

(B) 1-Bromopropane

(C) 2-Bromopropane

(D) 2-Bromobutane

Question 7.

The product of the oxidation of I^- with MnO_4^- in alkaline medium is:

[1 Marks]

(A) IO^-

(B) IO_3^-

(C) IO_4^-

(D) I_2

Question 8.

Polyhalogen compounds have wide application in industries and agriculture. DDT is also a very important polyhalogen compound. It is a:

[1 Marks]

- (A) fertilizer
- (B) greenhouse gas
- (C) biodegradable insecticide
- (D) non-biodegradable insecticide

Question 9.

What amount of electric charge is required for the reduction of 1 mole of MnO_4^- into Mn^{2+} ?

[1 Marks]

- (A) 5 F
- (B) 1 F
- (C) 4 F
- (D) 6 F

Question 10.

Alkenes are formed by heating alcohols with conc. H_2SO_4 . The first step in the reaction is:

[1 Marks]

- (A) protonation of alcohol molecule
- (B) formation of carbocation
- (C) formation of ester
- (D) elimination of water

Question 11.

Assertion (A) : Cuprous salts are diamagnetic.

Reason (R) : Cuprous ion has completely filled 3d-orbitals.

[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.

Question 12.

Assertion (A) : n-Butyl chloride has higher boiling point than n-Butyl bromide.

Reason (R) : C – Cl bond is more polar than C – Br bond.

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

(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) : Acetanilide is less basic than aniline.

Reason (R) : Acetylation of aniline results in decrease of electron density on nitrogen.

[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 14.

Assertion (A) : Electrolysis of aqueous NaCl gives H_2 at cathode and Cl_2 at anode.

Reason (R) : Chlorine has higher oxidation potential than H_2O .

[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.

Section B

Question 15.

The reaction between H_2 (g) and I_2 (g) was carried out in a sealed isothermal container. The rate law for the reaction was found to be :

$$\text{Rate} = k[H_2][I_2]$$

If 1 mole of H_2 (g) was added to the reaction chamber and the temperature was kept constant, then predict the change in rate of the reaction and the rate constant.

[2 Marks]

Question 16.

$PtCl_4 \cdot 2KCl$ doesn't give precipitate of AgCl with $AgNO_3$ solution. Write the structural formula and IUPAC name of the complex.

[2 Marks]

Question 17.

Define fuel cell. Give two advantages of fuel cell over ordinary cell.

[2 Marks]

Question 18.

What is meant by essential amino acids ? Why are amino acid amphoteric in nature ?

[2 Marks]

Section C

Question 19.

Calculate the cell voltage of the voltaic cell which is set up by joining following half-cells at 25°C: Al/Al³⁺ (0.001 M) and Ni/Ni²⁺ (0.1 M)

Given : $E^\circ_{\text{Ni}^{2+}/\text{Ni}} = -0.25 \text{ V}$, $E^\circ_{\text{Al}^{3+}/\text{Al}} = -1.66 \text{ V}$

[3 Marks]

Question 20.

Give explanation for each of the following observations :

- (a) With the same d-orbital configuration (d⁴), Mn³⁺ ion is an oxidising agent whereas Cr²⁺ ion is a reducing agent.
- (b) Actinoid contraction is greater from element to element than that among lanthanoids.
- (c) Transition metals form large number of interstitial compounds with H, B, C and N.

[3 Marks]

Question 21.

An aqueous solution of NaOH was made and its molar mass from the measurement of osmotic pressure at 27°C was found to be 25 g mol⁻¹. Calculate the percentage dissociation of NaOH in this solution.

[Atomic mass : Na = 23 u, O = 16 u, H = 1 u]

[3 Marks]

Question 22.

Arrange the following compounds as asked : 3

- (a) in decreasing order of pK_b values C₂H₅NH₂, (C₂H₅)₂NH, C₆H₅NHCH₃, C₆H₅NH₂
- (b) increasing order of boiling point C₂H₅OH, C₂H₅NH₂, (CH₃)₂NH

(c) increasing order of solubility in water $C_6H_5NH_2$, $(C_2H_5)_2NH$, $C_2H_5NH_2$

[3 Marks]

Question 23.

An aromatic compound 'A' with molecular formula C_8H_8O gives positive 2,4-DNP test. It gives yellow precipitate. of compound 'B' on treatment with sodium hypoiodite. Compound 'A' does not react with Tollen's or Fehling's reagent; on drastic oxidation with $KMnO_4$ it forms a carboxylic acid 'C'. Elucidate the structures of A, B and C. Also give their IUPAC names.

[3 Marks]

Section D

Question 24. According to the generally accepted definition of the ideal solution there are equal interaction forces acting between molecules belonging to the same or different species. (This is equivalent to the statement that the activity of the components equals the concentration.) Strictly speaking, this condition is fulfilled only in exceptional cases for mixtures (optical isomers, isotopic mixtures of an element, hydrocarbon mixtures). It is still usual to talk about ideal solutions as limiting cases in reality since very dilute solutions behave ideally with respect to the solvent. This view is further supported by the fact that Raoult's law empirically found for describing the behaviour of the solvent in dilute solutions can be deduced thermodynamically via the assumption of ideal behaviour of the solvent.

Question 25.

According to the generally accepted definition of the ideal solution there are equal interaction forces acting between molecules belonging to the same or different species. (This is equivalent to the statement that the activity of the components equals the concentration.) Strictly speaking, this condition is fulfilled only in exceptional cases for mixtures (optical isomers, isotopic mixtures of an element, hydrocarbon mixtures). It is still usual to talk about ideal solutions as limiting cases in reality since very dilute solutions behave ideally with respect to the solvent. This view is further supported by the fact that Raoult's law empirically found for describing the behaviour of the solvent in dilute solutions can be deduced thermodynamically via the assumption of ideal behaviour of the solvent.

Answer the following questions :

(1)

Give one example of miscible liquid pair which shows negative deviation from Raoult's law. What is the reason for such deviation ?

[2 Marks]

(2)

Raoult's law is a special case of Henry's law. Comment.

[1 Marks]

(3)

State Raoult's law for a solution containing volatile components.

[1 Marks]

(4)

Write two characteristics of an ideal solution.

[1 Marks]

Question 26.

Ribose and 2-deoxyribose have an important role in biology. Among the most important derivatives are those with phosphate groups attached at the 5 position. Mono-, di- and tri-phosphate forms are important, as well as 3-5 cyclic monophosphates. Purines and pyrimidines form an important class of compounds with ribose and deoxyribose. When these purine and pyrimidine derivatives are coupled to a ribose sugar, they are called nucleosides.

Answer the following questions :

(1)

Differentiate between nucleotide and nucleoside.

[1 Marks]

(2)

Mention two important functions of nucleic acid.

[1 Marks]

(3)

What products would be formed when DNA is hydrolysed ? How is DNA different from RNA with reference to a structure ?

[2 Marks]

(4)

Name the linkage which joins two nucleotides. Name the base that is found in nucleotide of RNA but not in DNA.

[1 Marks]