

CBSE EXAMINATION PAPER-2022

CHEMISTRY

(Solved)

Time allowed : 3 hours

Maximum Marks : 6

General Instructions :

Read the following instructions carefully and follow them :

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

Section A

Question 1.

Write three differences between Physisorption and Chemisorption.

[3 Marks]

Answer: Physisorption and chemisorption are two different types of adsorption processes with distinct characteristics. Firstly, physisorption involves weak van der Waals forces, making it a reversible process, while chemisorption involves the formation of strong chemical bonds, resulting in a typically irreversible reaction. Secondly, physisorption does not involve a significant change in the enthalpy of the system as it is a physical process, whereas chemisorption involves a considerable change in enthalpy due to the breaking and forming of bonds. Lastly, physisorption usually occurs at lower temperatures and is favored by larger surface areas, while chemisorption can occur at higher temperatures

and is more selective, often relying on specific interactions between the adsorbate and the surface of the adsorbent.

Question 2.

A compound 'A' on reduction with iron scrap and hydrochloric acid gives compound 'B' with molecular formula C_6H_7N . Compound 'B' on reaction with $CHCl_3$, and alcoholic KOH produces an obnoxious smell of carbonylamine due to the formation of 'C'. Identify 'A', 'B' and 'C' and write the chemical reactions involved.

[3 Marks]

Answer: Compound 'A' is benzoic acid (C_6H_5COOH). When benzoic acid is reduced with iron scrap and hydrochloric acid, it forms compound 'B', which is phenethylamine ($C_6H_5CH_2NH_2$), with the molecular formula C_6H_7N . The carbonylamine reaction involves compound 'B' reacting with $CHCl_3$ and alcoholic KOH to produce isocyanide (compound 'C'). The chemical reactions are as follows: 1) $C_6H_5COOH + 6[H] \rightarrow C_6H_5CH_2NH_2 + H_2O$ (Reduction) 2) $C_6H_5CH_2NH_2 + CHCl_3 + 3KOH \rightarrow C_6H_5CH_2N=C=O + 3KCl + 3H_2O$ (Carbonylamine reaction)

Section B

Question 3. Redox reactions are commonly known as reduction-oxidation reactions. They involve the transfer of electrons from one species to another. In a spontaneous reaction, energy is released which can be used to do work. The reaction is driven by two different containers and a voltaic Galvani cell is set up. In spontaneous redox reactions, a salt bridge connects the half-cells. The reading of the voltmeter gives the cell voltage or cell potential or electromotive force. If E_{cell} is positive the reaction is spontaneous and if negative the reaction is non-spontaneous and is referred to as an electrolytic cell. Electrolysis refers to the decomposition of a substance by electric current. One mole of electric charge when passed through a cell will discharge half a mole of a divalent metal ion such as Cu. This was first formulated by Faraday in the form of laws of electrolysis. The conductance of a material is the property of allowing the flow of ions through itself and thus conducts electricity. Conductivity is represented by k and it depends upon the nature and concentration of ions, temperature, etc. A more common term, molar conductivity, refers to the conductance of the volume of solution containing one mole of electrolyte kept between two electrodes with the unit area of cross-section and standard unit length. Limiting molar conductivity of weak electrolytes cannot be ascertained.
