CBSE EXAMINATION PAPER-2022

CHEMISTRY

(Solved)

Time allowed : 3 hours | Maximum Marks : 43

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **17 questions.** All questions are **compulsory.**

ii. This question paper is divided into **3 sections.**

iii. **Section A** – questions number **1 to 2** are case based questions

iv. **Section B** – questions number **3 to 4** are short answer

v. **Section C** – questions number **5 to 17** are long answer

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

vii. Use of calculator is NOT allowed.

Section A

Question 1. 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 Ecell 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

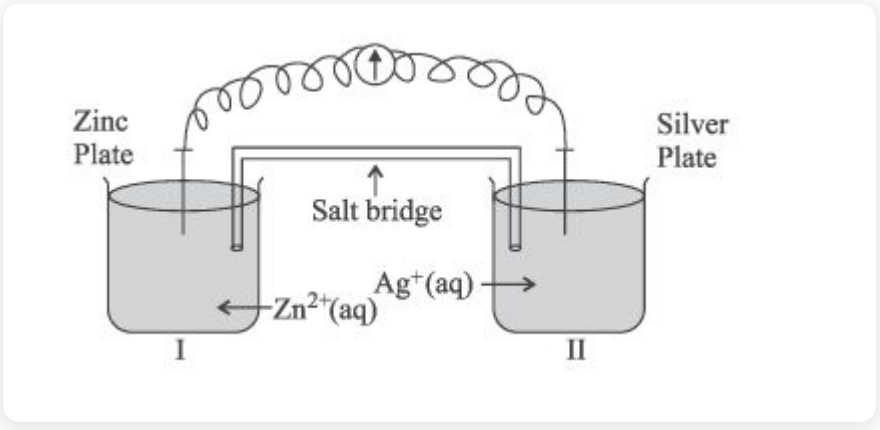
common term, molar conductivity, refers to the conductance of the volume of solution containing one mole of electrolyte kept between two electrodes with the unit area of cross-section and standard unit length. Limiting molar conductivity of weak electrolytes cannot be ascertained.

Question 2.

Read the passage give below and answer the question that follow :

Oxidation-reduction reactions are commonly known as redox reactions. They involve transfer of electrons from one species to another. In a spontaneous reaction, energy is released which can be used to do useful work. The reaction is split into two half reactions. Two different containers are used and a wire is used to drive the electrons from one side to the other and a Voltaic/Galvanic cell is created. It is an electrochemical cell that uses spontaneous redox reactions to generate electricity. A salt bridge also connects to 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 it is negative the reaction is non-spontaneous and is referred to as electrolytic cell. Electrolysis refers to the decomposition of a substance by an electric current. One mole of electric charge when passed through a cell will discharge half a mole of a divalent metal ion such as Cu2+. This was first formulated by Faraday in the form of laws of electrolysis.

The conductance of material is the property of materials due to which a material allows the flow of ions through itself and thus conducts electricity. Conductivity if represented by k and it depends upon nature and concentration of electrolyte, temperature etc. A more common term molar conductivity of a solution at a given concentration is conductance of the volume of solution containing one mole of electrolyte kept between two electrodes with the unit area of cross-section and distance of unit length. Limiting molar conductivity of weak electrolytes cannot be obtained graphically.



(1)

Is silver plate the anode or cathode?

[1 Marks]

(2)

What will happen if the salt bridge is removed?

[1 Marks]

(3)

(i) Why does conductivity of a solution decreases with dilution?

(ii)What will happen to the concentration of Zn^{2} +and Ag+ when Ecell = 0.

[1 Marks]

(4)

When does electrochemical cell behaves like an electrolytic cell?

[1 Marks]

(5)

The molar conductivity of a 1.5 M solution of an electrolyte is found to be 138.9 S cm^{2} mol^{-1}. Calculate the conductivity of this solution.

[1 Marks]

Section B

Question 3.

Arrange the following in the increasing order of their property indicated:

(a) Ethanal, Propanone, Propanal, Butanone (reactivity towards nucleophilic addition). (1)

(b) 4-Nitrobenzoic acid, benzoic acid, 3,4-Dinitrobenzoic acid, 4-Methoxy benzoic acid (Acid strength) (1)

[2 Marks]

Question 4.

Explain the following reactions:

(a) Wolff Kishner reduction. (1)

(b) Cannizzaro reaction. (1)

[2 Marks]

Section C

Question 5.

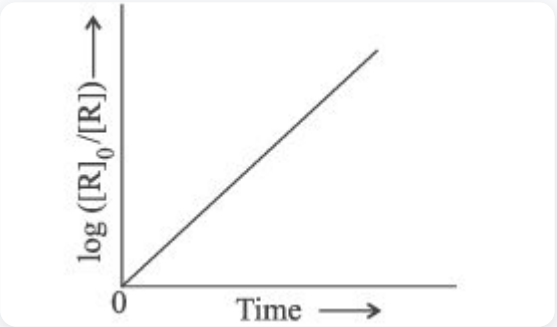
Observe the graph shown in figure and answer the following questions:

(i) What is the order of the reaction?(1)

(ii) What is the slope of the curve? (1)

(iii) Write the relationship between k and t1/2 (half life period)

[3 Marks]



Question 6.

(i) Write the IUPAC name of the following complex: K_2 [$PdCl_4$]. (1)

(ii) Using crystal field theory, rite the electronic configuration of d 5 ion, if Delta *Δ*0**> P.** (1)

(iii) What are Homoleptic complexes? (1)

[3 Marks]

Question 7.

b (i)Why chelate complexes are more stable than complexes with unidentate ligands? (1)

(ii) What is "spectrochemical series"? What is the difference between a weak field ligand and a strong field ligand? (2)

[3 Marks]

Question 8.

a (i) Define coagulation. (1)

(ii) State Hardy-Schulze rule. (1)

(iii) What is Electrophoresis? (1)

[3 Marks]

Question 9.

Write three differences between Physisorption and Chemisorption.

[3 Marks]

Question 10.

(a) Write any two consequences of Lanthanoid Contraction. (2)

(b) Name the element of 3d series which exhibits the largest number of oxidation states. Give reason. (1)

[3 Marks]

Question 11.

Give reasons for the following statements:

(a) Copper does not displace hydrogen from acids.(1)

(b) Transition metals: and most of their compounds show paramagnetic behaviour. (1)

(c)Zn, Cd and Hg are soft metals. (1)

[3 Marks]

Question 12.

Account for the following:

(a) pkb of aniline is more than that of methylamine. (1)

(b) Aniline does not undergo Friedel-Crafts reaction. (1)

(c) Primary amines have higher boiling points than tertiary amines. (1)

[3 Marks]

Question 13.

(i) Arrange the following compounds in the increasing order of their basic strength in aqueous solution: CH_3 NH_2, (CH_3) $_3N$, $(CH_3)_2$ NH. (1)

(ii) What is Hinsberg's reagent ? (1)

(iii) What is the role of pyridine in the acylation reaction of amines? (1)

[3 Marks]

Question 14.

A compound 'A' on reduction with iron scrap and hydrochloric acid gives compound 'B' with molecular formula C6H7N. Compound 'B' on reaction with CHCl3, and alcoholic KOH produces an obnoxious smell of carbylamine due to the formation of 'C'. Identify 'A', 'B' and 'C' and write the chemical reactions involved.

[3 Marks]

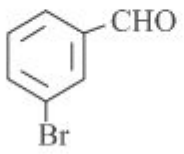
Question 15.

Complete the following:

[3 Marks]

(i) $CH_3CN \xrightarrow[2.\ H_2O]{1.\ AlH(i\text{-}Bu)_2}$ 'A' $\xrightarrow[H^+]{H_2N\text{-}OH}$ 'B'

(ii) Write IUPAC name of the following compound:



(iii) Write chemical test to distinguish between the following compounds :
Phenol and Benzoic acid

Question 16.

Convert the following:

(i) Benzoic acid to Benzaldehyde. (1)

(ii) Propan-1-ol to 2-Bromopropanoic acid. (1)

(iii) Acetaldehyde to But - 2-enal

[3 Marks]

Question 17.

1. Answer the following questions.

(a) Identify the order of reaction from the following unit for its rate constant $Lmol^{-1} s^{-1}$. (1)

(b) The conversion of molecules A to B follows second order kinetics. If the concentration of A is increased to three times, how will it affect the rate of formation of B?(1)

(c) Write the expression of the integrated rate equation for zero-order reaction. (1)

[3 Marks]