

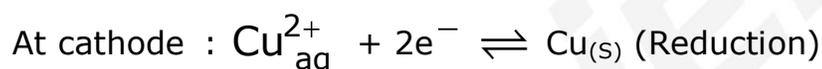
CHAPTER – 5

ELECTROCHEMISTRY

SYNOPSIS :

- **Electrochemical cell :**

Redox reaction takes place in an electrochemical cell.

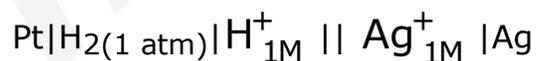


- **Half cell :**

The electrode and the solution in which it is dipped is collectively known as half cell. It is represented as under.



- **Cell is represented as under :**



- **Cell potential :**

The electrical potential is called the cell potential E_{cell} . The cell potential is in fact the difference in tendency to release the electrons of the two electrodes.

- To determine the potential of any standard half cell, it is connected to a standard hydrogen half cell through a salt bridge. Here half cell potential of standard hydrogen electrode is accepted to be zero.

- **E.M.F. Series :**

If the values of oxidation potential of different standard half cells are arranged in their decreasing order, the series obtained is called E.M.F. series.

- **Nernst equation :**

The equation showing relation between the potential of the nonstandard electrochemical cell and the concentrations of the solution is known as Nernst equation.

$$E_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.0592}{n} \log \frac{[C_1]}{[C_2]}$$

Where, C_1 = concentration of anode

C_2 = concentration of cathode.

- **Faraday's law of electrolysis :**

(1) First law : The amount of products obtained on the electrodes during electrolysis is directly proportional to the quantity of the electricity passed through the electrolytic cell.

(2) Second law : The number of moles of products obtained at the electrodes by oxidation and reduction half-reactions, is related to the quantity of electricity passing through the stoichiometry of the reactions.

- **Products obtained by electrolysis :**

It will depend upon the nature of electrodes used, concentration of solutions and electrode potential.

(1) Electrolysis of NaCl

→ Electrolysis of fused NaCl

→ Electrolysis of dilute solution of NaCl

→ Electrolysis of concentrated solution of NaCl

(2) Electrolysis of Na_2SO_4

(3) Electrolysis of CuSO_4

- **Conductors are classified into two types :**

- (1) Metallic conductors and
- (2) Solutions

- The conductance of the solution is mainly due to the ions present in it. It is called ionic conductance.

- **Kohlrausch's law :**

The equivalent conductance of an electrolyte of infinite dilution (\wedge°) is equal to the sum of the ionic conductances of positive and negative ions (λ_+^0 and λ_-^0) present in the electrolytes.

- **Cells :** (1) Dry cell
(2) Lead storage cell
(3) Fuel cell

- **Corrosion :**

The corrosion of certain metals takes place when kept in contact with air, viz. Iron gets corroded. Green coloured salt is produced on vessels of copper and brass.