

CHAPTER-03

ELECTROCHEMISTRY

CLASS-12

SUB-CHEMISTRY

Lecture: 01

Electrochemistry is that branch of chemistry which deals with the study of production of electricity from energy released during spontaneous chemical reactions and the use of electrical energy to bring about non-spontaneous chemical transformations.

Importance of Electrochemistry

1. Production of metals like Na, Mg. Ca and Al.
2. Electroplating.
3. Purification of metals.
4. Batteries and cells used in various instruments.

Conductors

Substances that allow electric current to pass through them are known as conductors.

Metallic Conductors or Electronic Conductors

Substances which allow the electric current to pass through them by the movement of electrons are called metallic conductors, e.g., metals.

Electrolytic Conductors or Electrolytes

Substances which allow the passage of electricity through their fused state or aqueous solution and undergo chemical decomposition are called electrolytic conductors, e.g., aqueous solution of acids, bases and salts.

Electrolytes are of two types:

1. **Strong electrolytes** The electrolytes that completely dissociate or ionise into ions

are called strong electrolytes. e.g., HCl, NaOH, K_2SO_4

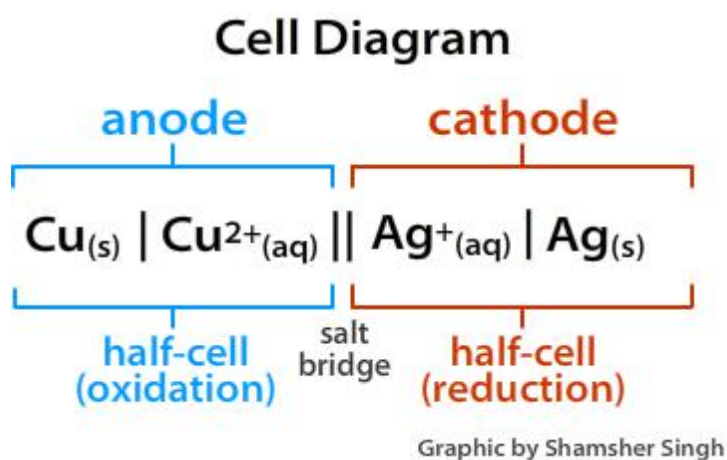
2. **Weak electrolytes** The electrolytes that dissociate partially ($\alpha < 1$) are called weak electrolytes, e.g., CH_3COOH , H_2CO_3 , NH_4OH , H_2S , etc.

Electrochemical Cell and Electrolytic

A cell of almost constant emf is called standard cell. The most common is Weston standard cell.

Galvanic cell is also called voltaic cell.

General Representation of an Electrochemical Cell

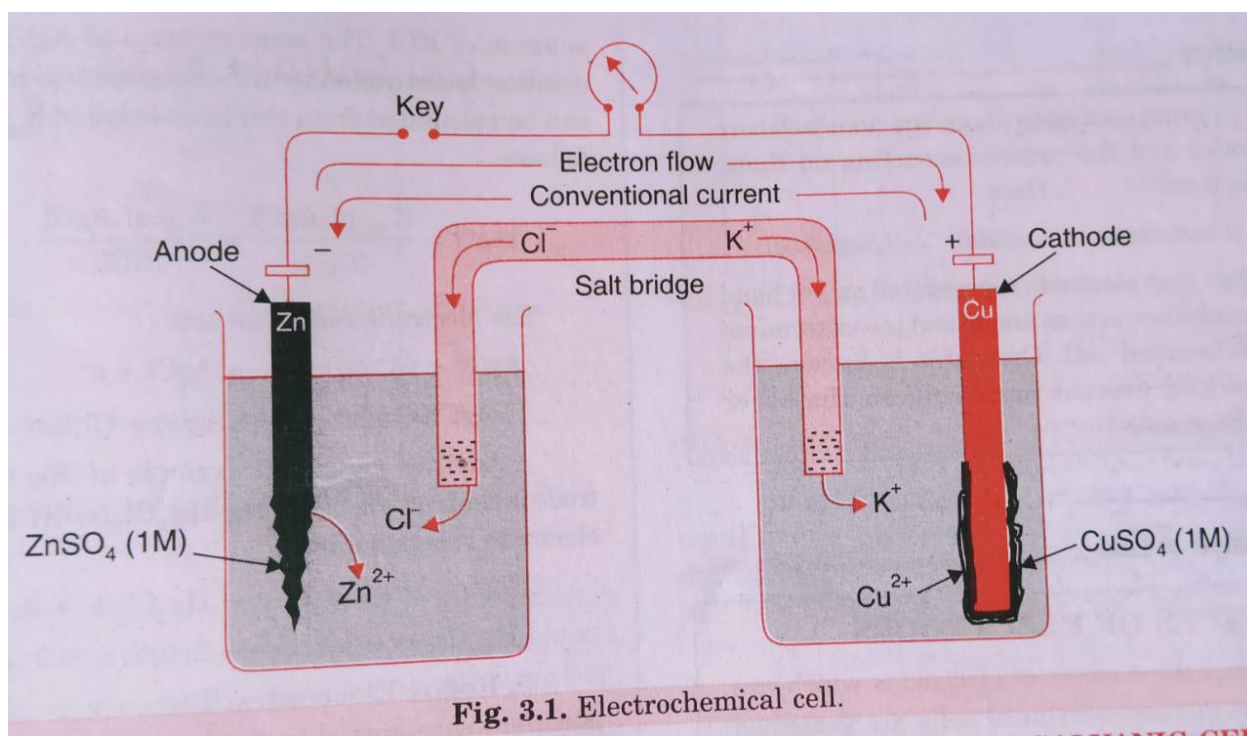


Other features of the electrochemical cell are

1. There is no evolution of heat.
2. The solution remains neutral on both sides.
3. The reaction and flow of electrons stops after sometime.

GALVANIC CELL:-

The device in which electrical energy is produced from chemical reaction are called electrochemical cells or galvanic cell or voltaic cell.



By convention cathode is represented on the RHS and anode on the LHS.

Function of salt bridge

1. It completes the circuit and allows the flow of current.

2. It maintains the electrical neutrality on both sides. Salt-bridge generally contains solution of strong electrolyte such as KNO_3 , KCl etc. KCl is preferred because the transport numbers of K^+ and Cl^- are almost same.

ELECTRODE POTENTIAL:-

When an **electrode** is in contact with the solution of its ions in a half-cell, it has a tendency to lose or gain electrons which is known as **electrode potential**. It is expressed in volts. It is an intensive property, i.e., independent of the amount of species in the reaction