ELECTROCHEMISTRY – 03
Computer Science – (Section – B)
13 – 04 – 2021 (5th Period)

DIELECTRIC MATERIALS (DIELECTRICS):

Therefore, a dielectric is an electrical insulator that can be polarized by an applied electric field. When a dielectric is placed in an electric field, electric charges do not flow through the material, as in a conductor, but only slightly shift from their average equilibrium positions causing dielectric polarization.

Thus a dielectric material is a substance that is a poor conductor of electricity, but an efficient supporter of electrostatic field and can store charge. For example porcelain (ceramic), mica, glass, plastics, oxides of various metals, dry air, distilled water etc. Dielectrics are used in capacitors, in the construction of radio-frequency transmission lines.

ELECTROCHEMICAL CELL: An electrochemical cell is a device capable of either deriving electrical energy from chemical reactions, or facilitating chemical reactions at the expense of electrical energy. In other words an electrochemical cell is a device in which either electrical energy is converted to chemical energy or chemical energy is converted to electrical energy.

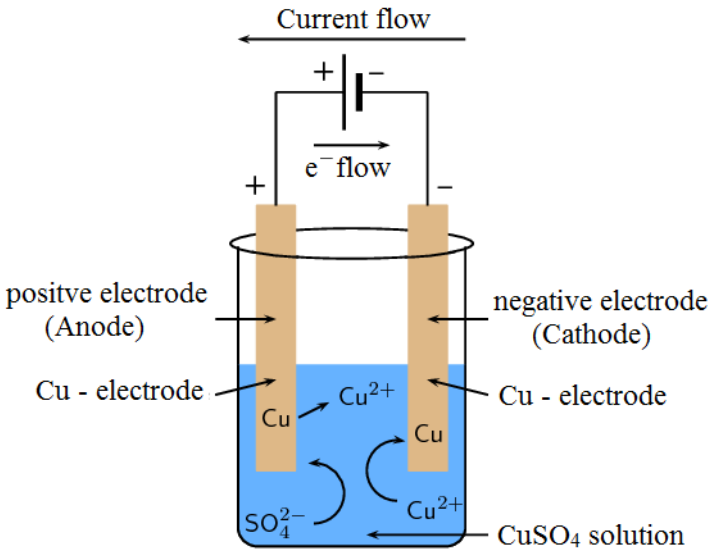
The electrochemical cell consists of two half-cells one of which is called oxidation half-cell where oxidation takes place and the other is called reduction half-cell where reduction takes place. Thus, an electrochemical cell represents a complete redox reaction.

TYPES OF ELECTROCHEMICAL CELL: Electrochemical cells are of two types.

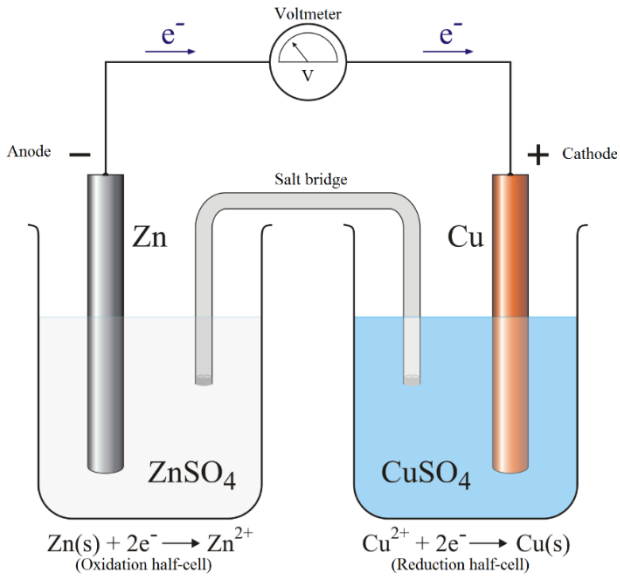
(i) Electrolytic Cell

(ii) Galvanic Cell

Electrolytic Cell: Electrolytic cell is a device in which non-spontaneous redox reactions (chemical reactions) are carried out at the expense of electrical energy. That is electrical energy is converted in to chemical energy. In electrolytic cell the cathode is negative electrode where reduction takes place and the anode is positive electrode where oxidation takes place. For example Cu-voltameter, Ag-voltameter etc. An copper voltameter can be shown as below.



Galvanic Cell: A galvanic cell is a device in which spontaneous chemical reactions are used to produce electrical energy, i.e. the chemical energy is converted to electrical energy. For example Voltaic cell. In Galvanic cell cathode is positive electrode where reduction takes place and the anode is negative electrode where oxidation takes place. Thus, the sign of electrodes in the galvanic cell is just opposite of the electrolytic cell. A voltaic cell can be shown as below.



SALT BRIDGE: A Salt Bridge is a U-tube, usually made up of glass or plastic packed with saturated solution of some strong and inert electrolytes like KCl, KNO_3 etc. in agar-agar.

Functions of Salt Bridge: Following are the important functions of the salt bridge.

1. It completes electrical circuit by connecting the solutions in two half cells.
2. It maintains electrical neutrality in the two half cells.
3. It prevents transference of ions from one half cell to another.
4. It prevents liquid junction-potential.

ELECTRODE: The electronic conductors mostly metallic conductors or even graphite taken in the form of rods or plates immersed in an electrolyte used to pass current through an electrolytic conductor are called electrodes.

The electrode where oxidation takes place is called anode and the electrode where reduction takes place is called cathode.

The electrode which take part in chemical reactions are called active electrode. For example: copper, zinc, silver etc. On the other hand electrode which do not take part in chemical reactions are called inert electrode. For example: platinum, graphite etc.