# BATTERIES

**Definition**

Battery is an arrangement of several electrochemical cells connected in series that can be used as a source of direct electric current.

A cell contains one anode and cathode

A battery contains several anodes and cathodes,

**Types of batteries**

1. Primary battery ( or) Primary Cells ( or) Non- reversible Battery
2. Secondary battery ( or) Secondary Cells ( or) Reversible battery
3. Flow Battery (or) fuel cells

1 **Primary Battery**

The electrodes reactions cannot be reversed by passing external electrical energy. They are not chargeable.

(eg) dry cell

2 **Secondary Battery (Accumulator)**

The electrode reactions can be reversed by passing external electrical energy .They are chargeable and are used again and again. They are called accumulators or storage cells.

(eg) Lead –Acid storage

Nickel- Cadmium Cell

**3. Flow battery or Fuel Cell**

They cells in which reactants products and electrolyte pass through the cell continuously are called fuel cell or flow battery.

Here chemical energy is converted to electrical energy with combustion.

(eg) $H_2$- $O_2$ fuel cell

**Alkaline Batteries**

Alkaline battery is an improved form of dry cell. It is an example for primary battery.

**Description**

Anode : Zinc

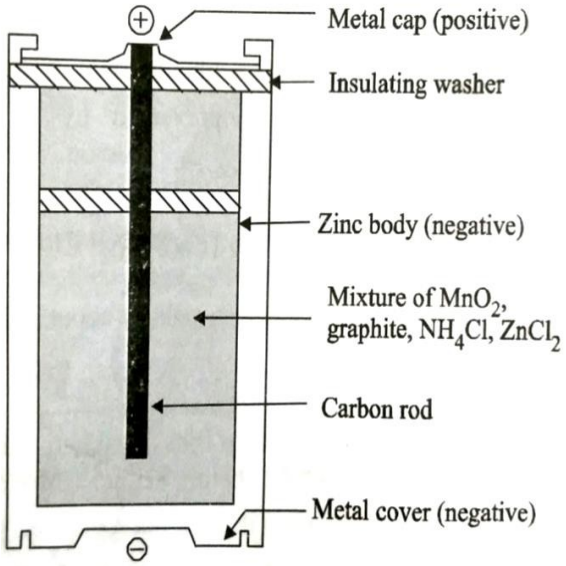
Cathode : Carbonrod(Graphite)

Electrolyte : $NH_4Cl + ZnCl_2 + MnO_2$ + Starch + WaterEMF : 1.5V

**Construction**

- Dry cell consists of a cylindrical zinc
- container that acts as an anode.
- A carbon rod (graphite) placed in the
- centre acts as a cathode.

- The space between the anode and cathode
- is packed with a paste of $NH_4Cl$, $ZnCl_2$ and $MnO_2$
- made using starch and water.
- The zinc cylinder has an outer insulation
- cardboard case.
- During use, the zinc cylinder gets
- consumed and at the end, it will develop holes
- which causes leakages.




**Working**

The cell reactions at two electrodes are as follows:

**Cell reactions:**

**At anode** : $Zn \longrightarrow Zn^{2+} + 2e^-$

**At cathode** :$NH_4^+(aq) + MnO_2(s) \longrightarrow MnO(OH)^- + NH_3$

**Over all Reactions**: $Zn+NH4^+(aq)+MnO_2(s) \longrightarrow Zn^{2+}+MnO(OH)^-+NH_3$

**Advantages;**

1) The emf of this cell is 1.5V
2) Zinc does not dissolve in basic medium, so no corrosion occurs
3) If maintain its voltage as current is drain from it.
4) If performance better in cold weather that other types of batteries

**Uses**

It is used in calculator.

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