



## Construction and working of alkaline battery

Describe the electrochemical reactions that occur at the anode and cathode during the discharge cycle of an alkaline battery.

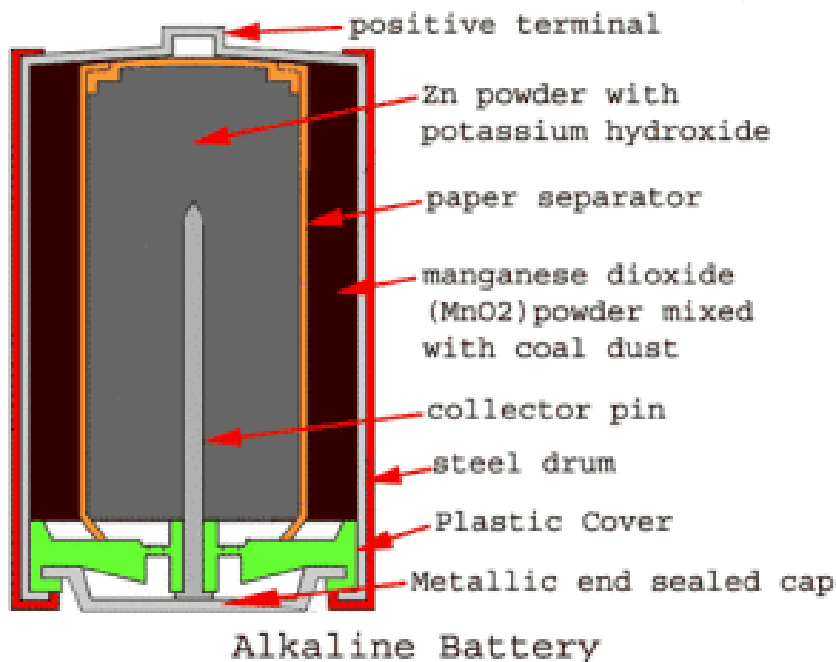
### Alkaline batteries

An **alkaline battery** is a type of primary battery which derives its energy from the reaction between zinc metal and manganese dioxide.

Alkaline battery is improved form of dry cell ,in which the electrolyte  $\text{NH}_4\text{Cl}$  is replaced by  $\text{KOH}$ .

### Construction

- A carbon rod (Graphite),acts as cathode .The positive terminal of the battery is projected from the top of this drum.
- the powdered zinc is mixed with  $\text{KOH}$  &  $\text{MnO}_2$  to get a gel.,is immersed in the electrolyte in the centre of the cell
- The outside cylindrical zinc body is made up of Zinc,acts as anode.





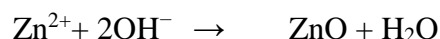
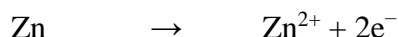
## Working

The alkaline electrolyte of potassium hydroxide is not part of the reaction, only the zinc and  $\text{MnO}_2$  are consumed during discharge.

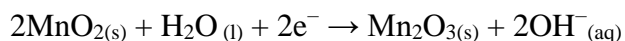
The half-reactions are:

### At Anode

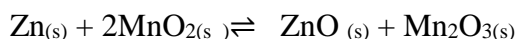
The half-reactions are:



### At Cathode



### Overall reaction:



The alkaline electrolyte of potassium hydroxide always remains in the cell, as there are equal amounts of  $\text{OH}^{-}$  consumed and produced. The voltage of alkaline battery cell is 1.5 V.

1. Alkaline batteries have a **shelf life of up to 5-10 years**, compared to about 2-3 years for dry cells.
2. The nominal voltage of an alkaline battery is typically **1.5V**, similar to a dry cell, but alkaline batteries are better at maintaining a stable voltage over time.
3. Zinc does not dissolve in basic medium; there is no corrosion on Zn.