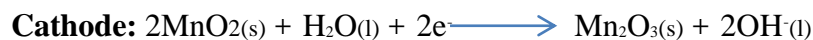




Alkaline batteries

It is the improved form of dry cell. It consists of a zinc cylinder which acts as anode and a graphite rod (carbon rod) at the center of the container which acts as the cathode. The zinc cylinder is filled with an electrolyte consisting of powdered zinc, KOH and MnO₂ in the form of paste. The zinc cylinder has an outer insulation of card board case (Fig. 3.15). The cell reaction is as follows:



Net Reaction:



Advantages of alkaline battery over dry battery

Zinc does not dissolve in a basic medium.

The life time of alkaline battery is longer than the dry battery because zinc cylinder is not involved in cell reaction. Zinc powder present in the electrolyte is only involved in reaction. So, there is no corrosion of zinc cylinder.

It gives constant voltage when the current is drawn from it.

Even in hot weather, it performs better than other type of batteries.

Uses

It is used in cameras, calculators, radios and watches.



Lead acid battery (or) Lead storage cell (or) Lead accumulator (or) Acid storage cell

Lead acid battery can be operated both as a voltaic and electrolytic cell. When it acts as a voltaic cell, it supplies electrical energy and run down. When it is recharged, it acts as an electrolytic cell. Thus, it is rechargeable.

Construction

A lead storage battery consists of 3 to 6 voltaic cells connected in series. In each cell, lead acts as anode and lead dioxide (PbO₂) acts as cathode .

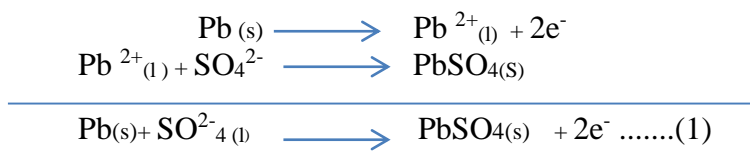
Various plates are separated from the adjacent one by insulator like rubber. Anodes and cathodes are immersed in 20 to 21 % dil. H₂SO₄ having a density of 1.3 gm/ml. The cell representation is given below.



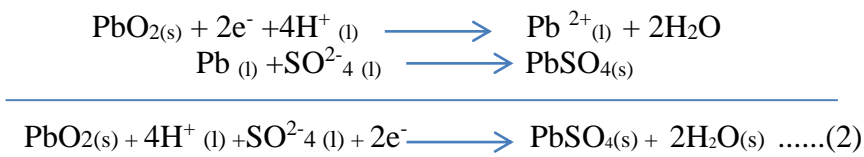
Working (Discharging)

When the storage cell is supplying electricity, lead is oxidized to Pb²⁺ ions and PbSO₄ is formed at anode. At cathode, PbO₂ gains the liberated electrons and gets reduced to Pb²⁺ and PbSO₄ is formed.

At anode:



At cathode:



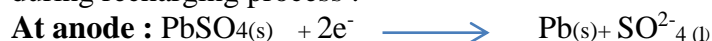
Overall cell reaction during (discharging) use (1) + (2)



At the time of discharging process, PbSO₄ is deposited at both the electrodes and H₂SO₄ is consumed. As a result, the concentration of H₂SO₄ decreases gradually.

Recharging

The cell is recharged when the density of H₂SO₄ becomes below 1.2 gm/ml. It can be done by applying an external electricity across the electrodes. The following reaction will take place during recharging process :



Overall Reaction