



19CH201 - ENGINEERING CHEMISTRY FOR CIRCUIT BRANCHES

UNIT-2 - ENERGY STORAGE DEVICES

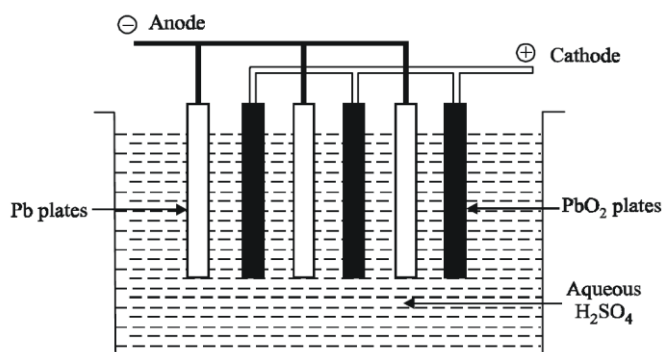
2.4. Secondary battery-Lead acid battery

Description

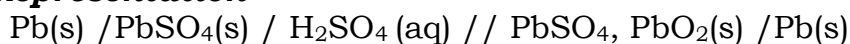
Anode : Pb
Cathode : PbO₂ Plates
Electrolyte: dil.H₂SO₄

Construction

The cell consists of a polypropylene container containing 6 number of voltaic cells connected in series to get 6 to 12 V battery. In each cell, the anode is made up of lead and the cathode is a grid of lead packed with PbO. The number of anode and cathode plates are linked together and separated from adjacent ones by rubber or glass. The entire combination is then immersed in dil.H₂SO₄ (density = 1.3g/L).



Cell Representation

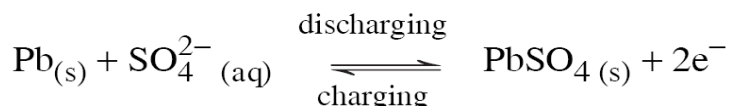


Working (Discharging)

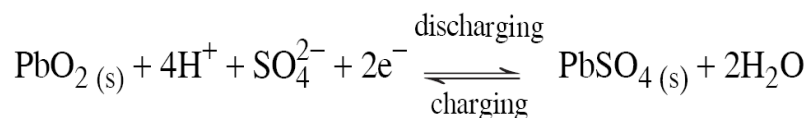
When lead - acid battery operates, at the anode Pb is oxidized to Pb²⁺ and PbSO₄ is formed at the cathode, PbO₂ is reduced to Pb²⁺ and PbSO₄ is formed.



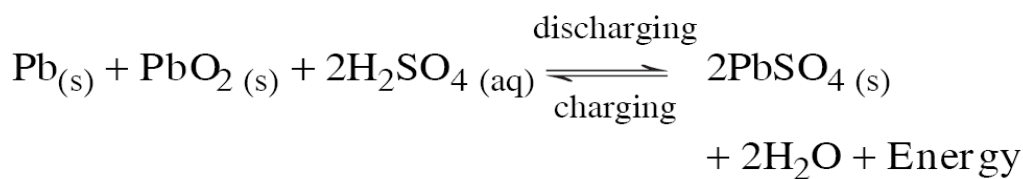
At anode :



At cathode:



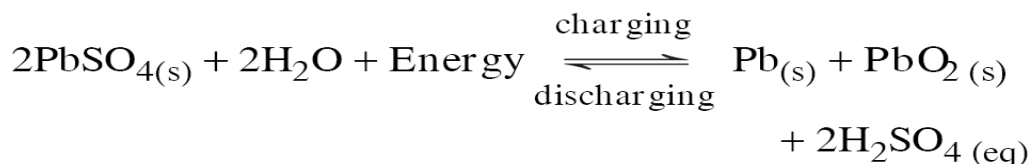
Overall reaction (discharging):



When the current is drawn, the battery becomes less efficient due to PbSO_4 is precipitated at both the electrodes and the concentration of H_2SO_4 decreases and hence the density of H_2SO_4 falls below 1.2 gm/mL, so the battery needs recharging.

Recharging

The cell can be recharged by passing electric current from an external source. The electrode reaction gets reversed. As a result, Pb^{2+} ions are reduced to lead and deposited at anode. The PbO_2 (cathode) electrode, Pb^{2+} ions are oxidized. The density of H_2SO_4 increases to its original value.





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Advantages

- It is made easily.
- It produces very high current.
- It acts effectively at low temperature.

Disadvantages

- Recycling of this battery causes environmental hazards.
- Mechanical strain and normal bumping reduces battery capacity.

Uses:

- It is used to supply current mainly in automobiles such as cars. Buses, trucks, etc.,
- It is also used in gas engine ignition, telephone exchanges, hospitals, power stations.