Storage and Fuel Cells

Storage Cells

These are cells (batteries) that can be recharged using mains electricity. The lithium ion battery used in mobile phones is an example.

At the anode, Lithium atoms are oxidised

$$Li \rightarrow Li^+ + e^-$$

At the cathode a metal oxide such as cobalt (IV) oxide is reduced

$$CoO_2 + Li^+ + e^- \rightarrow CoLiO_2$$

Overall

$$Li + CoO_2 \rightarrow CoLiO_2$$

$$\rightleftharpoons$$

When the battery is recharging lithium ions gain electrons to once again become lithium atoms.

Fuel Cells

Fuel cells use the energy from the reaction of a fuel with oxygen to create a voltage. An example is the hydrogen, oxygen fuel cell.

In acidic conditions

At the anode $H_2 \rightarrow 2H^+ + 2e^-$ x2

At the cathode $O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$

Overall $2H_2 + O_2 + 4H^+ + 4e^- \rightarrow 4H^+ + 4e^- + 2H_2O$

$$2H_2 + O_2 \rightarrow 2H_2O$$ ✱

In alkaline conditions

At the anode $H_2 + 2OH^- \rightarrow 2H_2O + 2e^-$ x2

At the cathode $O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$

Overall $2H_2 + 4OH^- + O_2 + 2H_2O + 4e^- \rightarrow 2H_2O + 4e^- + 4OH^-$

$$2H_2 + O_2 \rightarrow 2H_2O$$ ✱