Electrolytic processes in industry

Extraction of aluminium

Aluminium is obtained from the electrolytic reduction of melted impure oxide, bauxite. For the ionic compound, aluminium oxide, the metal part will be reduced and the non-metal part will be oxidised.

$A\ell^{3+} + 3e^- \rightarrow A\ell$ en $2O^{2-} \rightarrow O_2 + 4e^-$

Electroraffination of copper

The copper that is extracted from the ore, is made up of lumps of impure copper, which also contains various other metals. There is only one half-reaction. The impure copper anode is oxidised and the pure copper cathode is reduced.

Electroplating

During electroplating, a metal object is covered with a thin layer of another metal. It is often done to make it look better or to protect the cheaper metal against oxidation (rust).

Usually a bronze or nickle object is covered with a silver layer by using a silver solution. There is only one half-reaction. The metal that precipitates undergoes oxidation at the anode and the cathode that is plated, undergo reduction.

Oxidation

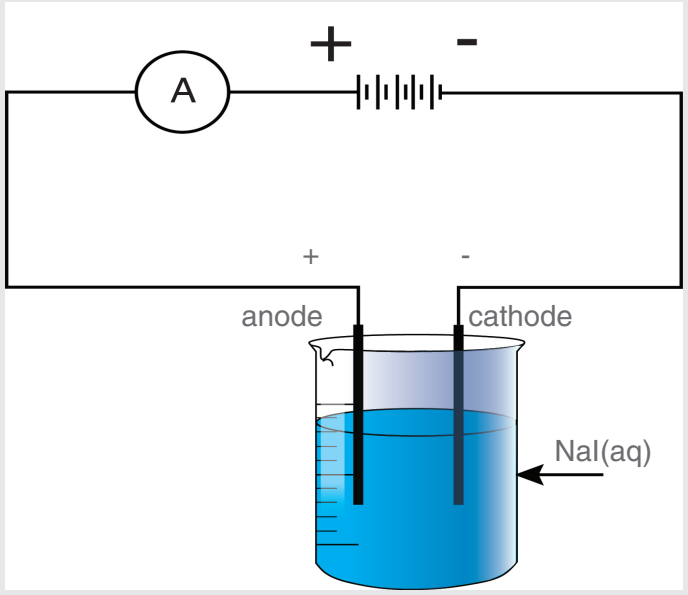
Takes place at the anode which is positive.
It is the process during which electrons are released.
One of the reactants will release electrons.
The substance that releases electrons is oxidised.
It is called the reducing agent.
The oxidation number of the reducing agent will increase.

Reduction

Takes place at the cathode which is negative.
It is the process during which electrons are received.
One of the reactants will receive electrons.
The substance that receives electrons is reduced.
It is called the oxidising agent.
The oxidation number of the oxidising agent will decrease.

ELECTROLYTIC CELL

Electrical energy is converted to chemical energy.



Uses

- Extraction of metals, especially aluminium, magnesium, sodium and gold
- The manufacturing of halogens like chlorine
- The purification (refining) of metals like copper and zinc
- Manufacturing of NaOH for the production of soap.
- Manufacturing of hydrogen gas for the production of ammonia.