

## Electrolytes

These are solutions or molten (melted substances) which conduct electricity. It is the electrolyte which is decomposed (broken-up) into its constituent elements.

All electrolytes are ionic substances that have been dissolved in water or heated up to melt them.

Examples include Copper sulphate solution, sodium chloride solution, molten lead bromide, dilute sulphuric acid and potassium iodide

Non-electrolytes are covalent substances, e.g. pure water, sugar solution, alcohol, petrol.

## Electrolysis

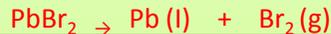
This is when an electric current passes through an electrolyte.

Electrons enter the solution through the negative electrode (cathode), cause a chemical change and leave by the positive electrode (anode).

Molten electrolytes are split into their elements by electrolysis.

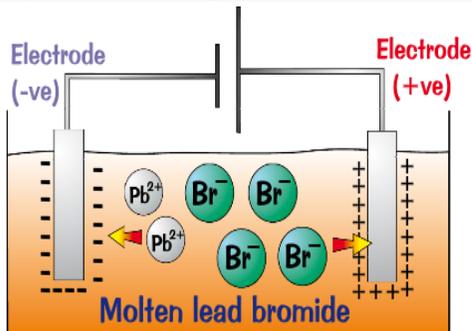
The metal is produced at the cathode (-), while the non-metal is produced at the anode (+)

e.g. Lead Bromide (molten) = Lead (at the cathode) + Bromine (at the anode)



**+ve ions** are attracted to the **-ve electrode**. Here they **gain electrons** (reduction).

**Lead** is produced at the **-ve electrode**.



**HEAT**

**-ve ions** are attracted to the **+ve electrode**. Here they **lose electrons** (oxidation).

**Bromine** is produced at the **+ve electrode**.

# Electrolysis higher

With aqueous electrolytes, the electrolyte is also split up. If the metal is more reactive than hydrogen, then hydrogen from the water is produced at the cathode instead place of the metal.

e.g. Copper chloride (aq) = Copper (at the cathode) + Chlorine (at the anode)

e.g. Sodium chloride (aq) = Hydrogen (at the cathode) + Chlorine (at the anode)

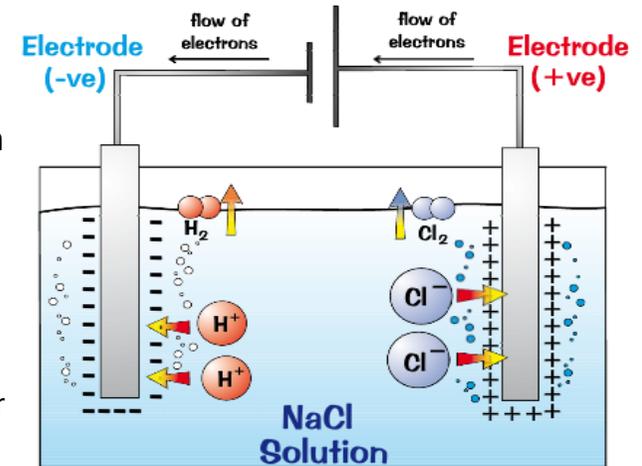
Because positive ions go to the cathode, they are called **Cations**

Because negative ions go to the anode, they are called **Anions**

## Change at the electrodes

During electrolysis ion move towards the electrodes.

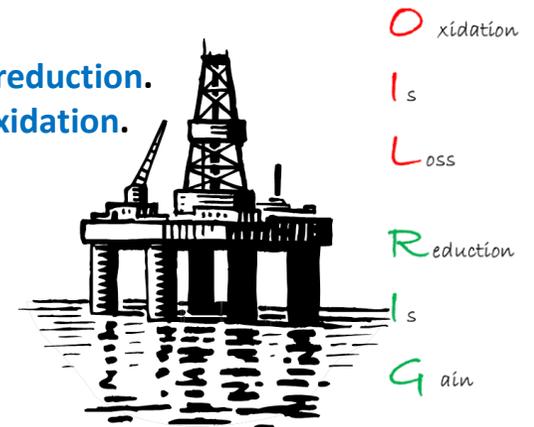
When an ion reaches the electrode they either lose or gain an electron depending on their charge.



Negatively charged ions *lose* electrons to become neutral atoms  
Positively charged ions form neutral atoms via *gaining* electrons.

Gaining electrons is called **reduction**.

Losing electrons is called **oxidation**.



### Keywords

**Electrode**, a conductor used to establish electrical contact with a circuit. The electrode attached to the negative terminal of a battery is called a negative electrode, or cathode. The electrode attached to the positive terminal of a battery is the positive electrode, or anode.

**Electrolysis**, the decomposition (break-down) of a compound using an electric current.

**Electrolyte**, a substance which, when molten or in solution, will conduct an electric current.

**Ion**, electrically charged particle, formed when an atom or molecule gains or loses electrons.

**Ionic compound**, an ionic compound occurs when a negative ion (an atom that has gained an electron) joins with a positive ion (an atom that has lost an electron).

**Molten**, a term used to describe a liquid substance (eg rock, glass or metal) formed by heating a solid.

**Oxidation**, the gain of oxygen, or loss of electrons, by a substance during a chemical reaction.

**Reduction**, the loss of oxygen, or gain of electrons, by a substance during a chemical reaction.

### Extraction of Aluminium

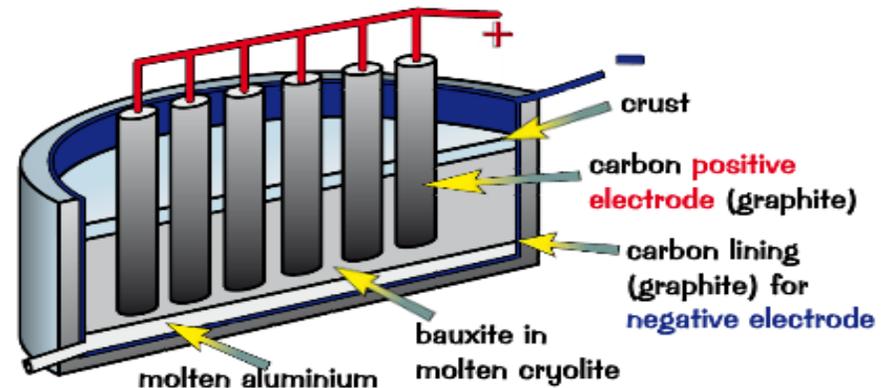
Aluminium is manufactured by the electrolysis of a molten mixture of **aluminium oxide** and **cryolite**.

**Cryolite** is used to **lower the melting point** of aluminium oxide

Graphite electrodes are used

Aluminium forms at the negative electrode and oxygen at the positive electrode.

The positive electrode is made of carbon, which reacts with the oxygen to produce carbon dioxide. For this reason the anode must be continually replaced as it loses mass.



### Electrodes

Graphite is commonly used as the material for electrodes as it conducts electricity and doesn't take part in the reactions.