

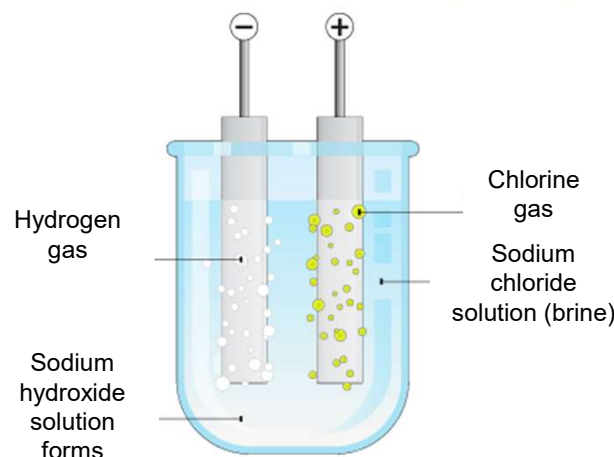
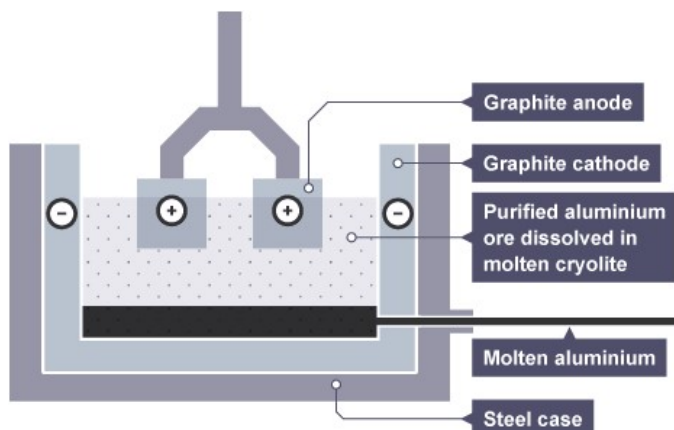
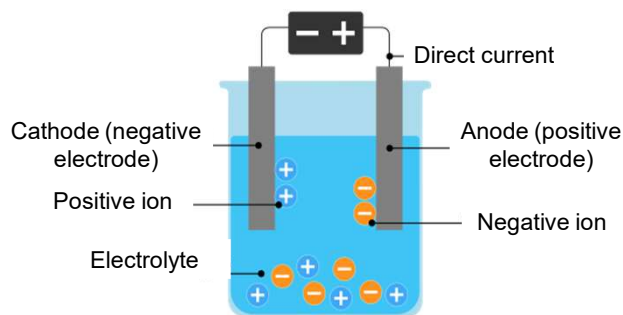
**AQA C4b Electrolysis
COMBINED HIGHER
RP – Electrolysis**

Extracting Metals Using Electrolysis

Metals can be extracted from molten or dissolved compounds using electrolysis. Aluminium is extracted in this way.

This process is used when the metal is more reactive than carbon.

It is expensive because it needs a lot of electrical energy to produce the current.



EXAMPLE - Electrolysis of brine (NaCl in water)

The products are H_2 , Cl_2 and NaOH

Positive anode: $2\text{Cl}^-(\text{aq}) \rightarrow \text{Cl}_2(\text{g}) + 2\text{e}^-$
chlorine

Negative cathode: $2\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{H}_2(\text{g})$
hydrogen

In solution: $\text{Na}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{NaOH}(\text{aq})$
sodium hydroxide

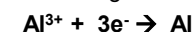
Extracting Aluminium

Aluminium oxide is mixed with cryolite to reduce its melting point

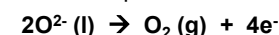
aluminium oxide \rightarrow aluminium + oxygen



Aluminium forms at the negative electrode (cathode)

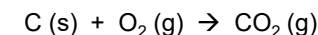


Oxygen forms at the positive electrode (anode)



OIL RIG - Oxidation Is Loss (of electrons), Reduction Is Gain (of electrons)

Oxygen reacts with the carbon electrodes to produce carbon dioxide, so the electrode burns away and has to be replaced



Electrolysis of Solutions

In water (aqueous solution): $\text{H}_2\text{O}(\text{l}) \rightleftharpoons \text{H}^+(\text{aq}) + \text{OH}^-(\text{aq})$

at the negative electrode

1. The metal will be produced on the electrode if it is less reactive than hydrogen, e.g. copper
2. Hydrogen will be produced if the metal is more reactive than hydrogen, e.g. sodium

at the positive electrode

If you have a halide ion (Cl^- , I^- , Br^-) then you will get chlorine, bromine or iodine formed.
Otherwise oxygen is formed at positive electrode from the hydroxide ion.

Don't P.A.N.I.C.

Positive Anode,

Negative Is Cathode

Opposite

charges

attract