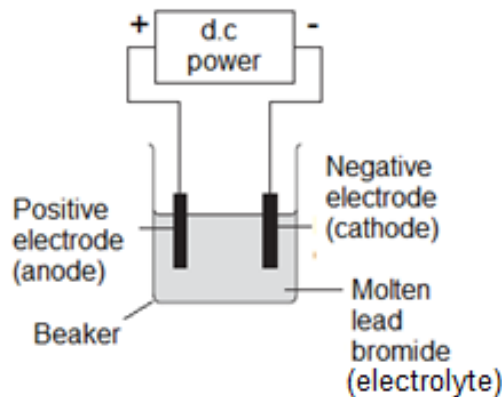


Section 1 Electrolysis key terms

Electrolysis	The process of splitting an ionic compound by passing electricity through it.
Electrolyte	An ionic compound that is molten (melted) or dissolved in water . The electrolyte is broken down by electricity enabling its ions to and hence carry a charge. move freely
Electrode	An electrical conductor that is placed in the electrolyte and connected to the power supply .
Cathode	The negative electrode . The electrode attached to the negative terminal of the power supply.
Anode	The positive electrode . The electrode attached to the positive terminal of the power supply.
Oxidation	Loss of electrons
Reduction	Gain of electrons



Positive
Anode
Negative
Is
Cathode

Section 2a: Changes at the electrodes – Pure ionic compounds

Electrolyte	Cathode	Anode
Molten Compound	Metal	Non-metal produced.
Molten lead bromide (diagram above)	Lead metal is produced $Pb^{2+} + 2e^{-} \rightarrow Pb$	Bromine is produced $2Br^{-} \rightarrow Br_2 + 2e^{-}$

Section 2b: Changes at the electrodes – Aqueous solutions

Electrolyte	Cathode	Anode
Dissolved compound (aqueous solution)	The metal if the metal is less reactive than hydrogen . Hydrogen is produced if the metal is more reactive than hydrogen .	Oxygen is produced unless the solution contains halide ions (chloride, bromide, iodide) when the halogen (chlorine, bromine, iodine) is produced.

Electrolyte	Cathode	Anode
$CuBr_{2(aq)}$	Copper	Bromine
$NaCl_{(aq)}$	Hydrogen	Chlorine
$KI_{(aq)}$	Hydrogen	Iodine
$Na_2SO_{4(aq)}$	Hydrogen	Oxygen

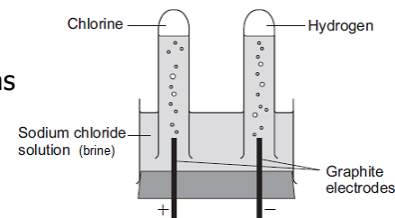
Electrolysis of Brine (concentrated sodium chloride solution)

In the electrolysis of brine, **three products** are formed, **hydrogen, chlorine** and **sodium hydroxide**.

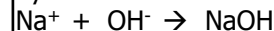
Sodium chloride solution \rightarrow **hydrogen gas** + **chlorine gas** + **sodium hydroxide solution**

At the **cathode** **hydrogen** gas forms
 $2H^{+} + 2e^{-} \rightarrow H_2$ (**reduction**)

At the **anode**, **chlorine** gas forms
 $2Cl^{-} \rightarrow Cl_2 + 2e^{-}$ (**Oxidation**)

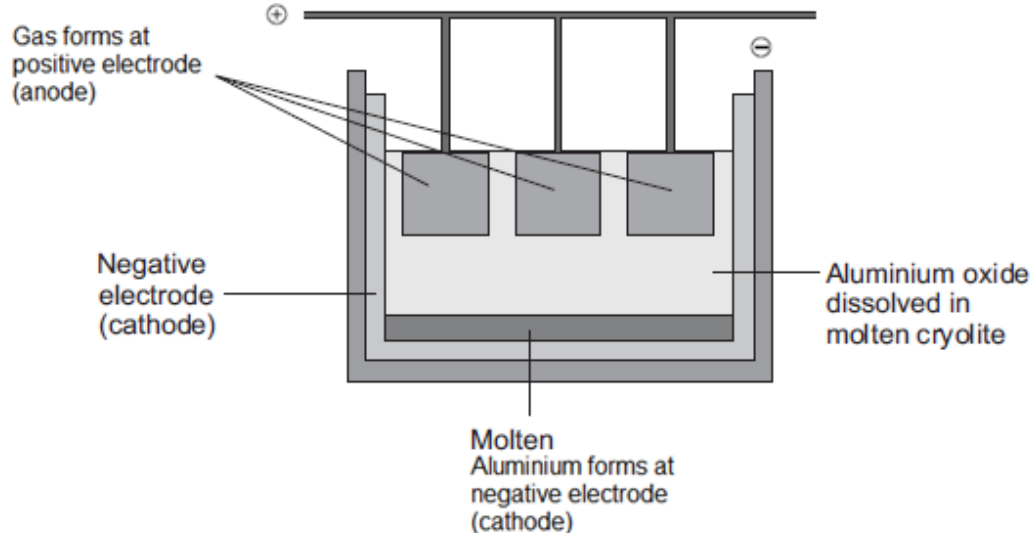


Sodium ions stay in solution (as sodium is more reactive than hydrogen) and **combine with hydroxide ions** to form sodium hydroxide.



Section 3a: The extraction of Aluminium by electrolysis

Bauxite	You get aluminium oxide from the ore called Bauxite , the ore is mined by open cast mining .
Cryolite	Aluminium oxide is dissolved in cryolite to lower its melting point . This saves money on energy costs .
Graphite	The electrodes are made from graphite (carbon) as graphite can conduct electricity (due to it having delocalised electrons between it's layers.)
Cathode	Positive Al³⁺ ions move to the cathode . Aluminium is produced (reduction). Al³⁺ + 3e⁻ → Al
Anode	Negative O²⁻ ions move to the anode . Oxygen is made (oxidation). 2O²⁻ → O₂ + 4e⁻ The anode wears away gradually as the carbon graphite anode reacts with oxygen to form carbon dioxide .



Section 3b: Uses of Aluminium

Aluminium is a very important metal, the uses of its metal or alloys include:

- Pans
- Overhead power cables
- Aeroplanes
- Cooking foil
- Drink cans
- Window and patio door frames
- Bicycle frames and car bodies