

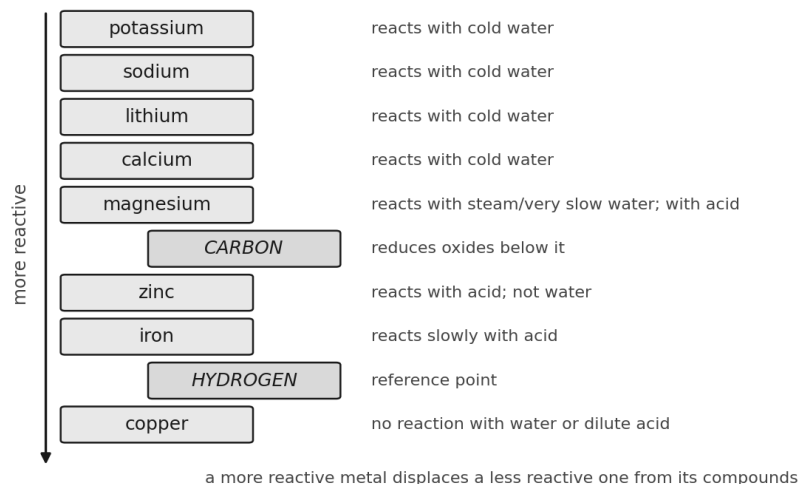
Exercise walk-through

4.3

Electrolysis (4.4.3.1–4.4.3.3)

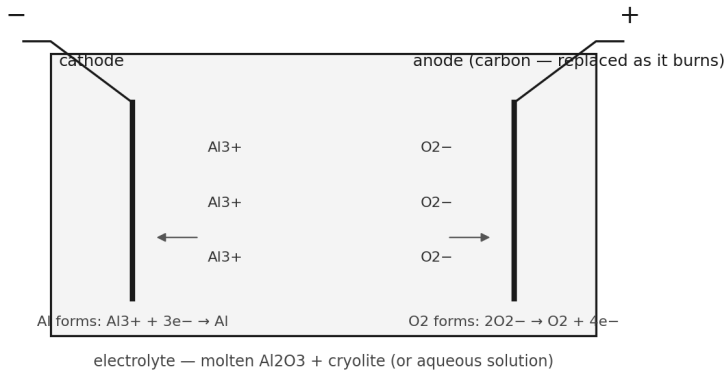
AQA · GCSE · Chemistry

The reactivity series



- K, Na, Li, Ca, Mg, (C), Zn, Fe, (H), Cu — learn the order.
- Water reactions fade down the series; acids react from Mg up.
- More reactive metal displaces a less reactive one.

Electrolysis



- Molten or dissolved — ions free to move to the electrodes.
- Cathode collects the metal or hydrogen; anode the non-metal.
- Aluminium — cryolite mixture; carbon anode burns away.

Exercises 2.1·2.3

2.1 Why does solid sodium chloride not conduct electricity but molten sodium chloride does? [2]

2.2 Name the product at each electrode when molten lead bromide is electrolysed. [2]

2.3 What forms at the anode when concentrated sodium chloride solution is electrolysed? [1]

Exercises 2.1·2.3

2.1 Why does solid sodium chloride not conduct electricity but molten sodium chloride does? [2]

2.1 In the solid, the ions are fixed in the lattice and cannot move; when molten the ions are free to move to the electrodes and carry charge.

2.2 Name the product at each electrode when molten lead bromide is electrolysed. [2]

2.2 Lead at the cathode; bromine at the anode.

2.3 What forms at the anode when concentrated sodium chloride solution is electrolysed? [1]

2.3 Chlorine.

Exercises 3.1·3.3

3.1 Explain why cryolite is mixed with aluminium oxide in aluminium extraction, and why the carbon anodes need regular replacement. [4]

3.2 Predict the products of electrolysis of aqueous copper sulfate using inert electrodes, explaining the electrode processes. [4]

3.3 (*HT*) Write half-equations for the electrolysis of dilute sulfuric acid at each electrode. [4]

Exercises 3.1·3.3

3.1 Explain why cryolite is mixed with aluminium oxide in aluminium extraction, and why the carbon anodes need regular replacement. [4]

3.1 The mixture has a much lower melting point than pure aluminium oxide; so less energy is needed to keep it molten – cheaper and probed. At the anode, oxygen is produced; the hot carbon anode reacts/burns with the oxygen to form carbon dioxide, so it is used up and must be replaced.

3.2 Predict the products of electrolysis of aqueous copper sulfate using inert electrodes, explaining the electrode processes. [4]

3.2 At the cathode, copper deposits – copper is less reactive than hydrogen, so Cu^{2+} is

3.3 (*HT*) Write half-equations for the electrolysis of dilute sulfuric acid at each electrode. [4]

3.3 Cathode (negative): $2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$. Anode (positive): $4\text{OH}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O} +$