

Topic 4: Chemical changes

AQA GCSE Chemistry 8462 · spec 4.4 · sheets 4.1–4.3

Three stories of electron transfer

- Metals race to lose electrons — the reactivity series ranks them.
- Acids hand H^+ to bases — salts and water result.
- Electrolysis pushes electrons on ions — elements come out.

The reactivity series

potassium	reacts with cold water
sodium	reacts with cold water
lithium	reacts with cold water
calcium	reacts with cold water
magnesium	reacts with steam/very slow water; with acid
CARBON	reduces oxides below it
zinc	reacts with acid; not water
iron	reacts slowly with acid
HYDROGEN	reference point
copper	no reaction with water or dilute acid

a more reactive metal displaces a less reactive one from its compounds

- 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.

Extraction and redox

- Below carbon — reduce the oxide with carbon.
- Above carbon — electrolysis of the molten compound.
- (HT) oxidation is loss, reduction is gain — of electrons.

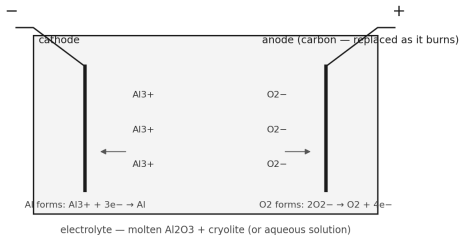
Acids, bases and salts

- Acid + base $\rightarrow$ salt + water; + carbonate $\rightarrow$ salt + water + CO₂.
- HCl gives chlorides; nitric gives nitrates; sulfuric gives sulfates.
- RP1 — warm, add excess insoluble base, filter, evaporate, crystallise.

pH, strong and weak

- pH 0 to 14 — universal indicator or a pH probe.
- (HT) strong acids fully ionised; weak acids partially.
- One pH unit down — ten times the H^+ concentration.

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.

Aqueous electrolysis rules

- Cathode — hydrogen if the metal outranks hydrogen; else the metal.
- Anode — oxygen, unless halide ions give the halogen.
- (HT) balance half-equations with electrons.

Check yourself

- Checklist before you call this topic done.
- The ladder with carbon and hydrogen; displacement and extraction rules.
- Salt names; RP1 sequence; OIL RIG; electrode predictions with half-equations.