

Group 2 metals

- reactive metals
- redox reaction most common - oxidised to form 2+ ions
- **Reducing Agents** - reagent which adds electrons to another species

Down the group

- Reactivity **INCREASES**
- First ionisation energies **DECREASE** down the group - more shielding and increased atomic radius
- **stronger** reducing agents
- solubility, pH and alkalinity of hydroxides in water **INCREASES** down group - contain more OH⁻ ions

Agriculture

calcium hydroxide added to fields (lime) to increase pH of acidic soil and neutralise acid in soil, forming H₂O

Medicine

antacids for treating acid indigestion - Mg and Ca carbonates forming H₂O

metal + oxygen

metal + water

metal + acid

metal oxide + water

Metal oxide (MO)

Metal Hydroxide (alkaline) + hydrogen

Salt + hydrogen

metal hydroxide (alkaline)

Trend in Hydroxides

1. Add spatula of group 2 oxide to water in test tube
2. shake saturated solution (some white powder still present)
3. measure pH of each solution
4. alkalinity increase down group

Halogens

- most reactive non metallic group
- found dissolved in sea water or with Na/K in solids
- redox reactions common
- **Oxidising agents** - remove electrons from another species

Boiling points increase down the group

- more electrons
- stronger London's Forces
- more energy needed to break the intermolecular forces

Displacement reactions

If halogen more reactive than halide present

1. halogen displaces halide
2. solution changes colour

Tell solutions apart - add non polar covalent solvent - cyclohexane as dissolve more readily

Solution in H₂O + cyclohexane

Cl₂



Br₂



I₂



Reactivity decreases down the group

- atomic radius increases
- shielding increases - more shells
- less nuclear attraction to take an e⁻ from another species

- Cl kills bacteria but a toxic gas - respiratory irritant
- can form chlorinated hydrocarbons if react - suspected of causing cancer

Chlorine and cold, dilute sodium hydroxide (aq)

- reaction in H₂O limited by low solubility of Cl in water
- more chlorine dissolves
- $\text{Cl}_2 + 2\text{NaOH} = \text{NaClO} + \text{NaCl} + \text{H}_2\text{O}$
- lots of chlorate ions ClO⁻ - from sodium chlorate
- household bleach

Chlorine + Water

- used in water purification - kills bacteria
- chloric acid also a weak bleach
- indicator paper red (acid) then colourless as is bleached
- $\text{Cl}_2 + \text{H}_2\text{O} = \text{HClO} + \text{HCl}$ - all products aqueous