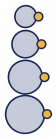
Group 2 Map

Cambridge International AS & A Level Chemistry · Topic 10 Group 2

1 Trends down the group 10.1.4

- Atomic radius **increases**: more shells
- **IE falls**: more shielding
- Reactivity **increases**
- Outer electrons lost more easily



2 Oxygen, water and acids 10.1.1

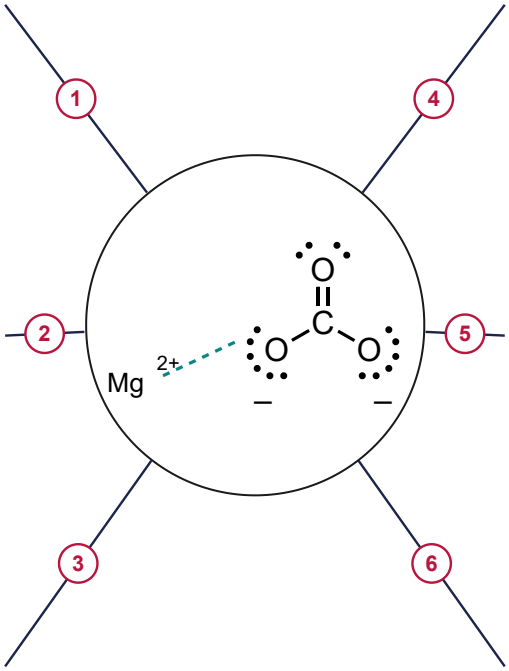
- $2M + O_2 \rightarrow$ **2MO**
- Water: $M(OH)_2 + H_2$
- HCl: $MCl_2 + H_2$
- H_2SO_4: $BaSO_4$ **coats** Ba



3 Oxides, hydroxides, carbonates 10.1.2

- $MO + H_2O \rightarrow M(OH)_2$
- Base + acid: **salt + water**
- $MCO_3 + 2HCl \rightarrow MCl_2 + H_2O +$ **CO_2**
- MCO_3: insoluble in water





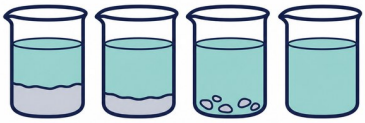
4 Thermal stability 10.1.3

- $MCO_3 \rightarrow MO + CO_2$
- $2M(NO_3)_2 \rightarrow 2MO + 4NO_2 + O_2$
- Larger ion: **less polarising**
- More stable **down** the group



5 Solubility 10.1.5

- Hydroxides: **more soluble** down
- Sulfates: **less soluble** down
- $Mg(OH)_2$ sparingly soluble
- $BaSO_4$ insoluble



6 Making predictions 10.1.4

- Radium: the **most reactive**
- $Ra(OH)_2$: very soluble
- $RaSO_4$: insoluble
- $RaCO_3$: the **most stable**



Down Group 2: Mg → Ba one larger ion explains most of the rows

Property	Trend	Why
Atomic radius	increases	one more shell each period
First ionisation energy	decreases	outer electron further out and more shielded
Reaction with water	faster	electrons lost more easily
Hydroxide solubility	increases	$Mg(OH)_2$ sparingly soluble; $Ba(OH)_2$ soluble
Sulfate solubility	decreases	$BaSO_4$ insoluble: the sulfate test
Carbonate stability	increases	larger cation polarises the anion less

Worked examples

Thermal decomposition

- 5.00 g $CaCO_3$ (M 100.1)
- 0.0500 mol CO_2
- **1.20 dm³** at r.t.p.

A nitrate

- $2Ca(NO_3)_2 \rightarrow$
- $2CaO + 4NO_2 + O_2$
- **brown** gas

Carbonate + acid

- $MgCO_3 + 2HCl \rightarrow$
- $MgCl_2 + H_2O + CO_2$
- **fizzing**

Group 2 returns with lattice energy (Topic 23) and the A Level explanation of its trends (Topic 27).

Online Learning System · onlinelearningsystem.net · © 2026 Online Learning System. All rights reserved. Not for redistribution.