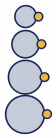
# Group 2 Map

OCR A Level Chemistry A · 3.1.2 Group 2

## 1 Electron structure

3.1.2(a)

- Outer shell **s²**
- $M \rightarrow M^{2+} + 2e^-$
- The metal is **oxidised**
- A **reducing agent**



## 2 Oxygen and water

3.1.2(b)(i)-(ii)

- $2M + O_2 \rightarrow$ **2MO**
- $M + 2H_2O \rightarrow M(OH)_2 + H_2$
- Mg + steam: **MgO** + $H_2$
- **Faster** down the group

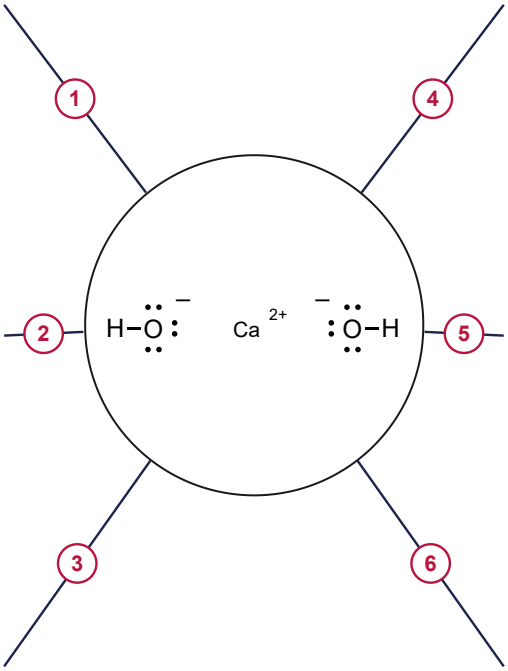


## 3 Dilute acids

3.1.2(b)(iii)

- $M + 2HCl \rightarrow MCl_2 + H_2$
- Ionic: $M + 2H^+ \rightarrow M^{2+} + H_2$
- $H^+$ is **reduced**
- Fizzing **faster** down the group






## 4 Oxides with water

3.1.2(d)

- $MO + H_2O \rightarrow$ **$M(OH)_2$**
- MgO: pH about 10
- CaO: pH about 12
- More **alkaline** down the group



## 5 Bases in use

3.1.2(e)

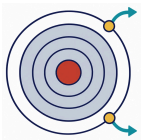
- $Ca(OH)_2$: neutralises **acid soils**
- $Mg(OH)_2$: an **antacid**
- $CaCO_3$: antacid; gives $CO_2$
- $Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + 2H_2O$



## 6 Reactivity explained

3.1.2(c)

- More shells: electrons **further out**
- More **shielding**
- $IE_1 + IE_2$ **fall**
- Electrons lost **more easily**



## Down Group 2: Mg → Ba

one larger atom 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 |
| Reaction with dilute acid | faster | the same reason: electrons lost more easily |
| pH of $M(OH)_2$ solution | rises | more soluble down the group: more $OH^-$ ions |

## Worked examples

### Dilute acid

- $Mg + 2HCl \rightarrow MgCl_2 + H_2$
- Mg 0 → +2: **oxidised**
- H +1 → 0: **reduced**

### Oxide in water

- $CaO + H_2O \rightarrow Ca(OH)_2$
- an alkaline solution
- pH about **12**

### Antacid

- $CaCO_3 + 2HCl \rightarrow$
- $CaCl_2 + H_2O + CO_2$
- **neutralises** stomach acid

Group 2 returns in qualitative analysis (3.1.4) and lattice enthalpy (5.2.1).

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