# Equations Map

Edexcel International A Level Chemistry · Unit 1 · Topic 1B Equations

## 1 Balancing equations 1.3

- Atoms **rearranged**, never made or destroyed
- Same atoms on **both sides**
- Change **coefficients** only
- Never change a formula
- Combustion: C, then H, then O



## 2 State symbols 1.3

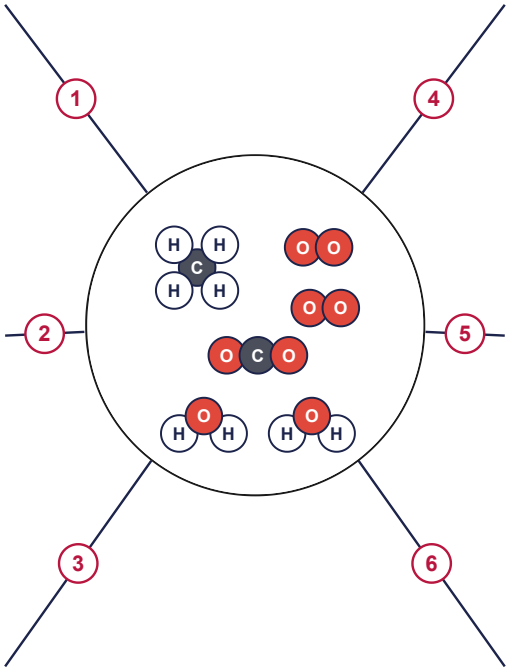
- **(s)** solid, **(l)** liquid, **(g)** gas
- **(aq)**: dissolved in water
- Water is (l), not (aq)
- Precipitates are (s)
- Fizzing: a (g) product



## 3 Ionic equations 1.3

- Split **aqueous** ionic substances
- Keep solids, liquids, gases whole
- Cancel **spectator ions**
- Balance atoms **and charge**
- $H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$






## 4 Precipitation 1.12

- Two solutions give an **insoluble solid**
- $Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$
- AgCl white, AgBr cream, AgI yellow
- $BaSO_4$ white; $Cu(OH)_2$ blue
- $Fe(OH)_2$ green; $Fe(OH)_3$ orange-brown



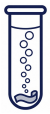
## 5 Displacement 1.12

- **More reactive** displaces less reactive
- $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$
- Blue fades, pink-brown copper
- $Cl_2 + 2Br^- \rightarrow 2Cl^- + Br_2$ (orange)
- $Br_2 + 2I^- \rightarrow 2Br^- + I_2$ (brown)



## 6 Reactions of acids 1.12

- Metal: **salt + hydrogen**
- Base or alkali: **salt + water**
- Carbonate: **salt + water + $CO_2$**
- $CO_2$ turns limewater cloudy
- Insoluble bases stay whole: CuO(s)



## Ionic equations and observations

the spectator ions are left out of every ionic equation

| Reaction | Ionic equation | Observation |
|---|---|---|
| Acid + alkali | $H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$ | warms; no visible change |
| Acid + magnesium | $Mg(s) + 2H^+(aq) \rightarrow Mg^{2+}(aq) + H_2(g)$ | fizzing; metal disappears |
| Acid + carbonate solution | $CO_3^{2-}(aq) + 2H^+(aq) \rightarrow H_2O(l) + CO_2(g)$ | effervescence |
| Acid + copper(II) oxide | $CuO(s) + 2H^+(aq) \rightarrow Cu^{2+}(aq) + H_2O(l)$ | black solid gives blue solution |
| Silver nitrate + bromide | $Ag^+(aq) + Br^-(aq) \rightarrow AgBr(s)$ | cream precipitate |
| Hydroxide + iron(III) | $Fe^{3+}(aq) + 3OH^-(aq) \rightarrow Fe(OH)_3(s)$ | orange-brown precipitate |
| Zinc + copper(II) sulfate | $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$ | blue fades; pink-brown solid |

## Worked examples

### Balance it

- $Fe + O_2 \rightarrow Fe_2O_3$
- O: LCM 6: $3O_2$, $2Fe_2O_3$
- **$4Fe + 3O_2 \rightarrow 2Fe_2O_3$**

### Burn it

- $C_4H_{10} + 13/2O_2$
- $\rightarrow 4CO_2 + 5H_2O$
- double: **$2C_4H_{10} + 13O_2$**

### Make it ionic

- $BaCl_2(aq) + Na_2SO_4(aq)$
- $Na^+$, $Cl^-$ are spectators
- **$Ba^{2+} + SO_4^{2-} \rightarrow BaSO_4(s)$**

Balanced equations give the mole ratios for reacting masses (Topic 1C) and gas volumes (Topic 1E).

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