

3.1 Formulae

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS formula • compound • symbol equation
• aqueous • ionic equation

Objective

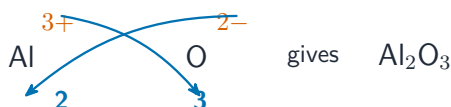
Build the skills to answer exam questions on **formulae** – working out ionic formulae from charges, **balancing equations**, **state symbols**, and **ionic equations**.

You must be able to:

- work out an ionic formula by balancing charges
- balance a symbol equation and add state symbols
- write a simple ionic equation (leaving out spectator ions)

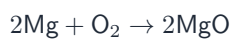
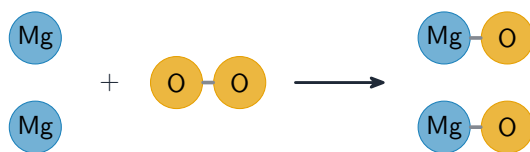
1 Key knowledge and worked examples

■ Formulae and balancing



the charge numbers cross over to become the subscripts (then simplify if they share a factor)

The ion charges cross over to give the formula (here Al₂O₃)



2 Mg and 2 O on each side: balanced

A balanced equation has the same number of each atom on both sides

Ionic (acid + alkali): $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$.

2 Practice

2.1 Give the formula of the compound formed from Mg^{2+} and Cl^- . [1]

2.2 State what the symbol (*aq*) means. [1]

3 Exam-style questions

3.1 The formula of the ionic compound from Ca^{2+} and NO_3^- is: [1]

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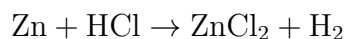
A CaNO_3

B $\text{Ca}(\text{NO}_3)_2$

C Ca_2NO_3

D $\text{Ca}_2(\text{NO}_3)_3$

3.2 Balance the equation, adding state symbols:



[3]

3.3 Write the ionic equation for the neutralisation of a strong acid by a strong alkali, and name the spectator ions when NaOH reacts with HCl. [3]

Solutions

Each answer shows the steps, then the **result**.

2.1

- two Cl^- balance one Mg^{2+}
- MgCl_2

2.2

- (aq) means **aqueous** – dissolved in water

3.1 B

- one Ca^{2+} needs two NO_3^-
- $\text{Ca}(\text{NO}_3)_2$

3.2

- zinc + hydrochloric acid $\rightarrow$ zinc chloride + hydrogen
- $\text{Zn}(s) + 2\text{HCl}(aq) \rightarrow \text{ZnCl}_2(aq) + \text{H}_2(g)$

3.3

- strong acid + strong alkali: H^+ and OH^- make water
- $\text{H}^+(aq) + \text{OH}^-(aq) \rightarrow \text{H}_2\text{O}(l)$
- spectator ions: Na^+ and Cl^-