

Exercise walk-through

Types of Chemical Reactions ■ 4.7

eXercise

You must be able to

- recognise **synthesis** 化合, **decomposition** 分解, **combustion** 燃烧, **precipitation**, and **acid-base** reactions
- predict products for simple cases
- classify a given equation

Method — The main reaction types

- **Synthesis (combination):** $A + B \rightarrow AB$.
- **Decomposition:** $AB \rightarrow A + B$.
- **Combustion:** a fuel + $O_2 \rightarrow CO_2 + H_2O$.
- **Precipitation:** two solutions form an insoluble solid.
- **Acid-base (neutralization):** acid + base $\rightarrow$ salt + water.

Method — Recognising by pattern

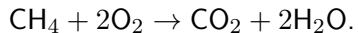
Count reactants and products: one product = synthesis; one reactant = decomposition; O_2 + a hydrocarbon = combustion; two solutions $\rightarrow$ a solid = precipitation.

Method — A worked classification

$2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$: two reactants, one product $\rightarrow$ **synthesis** (also a combustion of a metal).

Method — Combustion products

Complete combustion of a hydrocarbon always gives CO_2 and H_2O .



Practice 2.1 ■ 1 mark

Classify $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$.

Solution 2.1

Worked steps

Decomposition **B1**.

Practice 2.2 ■ 1 mark

Classify $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$.

Solution 2.2

Worked steps

Acid-base (neutralization) **B1**.

Practice 2.3 ■ 2 marks

What are the products of complete combustion of a hydrocarbon?

Solution 2.3

Method: Combustion products

Worked steps

Carbon dioxide and water **B1** **B1**.

Exam-style 3.1 ■ 1 mark

A reaction $A + B \rightarrow AB$ is a

A decomposition

B synthesis

C combustion

D precipitation

Solution 3.1

Method: The main reaction types

A decomposition

B synthesis



C combustion

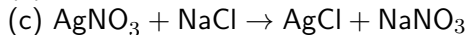
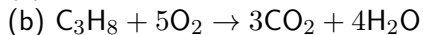
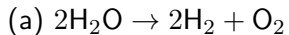
D precipitation

Worked steps

B — synthesis (combination).

Exam-style 3.2 ■ 1 mark

Classify each reaction:



Solution 3.2

Method: The main reaction types

Worked steps

(a) decomposition; (b) combustion; (c) precipitation **B1** **B1** **B1**.

Exam-style 3.3 ■ 3 marks

Write the balanced equation for the complete combustion of ethane, C_2H_6 .

Solution 3.3

Worked steps

$2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$ M1 M1 A1 *products, balance C/H, balance O.*