

# 4.7 Types of Chemical Reactions

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 11 marks

**KEY WORDS** combustion 燃烧 • decomposition 分解 • synthesis 化合 • acid 酸 • base 碱

## Objective

Build the skills to answer exam questions on the **types of chemical reactions**.

**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

## 1 Worked examples

Study these first. Each one shows the method for a question type used later — follow the steps and you can do the Practice and Exam-style questions yourself.

### ■ 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.

### ■ Recognising by pattern

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

### ■ A worked classification

$2Mg + O_2 \rightarrow 2MgO$ : two reactants, one product  $\rightarrow$  **synthesis** (also a combustion of a metal).

### ■ Combustion products

Complete combustion of a hydrocarbon always gives  $CO_2$  and  $H_2O$ .  $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ .

## 2 Practice

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Now apply the methods above.

**2.1** Classify  $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ . [1]

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**2.2** Classify  $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$ . [1]

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**2.3** What are the products of complete combustion of a hydrocarbon? [2]

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## 3 Exam-style questions

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**3.1** A reaction  $\text{A} + \text{B} \rightarrow \text{AB}$  is a [1]

- **A** decomposition
  - **B** synthesis
  - **C** combustion
  - **D** precipitation
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**3.2** Classify each reaction:

(a)  $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$  [1]

(b)  $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$  [1]

(c)  $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$  [1]

**3.3** Write the balanced equation for the complete combustion of ethane,  $\text{C}_2\text{H}_6$ . [3]

## Solutions

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**2.1** Decomposition.

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

**2.3** Carbon dioxide and water.

**3.1 B** — synthesis (combination).

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

**3.3**  $2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$ .