AP CHEMISTRY • EXERCISE SHEET

# 4.7 Types of Chemical Reactions

Name: _____ Class: _____ Date: _____ **Total: 11 marks**

## 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 → salt + water.

### Recognising by pattern

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

### A worked classification

$2Mg + O_2 \rightarrow 2MgO$: two reactants, one product → **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

Now apply the methods above.

**2.1** Classify $CaCO_3 \rightarrow CaO + CO_2$. [1]

**2.2** Classify $HCl + NaOH \rightarrow NaCl + H_2O$. [1]

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

## 3 Exam-style questions

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

- **A** decomposition
- **B** synthesis
- **C** combustion
- **D** precipitation

**3.2** Classify each reaction:

(a) $2H_2O \rightarrow 2H_2 + O_2$ [1]

(b) $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$ [1]

(c) $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$ [1]

**3.3** Write the balanced equation for the complete combustion of ethane, $C_2H_6$. [3]

## 4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **4.7 Types of Chemical Reactions** lesson on the **Learn** page;
- read the **Types of Chemical Reactions** section of the AP Chemistry handout on the **Know** page.

## Solutions

**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** $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$.