

4.7 Types of Chemical Reactions

Name: _____ Class: _____ Date: _____ **Total: 11 marks****KEY WORDS** combustion • decomposition • synthesis • acid • base

Objective

Build the skills to answer exam questions on the **types of chemical reactions**.**You must be able to:**

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

1 Key knowledge and 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

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]