Paper 1

Questions are applicable for both core and extended candidates

1 Magnesium reacts with steam.

$$Mg + H_2O \rightarrow MgO + H_2$$

When 2.43 g of magnesium reacts with an excess of steam, the products are 4.03 g of magnesium oxide and 0.20 g of hydrogen.

What is produced when 7.29 g of magnesium reacts with an excess of steam?

A 1.34 g of magnesium oxide and 0.07 g of hydrogen

B 4.03 g of magnesium oxide and 0.20 g of hydrogen

C 8.06 g of magnesium oxide and 0.40 g of hydrogen

D 12.09 g of magnesium oxide and 0.60 g of hydrogen

2 The equation for the combustion of methane is shown.

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

Which mass of methane produces 36 g of water?

A 16 g **B** 18 g **C** 32 g **D** 64 g

3 In which state does 1 dm^3 of methane contain the most particles?

A gas at 100 °C

B gas at room temperature

C liquid

D solid

Paper 2

Questions are applicable for both core and extended candidates unless indicated in the question

4 The equation for the thermal decomposition of sodium hydrogencarbonate is shown.

$$2NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$$

The M_r of sodium hydrogencarbonate, $NaHCO_3$, is 84.

The M_r of sodium carbonate, Na_2CO_3, is 106.

In an experiment, 2.1 g of sodium hydrogencarbonate is heated but not all of it decomposes. All of the carbon dioxide is collected and measured at room temperature and pressure. The total volume of carbon dioxide produced is 0.21 dm^3.

The volume of 1 mole of a gas at room temperature and pressure is 24 dm^3.

Which statement is correct? **(extended only)**

A The mass of sodium carbonate produced is 0.93 g.

B The mass of sodium carbonate produced is 1.33 g.

C The percentage yield of carbon dioxide is 10%.

D The percentage yield of carbon dioxide is 35%.

5 The equation for the reaction between sodium carbonate and excess dilute hydrochloric acid is shown.

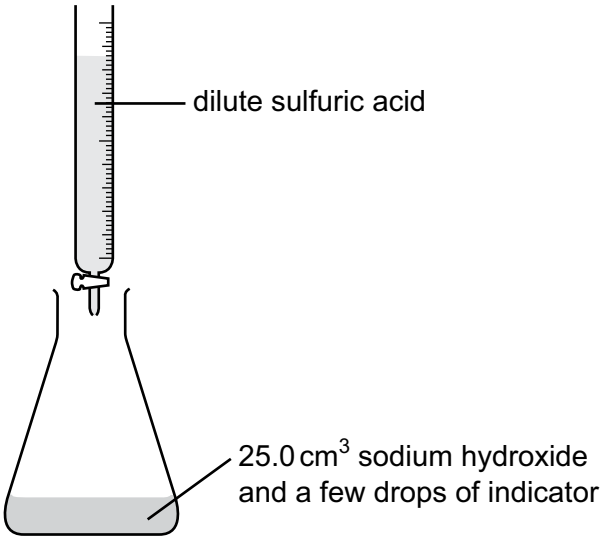
$$Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$$

When 26.5 g of sodium carbonate reacts with excess dilute hydrochloric acid, what is the maximum volume of carbon dioxide produced? **(extended only)**

A 6 dm^3 **B** 12 dm^3 **C** 18 dm^3 **D** 24 dm^3

6 A volumetric pipette is used to measure 25.0 cm^3 of 2.0 mol/dm^3 aqueous sodium hydroxide into a conical flask.

A burette is filled with dilute sulfuric acid.



The equation for the reaction is shown.

$$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$$

The reaction requires 50.0 cm^3 of dilute sulfuric acid to reach the end-point.

What is the concentration of the dilute sulfuric acid in mol/dm^3? **(extended only)**

A 0.50 mol/dm^3

B 1.0 mol/dm^3

C 2.0 mol/dm^3

D 4.0 mol/dm^3

7 Calcium carbonate, $CaCO_3$, reacts with dilute hydrochloric acid to produce carbon dioxide.

The equation for the reaction is shown. The relative formula mass of calcium carbonate is 100.

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$

10 g of calcium carbonate is reacted with an excess of dilute hydrochloric acid.

Which mass of carbon dioxide is produced? **(extended only)**

A 2.2 g **B** 2.8 g **C** 4.4 g **D** 44 g

8 4.55 g of zinc is reacted with 50 cm^3 of 2.25 mol / dm^3 dilute hydrochloric acid.

The equation for the reaction is shown. **(extended only)**

$$Zn + 2HCl \rightarrow ZnCl_2 + H_2$$

Which volume of hydrogen gas, at room temperature and pressure, is produced in the reaction?

A 1.35 dm^3 **B** 1.67 dm^3 **C** 2.70 dm^3 **D** 3.34 dm^3

9 The equation for the reaction between aqueous lead(II) nitrate and aqueous sodium chloride is shown.

$$Pb(NO_3)_2(aq) + 2NaCl(aq) \rightarrow PbCl_2(s) + 2NaNO_3(aq)$$

If 100 cm^3 of aqueous lead(II) nitrate of concentration 0.1 mol / dm^3 is reacted with an excess of aqueous sodium chloride, which mass of lead(II) chloride is obtained? **(extended only)**

A 1.16 g **B** 2.42 g **C** 2.78 g **D** 3.31 g