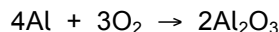




- 1 Calculate the mass of aluminium oxide that would be formed when 2.70 g of aluminium reacts with 2.56 g of oxygen. Give your answer to the appropriate number of significant figures.



$$\text{mol Al} = \frac{2.70}{27.0} = 0.100$$

$$\text{mol O}_2 = \frac{2.56}{32.0} = 0.0800$$

0.100 mol of Al reacts with 0.0750 mol of O₂ to form 0.0500 mol of Al₂O₃

$$\text{mass Al}_2\text{O}_3 = 0.0500 \times 102.0 = 5.10 \text{ g (3sf)} \quad (4)$$

- 2 Calculate the pressure exerted by 8.00 g of oxygen gas in a container of volume 205 cm³ at 37°C. Give your answer to the appropriate number of significant figures.

$$\text{mol O}_2 = \frac{8.00}{32.0} = 0.250$$

$$P = \frac{nRT}{V} = \frac{0.250 \times 8.31 \times 310}{205 \times 10^{-6}} = 3.14 \times 10^6 \text{ Pa (3sf)} \quad (4)$$

- 3 Write an ionic equation, including state symbols, for each of the following reactions.

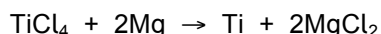
- a reaction of aqueous potassium carbonate solution with nitric acid



- b precipitation of lead(II) iodide when aqueous lead(II) nitrate is mixed with aqueous potassium iodide



- 4 Calculate the atom economy when titanium is extracted from titanium chloride.



$$\text{atom economy} = 100 \times \frac{47.9}{47.9 + 2(95.3)} = 20.1\% \quad (2)$$