

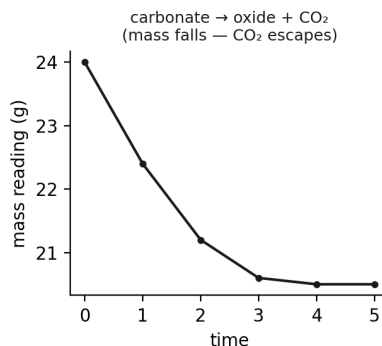
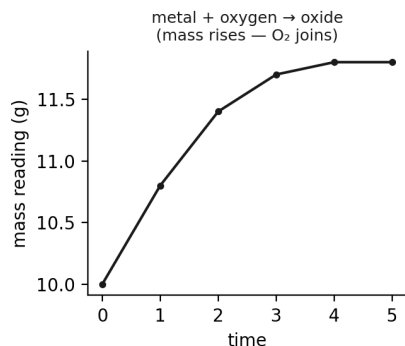
Exercise walk-through

3.5

Volumes of gases – chemistry only, HT (4.3.5)

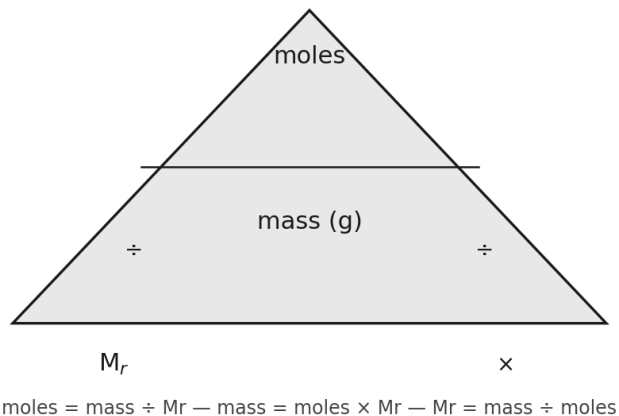
AQA · GCSE · Chemistry

Conservation of mass and Mr



- Conservation of mass and equations.
- Mass of products equals mass of reactants.
- Mr sums the atomic masses; percentage by mass follows.
- Gases explain any apparent mass change.

The mole



- Moles and reacting masses.
- One mole in grams = M_r ;
Avogadro constant 6.02×10^{23} .
- moles = mass divided by M_r .
- Ratio chain — mass to moles,
ratio, moles to mass.

Exercises 2.1·2.3

2.1 What does 1 cm³ of any two gases at the same temperature and pressure contain

2.2 $2 \text{ N}_2 + 3 \text{ H}_2 \rightarrow 2 \text{ NH}_3$ – 30 cm³ of nitrogen needs what volume of hydrogen? [1]

2.3 What volume of HCl gas forms from 25 cm³ of H₂ reacting with excess Cl₂? [1]

3 Exam-style questions

Exercises 2.1·2.3

2.1 What does 1 cm³ of any two gases at the same temperature and pressure contain

2.1 The same number of moles.

2.2 $2 \text{ N}_2 + 3 \text{ H}_2 \rightarrow 2 \text{ NH}_3$ – 30 cm³ of nitrogen needs what volume of hydrogen? [1]

2.2 45 cm³.

2.3 What volume of HCl gas forms from 25 cm³ of H₂ reacting with excess Cl₂? [1]

3 Exam-style questions

2.3 50 cm³.

Exercises 3.1·3.3

3.1 (*HT*) 50 cm³ of propane reacts with oxygen: $\text{C}_3\text{H}_8 + 5 \text{O}_2 \rightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O}$.

3.2 (*HT*) 100 cm³ of hydrogen reacts with 50 cm³ of oxygen. Determine which gas is in

3.3 (*HT*) Air is about 20 % oxygen. What volume of air supplies the oxygen for complete combustion of 200 cm³ of butane, $2 \text{C}_4\text{H}_{10} + 13 \text{O}_2 \rightarrow 8 \text{CO}_2 + 10 \text{H}_2\text{O}$? [4]

Exercises 3.1·3.3

3.1 (*HT*) 50 cm³ of propane reacts with oxygen: $\text{C}_3\text{H}_8 + 5 \text{O}_2 \rightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O}$.

3.1 $\text{O}_2 = 5 \times 50 = 250 \text{ cm}^3$; $\text{CO}_2 = 3 \times 50 = 150 \text{ cm}^3$.

3.2 (*HT*) 100 cm³ of hydrogen reacts with 50 cm³ of oxygen. Determine which gas is in

3.2 Ratio $\text{H}_2 : \text{O}_2 = 2 : 1$; 100 cm³ H_2 needs 50 cm³ O_2 exactly; neither is in excess /

3.3 (*HT*) Air is about 20 % oxygen. What volume of air supplies the oxygen for complete combustion of 200 cm³ of butane, $2 \text{C}_4\text{H}_{10} + 13 \text{O}_2 \rightarrow 8 \text{CO}_2 + 10 \text{H}_2\text{O}$? [4]

3.3 Oxygen needed = $13/2 \times 200 = 1300 \text{ cm}^3$; air is 20 % oxygen; air volume = $1300 \div 0.20 = 6500 \text{ cm}^3$.