

Worksheet 1.1: The Mole Concept & Mass Calculations ChemistrySheets

Specification: GCSE Chemistry (AQA 5.3.1.2 / Edexcel SC14 / OCR Gateway C4.1)

Core Formula:

$$\text{Moles (mol)} = \frac{\text{Mass (g)}}{M_r}$$

Rearranged Forms:

$$\text{Mass (g)} = \text{Moles (mol)} \times M_r$$

$$M_r = \frac{\text{Mass (g)}}{\text{Moles (mol)}}$$

Units:

Moles: mol (mole)

Mass: g (gram)

M_r (Relative formula mass): No units

Relative Atomic Masses (A_r) for calculations:

H=1, C=12, N=14, O=16, Na=23, Mg=24, S=32, Cl=35.5, K=39, Ca=40, Fe=56, Cu=63.5, Zn=65, Br=80, Ag=108, I=127, Ba=137.

Section A: Understanding the Formula & Conversions

1. Complete the table below for the variables in the mole formula.

Variable	Unit Name	Unit Symbol
Moles	_____	_____
Mass	_____	_____
Relative formula mass (M_r)	_____	_____

2. Rearrange the core formula to make Mass and M_r the subject.

a) Mass (g) = _____

b) M_r = _____

3. Perform the following conversions or calculations.

a) Convert 250 mg to grams (g): _____

b) Convert 0.075 kg to grams (g): _____

c) Calculate the M_r of H_2O : _____

d) Calculate the M_r of $\text{Mg}(\text{OH})_2$: _____

e) Calculate the M_r of $\text{Ca}(\text{NO}_3)_2$: _____

Section B: Practice Calculations

1. Calculate the number of moles in 10 g of calcium carbonate (CaCO_3).

2. How many moles are present in 24.5 g of sulfuric acid (H_2SO_4)?

3. What is the mass of 0.05 mol of sodium hydroxide (NaOH)?

4. A sample of an unknown compound has a mass of 15.6 g and contains 0.12 mol. Calculate its relative formula mass (M_r).

Section C: Challenge Context

1. Copper reacts with oxygen to form copper oxide.

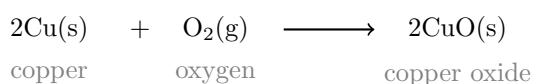


Figure 1: Simplified representation of copper reacting with oxygen.

If 12.7 g of copper (Cu) reacts completely, calculate the number of moles of copper involved in the reaction.

2. A student performs a titration to neutralise 25.0 cm³ of 0.10 mol/dm³ sodium hydroxide (NaOH) solution with hydrochloric acid (HCl).

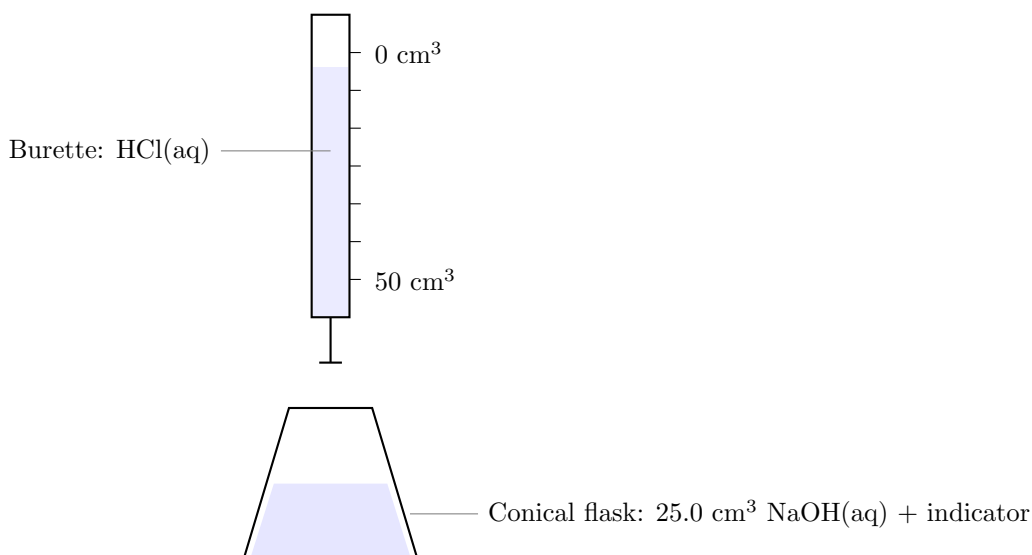


Figure 2: Simplified titration setup.

Calculate the mass of sodium hydroxide (NaOH) present in the 25.0 cm³ sample.
