

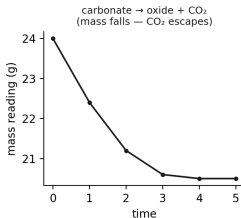
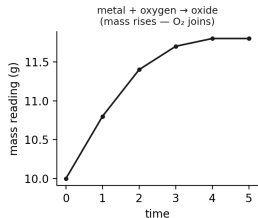
Topic 3: Quantitative chemistry

AQA GCSE Chemistry 8462 · spec 4.3 · sheets 3.1–3.5

Chemistry that counts

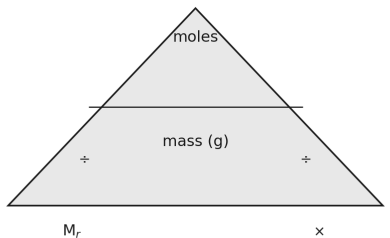
- No atoms lost or made — the balanced equation is a ledger.
- The mole converts grams into particle counts.
- Yield, atom economy and concentration finish the toolkit.

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



$$\text{moles} = \text{mass} \div M_r \quad \text{—} \quad \text{mass} = \text{moles} \times M_r \quad \text{—} \quad M_r = \text{mass} \div \text{moles}$$

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

Limiting reactants and concentration

- The fully-used reactant limits the product.
- Concentration in g per dm³ for everyone; mol per dm³ higher tier.
- $\text{moles} = \text{concentration} \times \text{volume in dm}^3$.

Yield and atom economy

- Yield below 100 percent — reversible, lost in separation, side reactions.
- Percent yield = $\text{actual over theoretical} \times 100$.
- Atom economy = $\text{Mr of desired product over total Mr} \times 100$.

Titration logic

- Moles of acid and alkali stand in the equation ratio.
- Calculate the known side, scale by the ratio, divide by the volume.
- Take a mean titre, discarding anomalies.

Gas volumes

- Equal gas volumes hold equal moles — same temperature and pressure.
- Volume ratios copy the equation's balancing numbers.
- Example — 2 volumes H_2 with 1 volume O_2 .

Check yourself

- Checklist before you call this topic done.
- Balance, Mr, percentage mass; the mole triangle and ratio chain.
- Yield reasons, atom economy, titration means, gas ratios.