STUDY FORMULA BOOKLET

AQA GCSE Chemistry 8462 periodic table and equations

AQA gives only the periodic table in the 8462 exam. Every calculation, from moles to atom economy, is yours to recall, and Higher Tier only ones are marked.

IN THE BOOKLET printed in the official booklet LEARN IT not printed: students must recall it

Based on the official **The Periodic Table of Elements, Insert for GCSE Chemistry (8462), Combined Science: Trilogy (8464), and Combined Science: Synergy (8465) papers v1 (AQA)**, with what to learn and exam tips added by CuratedPrep.

Notes printed with the periodic table

The insert prints only the periodic table and two notes. No equations are printed, so every formula below is yours to recall.

Relative atomic mass of chlorine

Printed note: Cl is not rounded to the nearest whole number. Use 35.5 in calculations.

$$A_r(\mathrm{Cl}) = 35.5$$

IN THE BOOKLET

Relative atomic mass of copper

Printed note: Cu is not rounded to the nearest whole number. Use 63.5 in calculations.

$$A_r(\mathrm{Cu}) = 63.5$$

IN THE BOOKLET

The periodic table of elements

Copied as printed on the AQA insert: groups 1 to 7 and 0, relative atomic masses as printed, square brackets kept. Relative atomic masses of Cu and Cl are not rounded to the nearest whole number. La and Ac sit in group 3 with an asterisk, and the lanthanides (atomic numbers 58 to 71) and actinides (90 to 103) are omitted, as on the insert, so 90 elements are shown.

1	2											3	4	5	6	7	0
1 H hydrogen 1																	2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 63.5	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium [98]	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57 La lanthanum 139	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium [209]	85 At astatine [210]	86 Rn radon [222]
87 Fr francium [223]	88 Ra radium [226]	89 Ac actinium [227]	104 Rf rutherfordium [261]	105 Db dubnium [262]	106 Sg seaborgium [266]	107 Bh bohrium [264]	108 Hs hassium [277]	109 Mt meitnerium [268]	110 Ds darmstadtium [271]	111 Rg roentgenium [272]	112 Cn copernicium [285]	113 Nh nihonium [286]	114 Fl flerovium [289]	115 Mc moscovium [289]	116 Lv livermorium [293]	117 Ts tennessine [294]	118 Og oganesson [294]

Z Sym name A_r — atomic number · symbol · name · relative atomic mass

Relative atomic mass and relative formula mass

All tiers. Use the relative atomic masses printed in the periodic table.

Relative atomic mass from isotopes

Weighted mean using the percentage abundance of each isotope. With percentages the bottom line is 100. All tiers.

$$A_r = \frac{\sum(\text{isotope mass} \times \text{abundance})}{\sum \text{abundance}}$$

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Relative formula mass

Add the relative atomic masses of every atom shown in the formula, using the numbers in the formula. For (OH)2 multiply the bracket contents. All tiers.

$$M_r = \sum A_r$$

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Percentage by mass of an element in a compound

Atoms is the number of atoms of that element in one formula. All tiers.

$$\%\ \text{by mass} = \frac{\text{atoms} \times A_r}{M_r} \times 100$$

LEARN IT

Moles and reacting masses

Higher Tier only throughout this section.

Amount of substance (moles)

n in mol, m in g, Mr relative formula mass (grams per mole). Rearrange for mass: m = n x Mr. Higher tier only.

$$n = \frac{m}{M_r}$$

LEARN IT

Avogadro constant

One mole of any substance contains 6.02 × 10^{23} atoms, molecules or ions, so the number of particles N = n x 6.02 × 10^{23}. Higher tier only.

$$6.02 \times 10^{23}\ \text{per mole}$$

LEARN IT

Moles in a balanced equation

Read the balancing numbers as mole ratios, for example Mg + 2HCl gives 1 mol Mg to 2 mol HCl. Convert to moles, use the ratio, then convert back to mass. Higher tier only.

$$\frac{n_A}{\text{coefficient of A}} = \frac{n_B}{\text{coefficient of B}}$$

LEARN IT

Balancing numbers from masses

Convert each mass to moles, then divide all by the smallest to get a simple whole number ratio. Higher tier only.

$$\text{ratio} = \frac{m_1}{M_{r1}} : \frac{m_2}{M_{r2}} : \cdots$$

LEARN IT

Limiting reactant

Work out the moles of each reactant, compare them with the equation ratio, and use the limiting one to find the amount of product. Higher tier only.

$$\text{limiting reactant} = \text{the reactant that runs out first}$$

LEARN IT

Concentration of solutions

Concentration in g/dm3

Rearrange to find the mass of solute in a given volume. Convert cm3 to dm3 by dividing by 1000. All tiers; explaining how mass and volume relate to concentration is Higher tier only.

$$c\ (\text{g/dm}^3) = \frac{\text{mass of solute (g)}}{\text{volume of solution (dm}^3)}$$

LEARN IT

Concentration in mol/dm3

n moles of solute, V volume of solution in dm3. Rearrange for n = c x V. Chemistry only and Higher tier only.

$$c\ (\text{mol/dm}^3) = \frac{n}{V\ (\text{dm}^3)}$$

LEARN IT

Converting between concentration units

Multiply mol/dm3 by Mr to get g/dm3, divide g/dm3 by Mr to get mol/dm3. Chemistry only and Higher tier only.

$$c\ (\text{g/dm}^3) = c\ (\text{mol/dm}^3) \times M_r$$

LEARN IT

Titration calculation

Find the moles of the solution you know (n = c x V in dm3), use the equation ratio, then find the unknown concentration. Required practical 2. Chemistry only and Higher tier only.

$$\frac{c_A V_A}{\text{coefficient of A}} = \frac{c_B V_B}{\text{coefficient of B}}$$

LEARN IT

Volume unit conversion

Divide cm3 by 1000 to get dm3 before any concentration or gas calculation.

$$1\ \text{dm}^3 = 1000\ \text{cm}^3$$

LEARN IT

Yield and atom economy

Chemistry only (not in Combined Science).

Percentage yield

Give the answer to an appropriate number of significant figures. Calculating the theoretical mass from a balanced equation is Higher tier only.

$$\%\ \text{yield} = \frac{\text{mass of product actually made}}{\text{maximum theoretical mass of product}} \times 100$$

LEARN IT

Percentage atom economy

Use the balanced equation and include every coefficient. A high atom economy means less waste. Explaining why a pathway is chosen from atom economy, yield, rate and by-products is Higher tier only.

$$\text{atom economy} = \frac{M_r \text{ of desired product from equation}}{\text{sum of } M_r \text{ of all reactants from equation}} \times 100$$

LEARN IT

Gas volumes

Chemistry only and Higher Tier only.

Molar gas volume at room temperature and pressure

One mole of any gas occupies 24 dm3 at room temperature and pressure (20 °C and 1 atmosphere). Equivalent to 24 000 cm3 per mole. Higher tier only.

$$V = n \times 24\ \text{dm}^3$$

LEARN IT

Gas volume from mass

Find moles from the mass and Mr, then multiply by 24. Higher tier only.

$$V\ (\text{dm}^3) = \frac{m}{M_r} \times 24$$

LEARN IT

Gas volume ratio from an equation

Equal moles of gases occupy the same volume under the same conditions, so the equation coefficients give the volume ratio directly. Higher tier only.

$$\frac{V_A}{\text{coefficient of A}} = \frac{V_B}{\text{coefficient of B}}$$

LEARN IT

Energy changes and rates

Overall energy change from bond energies

Bond energies in kJ/mol are given in the question. A negative answer means exothermic (more energy released making bonds than taken in breaking them). Higher tier only.

$$\text{energy change} = \Sigma(\text{bonds broken}) - \Sigma(\text{bonds formed})$$

LEARN IT

Mean rate of reaction (product formed)

Quantity measured as mass in g or volume in cm3, so units g/s or cm3/s. Higher tier also uses moles and mol/s.

$$\text{mean rate} = \frac{\text{quantity of product formed}}{\text{time taken}}$$

LEARN IT

Mean rate of reaction (reactant used)

Same method using the reactant used up. Units g/s, cm3/s, or mol/s at Higher tier.

$$\text{mean rate} = \frac{\text{quantity of reactant used}}{\text{time taken}}$$

LEARN IT

Rate at one moment from a tangent

Draw a tangent to the curve at the chosen time and calculate its gradient. Higher tier only. All tiers draw tangents and use the slope.

$$\text{rate} = \text{gradient of tangent} = \frac{\Delta y}{\Delta x}$$

LEARN IT

Chromatography and uncertainty

Rf value
Measure from the origin line to the centre of the spot, and to the solvent front. No unit, between 0 and 1.

$$R_f = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$$

LEARN IT

Mean of repeat results
Ignore anomalous results before averaging.

$$\text{mean} = \frac{\text{sum of results}}{\text{number of results}}$$

LEARN IT

Uncertainty from the range
The spec asks you to use the range of a set of measurements about the mean as the uncertainty. Range is largest minus smallest.

$$\text{uncertainty} = \pm\frac{\text{range}}{2}$$

LEARN IT

Learn these: not in the booklet

Moles from mass

$$n = \frac{m}{M_r}$$

The most used relationship in 8462 calculations. Higher Tier only, but the foundation for everything else in quantitative chemistry.

Avogadro constant

6.02×10^{23} per mole

Write it in standard form. Higher Tier only.

Molar gas volume

$24\ \text{dm}^3$ per mole

At room temperature and pressure, 20 °C and 1 atmosphere. Chemistry only and Higher Tier only.

Unit conversions

$1\ \text{dm}^3 = 1000\ \text{cm}^3$

Divide cm3 by 1000 for dm3. Remember 1 kg is 1000 g when masses are given in kilograms.

Percentage yield and atom economy

Yield is actual over theoretical times 100. Atom economy is Mr of the desired product over the total Mr of all reactants, times 100. Both are chemistry only.

Isotopes and relative atomic mass

Isotopes are atoms of the same element with the same protons but different neutrons. Relative atomic mass is the weighted mean mass of the isotopes.

pH and hydrogen ion concentration

As pH decreases by one unit, the hydrogen ion concentration increases by a factor of 10. Stronger acids have lower pH at the same concentration.

Using the booklet in the exam

- Take each Ar from the table as printed: every mass is a whole number except chlorine at 35.5 and copper at 63.5.
- Write the equation, convert units (cm3 to dm3, kg to g), substitute, then give the answer with its unit and sensible significant figures.
- For equation calculations, go mass to moles, use the balanced equation ratio, then moles to mass, volume or concentration.
- Show every stage: marks are awarded for the moles, the ratio and the final answer separately.
- Foundation students can skip the Higher Tier only rows, but percentage yield, atom economy, Rf, mean rate and mass concentration still appear.

Based on: AQA GCSE Chemistry 8462, The Periodic Table of Elements, insert for GCSE Chemistry (8462), Trilogy (8464) and Synergy (8465) papers (June 2022 version of the same insert); AQA GCSE Chemistry 8462 specification, Specification version 1.2, 16 January 2026 (section 4.3 quantitative chemistry, 4.5 energy changes, 4.6 rates, 4.8 chromatography); AQA GCSE Chemistry 8462 assessment resources, Inserts and papers. Statistical tables are calculated by CuratedPrep to the same layout. Updated 31 October 2026. Always practise with the version of the official booklet your exam uses. More free sheets and topic worksheets at curatedprep.com.