

Exam technique

How the exams work, technique for every type of question, and every command word

How the exams work

AQA GCSE Chemistry (8462) is examined by two written papers at the end of the course, each lasting 1 hour 45 minutes, worth 100 marks and counting for half of the GCSE; you sit the Higher tier of both, and there is no coursework. Both papers mix multiple-choice, structured, short-answer and open-response questions, a calculator is allowed, and a periodic table is provided as an insert, but there is no equation sheet. The required practicals are assessed through the written papers: at least 15% of the marks are questions on them, and at least 20% of the marks test maths skills.

Paper	Time	Marks	Calculator	What's on it
Paper 1	1 h 45 min	100	Allowed	Topics 1 to 5 (4.1 to 4.5): atomic structure and the periodic table; bonding, structure and the properties of matter; quantitative chemistry; chemical changes; energy changes. Required practicals: making a pure, dry soluble salt, titration, electrolysis of aqueous solutions, temperature changes.
Paper 2	1 h 45 min	100	Allowed	Topics 6 to 10 (4.6 to 4.10): the rate and extent of chemical change; organic chemistry; chemical analysis; chemistry of the atmosphere; using resources. Questions can also draw on the basic ideas of topics 1 to 3 (atoms, bonding and quantitative chemistry). Required practicals: rates of reaction, chromatography, identifying ions, water purification.

Exam technique

Preparing in the weeks before

- Revise all ten topics. Any subtopic in a paper's topics can be examined, there is no choice of questions, and Paper 2 can also use the basics of topics 1 to 3.
- Test yourself instead of rereading: close your notes, write or say what you remember, then check it and correct it.
- Learn every equation by heart, because chemistry has no equation sheet: moles, concentration (g/dm^3 and mol/dm^3), percentage yield, atom economy, R_f , mean rate, energy change from bond energies, and gas volume (24 dm^3 per mole at room temperature and pressure).
- Learn the chemical tests word for word: gases, flame colours, hydroxide precipitates, carbonates, halides and sulfates. They are quick marks, but only with the exact result.
- Know all eight required practicals: the method in order, the equipment, the variables, the hazards and how the results are processed.
- Practise writing formulas and balancing equations until it is automatic, including the ions SO_4^{2-} , NO_3^- , CO_3^{2-} , OH^- and NH_4^+ .
- Space your revision: come back to each topic several times over the weeks, and mix topics within a session, as the exam does.
- Sit full papers against the clock and mark them strictly. AQA publishes past papers and mark schemes (the most recent ones may only be available through your school); the mark schemes show the exact wording that earns each mark.

The night before and the morning of the exam

- Check which paper it is. Paper 1 is topics 1 to 5; Paper 2 is topics 6 to 10, plus the basics of atoms, bonding and moles.
- Pack black pens, a pencil, a rubber, a sharpener, a ruler (a 30 cm ruler makes tangents and lines of best fit easier) and the scientific calculator you have practised with, with a working battery.
- Do light review only: your equation list, the chemical tests and your required practical summaries. Don't start anything new.
- Get a proper night's sleep. You will recall more rested than after an extra hour of late cramming.
- In the morning, eat something, then write the equations out once from memory as a warm-up.
- Arrive early, and steer clear of anxious last-minute guessing about what will come up.

The first five minutes

- Read the front cover: black ink, pencil only for drawing, answer every question in the spaces provided, and show clearly how you work out calculations. The marks for each question are shown in brackets.
- Keep the periodic table insert beside your paper. It gives the atomic number and relative atomic mass of each element. Use the values exactly as printed: some, such as chlorine (35.5), are not whole numbers.
- Once you are allowed to write, jot any equations you tend to forget in a margin, so they are ready when you need them.
- Flick through: see how many questions there are, where the longer 6-mark answers are, and whether there are extra lined pages at the back.
- Then start Question 1 and work through. There is no choice of questions, so there is nothing to decide.

Timing

- Each paper is 105 minutes for 100 marks, so allow about 1 minute per mark.
- A 1-mark recall question should take well under a minute. A 6-mark extended answer deserves 6 to 8 minutes, including a short plan.
- Checkpoint: by about 50 minutes you should be roughly halfway through the marks. Aim to finish with 5 to 10 minutes to spare for checking.
- Difficulty is mixed. Many questions open with easier parts and build up, and the later questions still contain accessible parts, so never give up on a whole question because one part is hard.
- If one part has taken twice its marks in minutes, circle the question number, move on and come back at the end.
- Calculations often take longer than their marks suggest; recall and tick-box questions take less. Keep moving and the two balance out.

Reading the question

- Underline the command word and do exactly that: 'describe' is not 'explain', and 'compare' needs both things in each point.
- Circle any restriction: 'in terms of electrons', 'in terms of particles', 'use the data', 'give one', 'to 3 significant figures', 'in standard form'. An answer that ignores it cannot get full marks.
- Use the marks as a guide: a 3-mark 'explain' usually needs three separate, linked points.
- Re-read the introduction to each question. Information in the stem, a table or a figure is often needed several parts later.
- Check exactly which substance and which conditions: electrolysis of molten sodium chloride gives sodium and chlorine, but sodium chloride solution gives hydrogen and chlorine.
- Unfamiliar contexts test familiar chemistry. If a question describes a compound or reaction you haven't met, find the idea it is testing (a group trend, a type of bonding, a type of reaction) and use the information given.

Multiple-choice and short-answer questions

- 'Tick one box' means one tick. Two ticks score zero, even if one of them is right.
- To change an answer, cross out the wrong tick clearly so that only one tick remains.
- Work out the answer before you look at the options, then find it. If you are unsure, rule out the options you know are wrong. Never leave it blank: there is no penalty for a wrong answer.
- 'Give' and 'name' need a short, precise answer, not an explanation. Give only as many answers as asked: an extra wrong answer can cancel a right one.
- Be specific: 'carbon dioxide', not 'a gas'; 'delocalised electrons', not 'electrons'; 'a white precipitate', not 'it goes white'.
- In 'complete the table' or 'complete the sentence' questions, fill every gap. If the words come from a box, check whether each can be used once, more than once or not at all.

Calculations and method marks

- Write the equation you are using, substitute the numbers, then give the answer. Each stage can earn a mark.
- A correct final answer usually earns full marks on its own (not in 'show that' questions), but a wrong answer with no working earns nothing. Working turns a slip into one lost mark instead of all of them.
- If you get part (a) wrong, still use your answer in part (b). Mark schemes often allow an error carried forward, so the later marks are still there for you.
- Keep the full calculator value all the way through and round only the final answer.
- Moles calculations (Higher): set them out the same way every time. Moles of the known substance = $\text{mass} \div M_r$; use the ratio from the balanced equation; mass of the other substance = $\text{moles} \times M_r$.
- Concentration and titration calculations: divide cm^3 by 1000 to get dm^3 before using mol/dm^3 , and use the mean of the concordant titres only.
- Bond energy calculations (Higher): sketch the displayed formulae and count every bond, then energy change = energy needed to break the bonds in the reactants – energy released making the bonds in the products. A negative answer means exothermic.
- Sense-check every answer: percentage yield and atom economy cannot be above 100%, an R_f value lies between 0 and 1, and a reacting mass should be in proportion to the masses you started with.

Units, significant figures, standard form and your calculator

- Give a unit whenever the answer line doesn't print one. Know g/dm^3 , mol/dm^3 , cm^3/s , g/s , mol/s , kJ/mol , dm^3 and $^\circ\text{C}$. Some questions ask for the unit for a separate mark.
- Follow any instruction on significant figures or decimal places exactly. If there is none, give a sensible answer that matches the data, usually 2 or 3 significant figures.
- Standard form: $1 \text{ nm} = 1 \times 10^{-9} \text{ m}$, and an atom has a radius of about $1 \times 10^{-10} \text{ m}$. Check the power of ten makes sense for the size you are describing.
- Type standard form with the $\times 10^x$ (or EXP) key, not ' $\times 10 \wedge$ ', so the calculator treats it as one number.
- Put brackets round the bottom of a fraction, e.g. $2.4 \div (24 \times 0.05)$, and use the Ans key or memory instead of retyping rounded values.
- When rate is worked out from a time (e.g. the disappearing cross), rate is proportional to $1/\text{time}$: use the $1/x$ or x^{-1} key.
- Use the same calculator all year. Learning its buttons on exam day costs time and marks.

Equations: word, symbol, ionic and half equations

- Word equations: reactants → products, using full, correct names such as 'magnesium sulfate' and 'hydrogen'.
- Symbol equations: get every formula right first, using ion charges for ionic compounds (Al^{3+} and O^{2-} give Al_2O_3), then balance with numbers in front of formulas. Never change a subscript.
- Remember the elements that exist as diatomic molecules: H_2 , N_2 , O_2 , F_2 , Cl_2 , Br_2 and I_2 .
- Add state symbols (s), (l), (g) and (aq) when the question asks for them; (aq) means dissolved in water.
- Ionic equations (Higher): leave out the spectator ions and balance charge as well as atoms. Every acid–alkali neutralisation is $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$.
- Half equations (Higher): electrons are gained at the cathode ($\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$) and lost at the anode ($2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$). Oxidation is loss of electrons and reduction is gain (OIL RIG).
- Check every equation: count each element on both sides and, for ionic and half equations, check that the total charge is the same on both sides.

Explanations: the wording that earns marks

- Mark schemes credit specific, linked ideas. Name the particles (atoms, ions, molecules or electrons) instead of writing 'particles' or 'it'.
- Structure and properties: name the structure, the particles, the force or bond and how strong it is, then link to energy. For example: giant ionic lattice; strong electrostatic forces between oppositely charged ions; a lot of energy needed to overcome them; so a high melting point.
- Simple molecular substances melt and boil when the weak intermolecular forces between the molecules are overcome. The covalent bonds do not break, and saying they do loses the mark.
- Conductivity: metals and graphite have delocalised electrons that move through the structure and carry charge. Ionic compounds conduct only when molten or dissolved, because then the ions are free to move.
- Rate: write 'more frequent collisions' or 'more collisions per second', not just 'more collisions'. For temperature, add that more of the collisions have energy greater than or equal to the activation energy. A catalyst provides a different pathway with a lower activation energy.
- Group trends: link to the distance of the outer shell from the nucleus. Group 1 metals get more reactive down the group because the outer electron is further from the nucleus, so it is less strongly attracted and more easily lost; the halogens get less reactive down Group 7 because an electron is less easily gained.
- Equilibrium (Higher): say which way the position of equilibrium shifts and why, e.g. 'towards the side with fewer molecules of gas' or 'in the direction of the endothermic reaction'.
- Observations are what you would see or measure: fizzing, a colour change from one colour to another, a precipitate and its colour, a solid disappearing, a temperature rise. 'Hydrogen is made' is not an observation.

Graphs, tables and data

- Read the axis labels and units before you read any value, and draw construction lines on the graph to show where your reading came from.
- Describing a trend: state the pattern ('as the concentration increases, the time taken decreases'), quote values with units, and describe any change in the pattern, e.g. 'the volume of gas levels off at 60 cm³ because the magnesium has all reacted'.
- Plotting: small, neat crosses with a sharp pencil, accurate to half a small square. Choose a scale that uses at least half the grid and goes up in easy steps.
- Line of best fit: one smooth curve or one ruled straight line that follows the pattern and ignores anomalies. Never join the dots.
- Mean rate = change in quantity ÷ time taken. Rate at one moment (Higher): draw a tangent that touches the curve at that time, make a large triangle and work out the gradient = change in y ÷ change in x, with units such as cm³/s.
- Means from tables: spot and leave out anomalous results, then add up the rest and divide. Give the mean to the same precision as the readings.
- Uncertainty in a mean: ± half the range of the repeat readings.
- With data on unfamiliar substances, use the numbers: compare melting points and conductivities to decide on a structure, or continue a trend to predict a value.

Diagrams you draw

- Draw in pencil with clear, dark lines, and use a ruler for straight lines and label lines.
- Ionic dot and cross: show the outer shell of each ion after the transfer (now full), in square brackets with the charge outside, e.g. [Na]⁺ and [Cl]⁻ with 8 outer electrons. Use dots for one atom's electrons and crosses for the other's.
- Covalent dot and cross: shared pairs sit where the shells overlap, and non-bonding pairs must be shown (two pairs on the oxygen in water). Check every atom ends with a full outer shell, which is 2 for hydrogen.
- Displayed formulae: every atom and every bond. Carbon makes 4 bonds, oxygen 2 and hydrogen 1; an alkene has one C=C double bond.
- Addition polymers: the repeating unit in brackets, with bonds passing out through the brackets, a C–C single bond in the chain and n outside.
- Reaction profiles: axes labelled energy and progress of reaction; products lower than reactants for exothermic and higher for endothermic; an arrow from the reactants up to the peak for the activation energy, and an arrow from reactants to products for the overall energy change.
- Apparatus: simple 2D cross-sections, joined up so gas cannot escape where it is being collected, and labelled.
- Electronic structures: the first 20 elements fill shells as 2, 8, 8 and then 2, e.g. calcium is 2,8,8,2. The number of outer electrons equals the group number for Groups 1 to 7.

Six-mark extended answers

- Extended answers, usually worth 6 marks, are marked by levels, not by counting points: the examiner reads the whole answer, places it in a level (1 to 2, 3 to 4 or 5 to 6 marks), then decides the mark within that level.
- The top level needs a detailed, coherent answer in a logical order with the ideas linked. A list of disconnected facts stays in the lower levels.
- Plan for 30 to 60 seconds: jot five or six key points in the margin, number them in order, then write.
- Method questions ('describe how', 'plan'): numbered steps in order, naming the equipment and amounts, what you measure and how, and how you keep it fair and safe. Someone else should be able to follow it.
- Explain questions: build a chain from cause to effect with 'because', 'so' and 'which means'.
- Compare questions: make each point about both things in the same sentence, using 'whereas', 'both' or comparatives such as 'higher' and 'weaker'.
- Evaluate questions: use the information given for points on both sides, then finish with a clear judgement and the reason for it.
- Stay on the question. Irrelevant facts don't raise the level, and wrong chemistry makes the top level hard to reach.

Required practicals and working scientifically

- At least 15% of the marks are on the eight required practicals: the method, the results, the analysis or the evaluation. Some questions use the same techniques in an investigation you haven't done.
- Paper 1: a pure, dry soluble salt from an insoluble oxide or carbonate; titration of a strong acid with a strong alkali; electrolysis of aqueous solutions; temperature changes in reactions. Paper 2: rates of reaction (by gas volume, and by a colour change or cloudiness); paper chromatography and R_f values; identifying ions; analysing and purifying water samples.
- Know why each step is done: the insoluble base is added in excess so all the acid reacts, then filtered off; the chromatography start line is in pencil because ink would dissolve and run; a lid stops the solvent evaporating; a polystyrene cup with a lid reduces energy transfer to the surroundings.
- Variables: independent (what you change), dependent (what you measure) and control (what you keep the same). Name them precisely: 'the concentration of the hydrochloric acid', not 'the acid'.
- Use the terms correctly: accurate (close to the true value), precise (little spread around the mean), repeatable, reproducible, resolution, random error, systematic error, zero error and anomalous result.
- Make improvements specific: 'collect the gas in a gas syringe', 'measure the volume with a burette', 'put a lid on the cup', 'repeat and calculate a mean', 'use a pH meter instead of universal indicator'.
- Hazards: give the hazard and the precaution together, e.g. 'the acid is an irritant, so wear eye protection' or 'hydrogen is flammable, so keep flames away'.

Getting unstuck, checking, extra space and crossing out

- Stuck? Write down what you do know that is relevant: the equation, the key term, a labelled diagram. Partial answers often score.
- In a calculation you can't finish, write the equation and substitute what you can. Method marks don't need a final answer.
- Look for clues in the stem, earlier parts and figures: the value or idea you need is often already on the page.
- Circle anything unfinished and come back to it at the end. Never leave a blank: a sensible attempt can score and a blank never does.
- Check in this order: blanks first; then redo each calculation and check units and significant figures; then that equations balance; then that each 'tick one' question has exactly one tick; then re-read 6-mark answers for missing links.
- Out of space? Use any extra lined pages at the back of the booklet, write the question number clearly, and write 'continued at the back' in the original space.
- Cross through work you don't want marked with one neat line, and only once you've written the replacement. Never leave two different answers to the same question.

Learning from mocks

- Sit mocks in exam conditions: a full paper, timed, silent, with no notes. Only that shows what you can do in 105 minutes.
- Mark strictly against the mark scheme. If your wording doesn't match the marking point, don't give yourself the mark.
- Sort every lost mark by cause: didn't know it, misread the question, calculation or unit slip, not enough detail, or ran out of time. Each cause has a different fix.
- Turn 'didn't know it' into a list of subtopics to relearn, and redo those questions a week later without looking at the answers.
- Note where you were at 50 minutes, and adjust your pace in the next mock.
- Read the mark scheme for every question you dropped marks on: it shows the exact key words examiners look for.
- On this site, Mock exams give you full timed papers shaped like the real ones, and Progress lists your scores by subtopic, weakest first, with the questions you dropped marks on ready to redo.

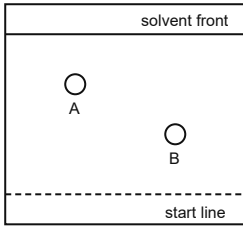
Command words

Word	What it means	How to answer	Example
Balance	Put numbers in front of formulas so there are the same number of atoms of each element on both sides of an equation.	Count each element on both sides and change only the numbers in front, never the subscripts. For ionic and half equations, balance the charges too.	Balance the equation: $\text{C}_3\text{H}_8 + __\text{O}_2 \rightarrow __\text{CO}_2 + __\text{H}_2\text{O}$ (5, 3, 4)

Word	What it means	How to answer	Example						
Calculate	Work out a numerical answer from the information given.	Write the equation, substitute the values, show each step and finish with the answer, its unit and sensible significant figures.	Calculate the relative formula mass (M_r) of calcium hydroxide, $\text{Ca}(\text{OH})_2$. $(40 + 2 \times (16 + 1) = 74)$						
Choose	Pick the right answer from the options given.	Choose only as many as asked, and write or tick the option exactly as it appears.	Choose the gas that relights a glowing splint: carbon dioxide, hydrogen, nitrogen, oxygen. (oxygen)						
Compare	Give the similarities and/or differences between two or more things.	Make each point about both things, using words such as 'whereas', 'both', 'higher' or 'more'. Two separate descriptions do not count as a comparison.	Compare the structure and bonding in diamond and graphite. (Both are giant covalent structures of carbon, whereas each carbon forms four bonds in diamond but three in graphite, which leaves delocalised electrons...)						
Complete, Label	Complete: fill in the gaps in a sentence, table, equation or diagram. Label: add the correct names to parts of a diagram.	Write in the spaces provided. Use words from a box if one is given. Make label lines touch the part you mean.	Complete the table to show the numbers of protons, neutrons and electrons in an atom of potassium-39 (atomic number 19). <table><tr><th>Protons</th><th>Neutrons</th><th>Electrons</th></tr><tr><td></td><td></td><td></td></tr></table> (19, 20, 19)	Protons	Neutrons	Electrons			
Protons	Neutrons	Electrons							
Define	Give the exact meaning of a scientific term.	Learn the definitions word for word and write one or two precise sentences. No example is needed unless it is asked for.	Define the term isotopes. (Atoms of the same element with the same number of protons but different numbers of neutrons.)						

Word	What it means	How to answer	Example												
Describe	Set out the facts, features, steps or observations, without giving reasons.	Say what happens or what you would see, in a logical order. Don't explain why unless the question also asks you to.	Describe what you would see when a small piece of potassium is added to water. (Floats, moves around, fizzes, melts into a ball, burns with a lilac flame, disappears.)												
Design, Plan	Design: set out how something will be done. Plan: write a method for an investigation.	Numbered steps in order, naming the equipment and amounts, the variables to change, measure and control, how to repeat, and how to work safely.	Plan an investigation into how the concentration of hydrochloric acid affects the rate of its reaction with magnesium ribbon.												
Determine	Use the data or information given to find an answer, often from a graph or table.	Show where your values came from (construction lines on a graph) and set out any working.	Use the results in the table to determine the time taken to collect 40 cm ³ of hydrogen. <table><tr><th>Time in s</th><th>0</th><th>10</th><th>20</th><th>30</th><th>40</th></tr><tr><td>Volume of hydrogen in cm³</td><td>0</td><td>16</td><td>30</td><td>40</td><td>46</td></tr></table> (30 s)	Time in s	0	10	20	30	40	Volume of hydrogen in cm ³	0	16	30	40	46
Time in s	0	10	20	30	40										
Volume of hydrogen in cm ³	0	16	30	40	46										
Draw, Sketch	Draw: produce or add to a diagram accurately. Sketch: a rough drawing that shows the correct shape and key features, not exact values.	Use a sharp pencil. For a drawing, show every detail asked for (bonds, electrons, charges, labels). For a sketch, get the shape and position right and label it.	Draw a dot and cross diagram for a molecule of ammonia, NH ₃ , showing the outer shell electrons only. / A graph shows the volume of gas against time for a reaction. Sketch the curve you would expect if the reaction were repeated at a higher temperature. (Steeper at the start, levelling off sooner at the same final volume.)												
Estimate	Give an approximate value.	Use rounded numbers or read from a graph or a trend, show how you got it, and check the value is a sensible size.	Use the boiling points in the table to estimate the boiling point of pentane, the alkane with 5 carbon atoms. <table><tr><th>Alkane</th><th>Carbon atoms</th><th>Boiling point in °C</th></tr><tr><td>propane</td><td>3</td><td>−42</td></tr><tr><td>butane</td><td>4</td><td>−1</td></tr><tr><td>hexane</td><td>6</td><td>69</td></tr></table>	Alkane	Carbon atoms	Boiling point in °C	propane	3	−42	butane	4	−1	hexane	6	69
Alkane	Carbon atoms	Boiling point in °C													
propane	3	−42													
butane	4	−1													
hexane	6	69													

Word	What it means	How to answer	Example															
			(About 34 °C, roughly midway between butane and hexane; the real value is 36 °C.)															
Evaluate	Use the information given, and your knowledge, to weigh up strengths and weaknesses and reach a judgement.	Give points on both sides, using the data provided, then finish with a clear conclusion that follows from your points.	Evaluate the use of paper bags instead of plastic bags. Use the life cycle assessment information in the table. <table><tr><th></th><th>Paper bag</th><th>Plastic bag</th></tr><tr><td>Raw material</td><td>wood (renewable)</td><td>crude oil (non-renewable)</td></tr><tr><td>Energy used to make one bag</td><td>higher</td><td>lower</td></tr><tr><td>Times it can usually be reused</td><td>few</td><td>many</td></tr><tr><td>Disposal</td><td>biodegrades; can be recycled</td><td>does not biodegrade; can be recycled</td></tr></table>		Paper bag	Plastic bag	Raw material	wood (renewable)	crude oil (non-renewable)	Energy used to make one bag	higher	lower	Times it can usually be reused	few	many	Disposal	biodegrades; can be recycled	does not biodegrade; can be recycled
	Paper bag	Plastic bag																
Raw material	wood (renewable)	crude oil (non-renewable)																
Energy used to make one bag	higher	lower																
Times it can usually be reused	few	many																
Disposal	biodegrades; can be recycled	does not biodegrade; can be recycled																
Explain	Give reasons for something, or say how or why it happens, linking cause and effect.	Use 'because' and 'so' to link each step, include the key chemical terms, and give one clear idea for each mark.	Explain why magnesium oxide has a high melting point. (Giant ionic lattice; strong electrostatic forces between oppositely charged ions; a lot of energy is needed to overcome them.)															
Give, Name, Write	Only a short answer is needed: a word, a phrase, a formula or a number. No explanation.	Be brief and precise, and give only as many answers as the question asks for.	Name the gas produced at the cathode when sodium chloride solution is electrolysed. (hydrogen)															
Identify	Name or pick out something, often from data, a diagram or a list.	Give the specific name, formula, letter or value. No reason is needed unless it is asked for.	A solution gives a green precipitate with sodium hydroxide solution. Identify the metal ion in the solution. (iron(II), Fe ²⁺)															

Word	What it means	How to answer	Example										
Justify	Support an answer or decision with evidence from the information given.	State your answer, then quote the data or facts that back it up and say how they support it.	Which fuel in the table releases the most energy per gram? Justify your answer. <table><tr><th>Fuel</th><th>A</th><th>B</th><th>C</th></tr><tr><td>Energy released in kJ/g</td><td>30</td><td>46</td><td>55</td></tr></table> (C, because it releases 55 kJ/g, more than A (30 kJ/g) or B (46 kJ/g).)	Fuel	A	B	C	Energy released in kJ/g	30	46	55		
Fuel	A	B	C										
Energy released in kJ/g	30	46	55										
Measure	Find a value for a quantity, usually with a ruler on a diagram.	Measure carefully to the nearest millimetre, from the right starting point, and give the unit.	Measure the distance that spot B has moved from the start line on this chromatogram.  (Put the ruler's zero on the start line and measure to the centre of spot B, to the nearest millimetre, giving the unit.)										
Plot	Mark data points on a graph grid.	Small, neat crosses in sharp pencil, each accurate to half a small square. Draw a line of best fit only if the question asks for one.	Plot these results on a graph grid. <table><tr><th>Time in s</th><th>0</th><th>20</th><th>40</th><th>60</th></tr><tr><td>Volume of gas in cm³</td><td>0</td><td>18</td><td>30</td><td>36</td></tr></table> (Four small, neat crosses, each within half a small square of the correct position.)	Time in s	0	20	40	60	Volume of gas in cm ³	0	18	30	36
Time in s	0	20	40	60									
Volume of gas in cm ³	0	18	30	36									
Predict	Say what is likely to happen, using a pattern, trend or data.	Give a clear outcome (a value, a state, a direction or an observation), based on the trend. Add a reason only if one is asked for.	Predict the state of astatine at room temperature. (solid)										
Show	Give the working or reasoning that leads to a result you have been told.	Set out every step clearly. The final line must reach the given value; if it is rounded, show your unrounded answer too.	Show that the M_r of sodium carbonate, Na_2CO_3 , is 106. ($2 \times 23 + 12 + 3 \times 16 = 106$)										
Suggest	Apply your chemistry to an	Give a sensible answer based on	Suggest why a zinc coating still protects iron from rusting when the coating is scratched. (Zinc is more reactive than										

Word	What it means	How to answer	Example																
	unfamiliar situation, where more than one answer may be acceptable.	a chemical principle you know, with a reason if marks allow. Always write something.	iron, so it reacts instead of the iron.)																
Use	Base your answer on the information given; without using it you cannot get the marks. Sometimes you are also asked to use your own knowledge.	Take the data or facts from the question and show clearly how you used them.	Use the table to suggest which alloy is best for making aircraft bodies. Give reasons for your answer. <table border="1"> <thead> <tr> <th>Alloy</th><th>Density in g/cm³</th><th>Strength</th><th>Resistance to corrosion</th></tr> </thead> <tbody> <tr> <td>P</td><td>2.8</td><td>high</td><td>good</td></tr> <tr> <td>Q</td><td>7.9</td><td>very high</td><td>poor</td></tr> <tr> <td>R</td><td>8.5</td><td>medium</td><td>good</td></tr> </tbody> </table> (P, because it has the lowest density, so the aircraft is lighter, it is strong and it resists corrosion.)	Alloy	Density in g/cm ³	Strength	Resistance to corrosion	P	2.8	high	good	Q	7.9	very high	poor	R	8.5	medium	good
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