EXAMINER TIPS for AS and A Level Chemistry 9701

How to Use These Tips

These tips highlight some common mistakes made by students. They are collected under various subheadings to help you when you revise a particular topic.

General Advice

- Read the question carefully. Yes, we know you've been told this before, but it is still a common issue. Misreading a question costs you marks if you could have answered the question that was there.
- Don't concentrate your revising on "difficult" material if it means you leave out the "easier" material. There will be many easier marks on each paper, so make sure you score them all. For example, learn all the definitions you have been taught, such as first ionisation energy and standard electrode potential.
- There will be harder questions on the paper. Some of these could involve elements or compounds you may not have studied. Don't give up on these questions! If you know your chemistry you will be able to score all the marks by *applying* what you know to these substances.
- Write clearly. If your answer to a question is "alkene" the person marking your papers must be able to be certain that you have written "alkene": if it looks at all like "alkane" you will not get the mark.
- Write numbers clearly. If your answer to a question is "0.46 moles" make sure the numbers are clear: if it looks like you might have written "0.96 moles" or "0.40 moles" you will not get the mark.
- If you have to make a correction, cross out what you have written and write down your new answer clearly in an available space. Don't try to write over the top of your previous answer, or fit the new answer into the space between lines of writing. Make sure you identify your new answer clearly, e.g. "continuation of Q4 (b)".
- On papers that give scope for longer answers, look at how many marks are available for each part of the question. For example, if part (a) has one mark and part (b) has two marks, then a single statement might be sufficient for part (a) but it won't be for part (b).
- Look out in part (b) for the possibility of writing a statement and an explanation.

General Tips

- You are going to take several chemistry exam papers lasting a total of many hours. These papers will cover the whole syllabus very thoroughly. If you don't know something, find it out and learn it.
- Method marks contribute a lot to your total on many papers. Write out each step of your method! This is very important when you find you are unable to work all the way through a longer question to the final answer. Don't give up on it, or leave blanks. You may be able to score the majority of the marks. Examples of this situation include:
  - At the end of a four-mark calculation on gas volume you get an answer you know is wrong, e.g. you work out that 45,000 dm3 of gas are released from a test tube reaction! If you write out your method in full you may still score three marks if you have only made one mistake. Even if you only score one mark it might be important.
  - You are answering a five-mark organic question in which you have to use information from the question to deduce the full structural formula of a compound.
- You find you cannot produce a structure that fits all the information. Answer the question anyway, stating in full what your deductions are from each separate piece of information in the question. Many answers like this can still score four or five marks, even without the final structure.
- Don't cross out an answer, or part of an answer, simply because you are unsatisfied with it. If you are changing an answer or part of an answer, only cross out your first answer if it contradicts your new answer, e.g. in a question about "sodium chloride dissolving in water" you might have started by saying that "sodium chloride is a covalent compound". If you then want to change this to "sodium chloride is an ionic compound", you must cross out your first answer because these two answers contradict each other. However, if you begin your answer by saying that "sodium chloride dissolves in water to give a solution of pH 7", and then you decide this is not relevant, don't cross it out. It may score you marks.
- Round off calculations to the correct number of significant figures at the *end* of the calculation. Do not round off after each step of the calculation. If you do this, rounding errors can add together so that your final answer is not close enough to the correct answer.
- Be prepared to guess intelligently. For example, a question says that "when silver nitrate solution is added to an unknown solution a yellow precipitate forms". If you know that this means that either bromide or iodide ions are present, but you can't remember which, you have nothing to lose if you guess. If you leave the answer blank, you get no mark. If you guess wrongly, you get no mark. If you guess correctly, you score a mark.
- If a question asks you about an inorganic compound you are not familiar with, look at your periodic table. You may be able to answer the question by applying your knowledge of other elements in the same group. If, for example, you get a question about the shape or acid/base behaviour of phosphine (PH3), think of what you know about ammonia (NH3).
- If a question asks you about an organic compound you are not familiar with, look at the functional groups in the compound. You may be able to answer the question by applying your knowledge of how these functional groups behave. If, for example, you get a question about an organic compound with an aldehyde (-CHO) group, think of what you know about ethanal (CH3CHO).

Paper 1 Tips: Multiple Choice

- Answer every question.
- If you are not sure about an answer, make a note of the question number on the front of your question paper. Go back to this question first if you have time at the end of the exam.
- Questions 1-30 have four answers. If you cannot spot the correct answer with certainty, mark each answer with a tick, a question mark, or a cross. Use this to decide which of the four answers is the best answer.
- Some questions will state a fact, and then ask for an explanation of the fact. Beware of answers that are true but do not answer the question, e.g. a question says, "explain why MgO has a higher melting point than NaCl" and one of the possible answers states, "MgO has a giant ionic structure". This is true, but it does not answer the question as NaCl also has a giant ionic structure.
- Questions 31-40 have three statements. To answer these questions you have to decide whether each statement is true or not. When you have decided whether or not the first statement is true, put a tick or cross by it. Do the same for the second and third statements. This way you don't have to remember your earlier decisions while looking at later statements.
- If a question involves a calculation write out your method. This will save you time if you have to check your answer.

Paper 2 Tips: Theory 1

- Use the space on the paper as a rough guide to the length of answer necessary. If there are five lines to write in, a one-line answer is unlikely to be enough.
- You must learn definitions exactly, e.g. definitions of energy changes. Don't be satisfied with learning a definition until you are word perfect – you will lose marks otherwise.
- If an state symbols are asked for in an equation, put them in. Read the question, and then answer it!
- Look out for questions that ask for an observation or statement *and* an explanation, and make sure you include the explanation. Look at the mark allocation to help you to decide how much detail is required in the explanation. There will probably be only one mark for the observation or statement.
- If a question asks for an explanation of a particular type you must answer what has been asked. An example of this is a question that asks you to explain how the electronic configurations of the elements in a group affect the reactivity of the elements. If your answer concentrates on some other factor, for example the structure and bonding of the elements, it is unlikely to score marks.
- If you are calculating a ΔH^o value in a thermo chemistry question, don't forget that the ΔH^ovalues you are given to work it out are *per mole* of substance. For example, if you are using ΔH^o_f values to calculate the ΔH^o of the decomposition $2NaHCO_3 \rightarrow Na_2CO_3 + CO_2 + H_2O$ make sure you double the ΔH^o_f of $NaHCO_3$.
- Organic chemistry questions often ask for the isomers of a given compound to be drawn. Beware of writing answers that are simply redrawings of the same structure! You may find it easier here if you draw skeletal formulae as well as displayed formulae. It is often easier to spot two identical structures if they are drawn as skeletal formulae.
- Give answers that are as specific and as precise as you are able. For example, in an organic chemistry question worth two marks you have to name the functional groups in the compound $H_2C{=}CHCH_2CHO$. If you answer "The compound has a double bond and a carbonyl group"

you will score no marks. Many compounds have double bonds, but if it is a C=C double bond then the specific name for the functional group is “alkene”. Many compounds have carbonyl groups, but if the carbonyl group is directly bonded to a hydrogen atom then the specific name for the functional group is “aldehyde”. If you answer

- “The compound has an alkene functional group and an aldehyde functional group” you will score two marks.
- Many questions will ask you to state the observations that will be made during an experiment. Make sure you use the accepted terms to describe colour changes that will be seen. Use examiners’ reports and textbooks (e.g. *AS Level and A Level Chemistry* by
- Ratcliff et al) to find out what these accepted terms are, e.g. the colour change when acidified potassium dichromate solution is reduced should be described as “from orange to green”. The colours of silver chloride, silver bromide and silver iodide should be described as white, cream and yellow respectively.

Papers 3, 5, and 9 Tips: Practical Test

- As with all exams it is essential that you read practical exam papers very carefully. You must follow the instructions on the paper so that you do the *correct* experiments and record the *correct* observations. If the question tells you to record results or observations in a certain place you must record them in that place.
- Make sure you are well practised in handling all of the equations relating to titrations. Being able to convert between cm3 and dm3 is an essential part of this.
- Make sure you are well practised in the graphical techniques that have been necessary to answer questions on past papers. Get a set of results for each question of this sort and repeat the graphical exercises until your teacher agrees you have them right.
- Don’t forget to record titration results in a suitable format, giving initial and final burette readings, and recording volumes to 0.05cm3, not 0.1cm3 or 0.01cm3.
- You need to get two titration results that are within 0.01cm3 of each other. You don’t need more accurate results than this unless the question specifically says so.
- Make sure you are well practised in the correct vocabulary for recording observations, e.g. precipitate, slight, dense, soluble, insoluble, excess, gelatinous, and effervescence.
- If you are asked to record observations do so in as much detail as possible. If a solution is colourless, or a precipitate is white, say so. Don’t just describe it as a “solution” or a “precipitate”.
- If you have to add one solution to another, looking for observations, add it slowly. You need to notice the difference between an instant or sudden change and a gradual change.
- If a change is instant or sudden, say so. If a change is gradual, say so. If the change goes through intermediate stages, describe each of these stages.
- If a planning exercise asks you to produce a plan with the *minimum* number of steps – do as it says! Adding extra detail and including irrelevant extra steps will lose marks.
- Many planning exercises require you to produce a logical sequence of steps – the order of the steps will be important. To avoid too many corrections and alterations you may find it helpful to try to get the order of steps worked out very briefly in rough before writing your plan on your answer paper.

Paper 4 Tips

- As with Paper 2 there will be definitions to learn for Paper 4. Make sure you know them exactly. Be strict with yourself when you are practising them.
- Some definitions will be essential in order to do calculations correctly. For example, you may have to do a calculation that involves Cl-Cl bonds. The data in the question says the bond energy for the Cl-Cl bond is +242 kJmol-1. Does this energy value refer to making bonds or breaking them? Does this energy term refer to one mole of Cl-Cl bonds or one mole of Cl atoms? If you don't know the definition of bond energy then you are unlikely to get the right answer to the question.
- If a question requires the use of data from the data booklet, write down the data you have selected. There will often be a mark for choosing the correct data from the booklet.
- This paper will ask you to write balanced chemical equations. Practise this skill.
- If a question gives details of a reaction and asks you to explain it there will probably be a mark for a balanced chemical equation. Write an equation, including state symbols. This gives you extra chances to pick up marks.
    - There may be a mark for naming a certain product; if you forget to name it but write it in an equation you will get the mark.
    - There may be a mark for saying a gas is given off; if you forget to state this but write it in an equation with (g) after it you will get the mark.
    - There may be a mark for saying a precipitate forms; if you forget to state this but write it in an equation with (s) after it you may get the mark. For example, a question asks you about the thermal decomposition of the carbonates of group 2 metals. If you write the equation $MgCO_3(s) \rightarrow MgO(s) + CO_2(g)$ you will pick up any marks available for saying that the products include a metal oxide, or for saying that the products include carbon dioxide gas.
- Be definite and specific. If a question asks you to describe the structure and bonding of a substance you need to use two words. One word describes the structure – giant or simple.
- One word describes the bonding – metallic, ionic, or covalent. Your answer must be two words, chosen from this list of five.
- The organic questions on this paper often prove to be difficult! However you can make them much easier for yourself by learning all of the reactions the specification says you need to know. If you learn these reactions and practise writing the balanced chemical equations, you will give yourself the best chance you can.
- You are very likely to have to show your knowledge of at least one organic reaction mechanism. Practise them and make sure you know which reactions go by which mechanism. Learn the equations! Have a checklist in your memory for writing mechanisms:
    - Definitions – electrophile and nucleophile
    - Which bonds have to be labelled with dipoles (δ+ and δ-)
    - Curly arrows

Applications questions
Questions based on these syllabus sections will often ask you to use your knowledge of core chemistry in an unfamiliar context. If the question is about a topic which you no little or nothing about, it is important not to panic.

The examiner has chosen a topic in which you can show how to apply your understanding of the fundamental principles of chemistry in an area that is unfamiliar to you.

The following is a strategy that you could use when tackling such questions.

- Read carefully through the stem of the question and try and work out the topic it is based on.
- Think back to what you studied in this topic.
- Look carefully at any information/data provided in the question
- Read each sub-question carefully and see how it links to what you know, and any of the data provided.
- Remember these questions more often test your ability to apply what you know, not to recall specific points covered in lessons.

It is important to remember that any data provided is there for a reason. You will need to use it in answering some part of the question.

About the Examiner – David Acaster

David was born in 1965 and educated at Aylesbury Grammar School and Cambridge University. He worked for three years at a rural school in Kenya and has taught in comprehensive schools in Northamptonshire, England since 1982. He is now an Advanced Skills Teacher, teaching chemistry and physics to A Level. He has been an A Level chemistry examiner for Cambridge International Examiners for many years and has written several GCSE and A Level chemistry texts, all published by Cambridge University Press.

David counts himself very fortunate to live in a quiet Northamptonshire village with his wife Di and their three children, James, Ruth and Stephen.