Minimise Study Time
Maximise Scores

VCE Exam Advice – Unit 3 & 4 Chemistry

Before the Exam

Examination preparation is a two-step process.

Step 1: Ongoing examination preparation

A thorough knowledge of the course work is required before you attempt practice examinations. This involves understanding core concepts and the memorisation of some areas of the course. This part of your exam preparation should be an ongoing process throughout the year. Making the mistake of doing this in the weeks prior to your examination severely limits the time you have to practice examination style questions.

- Chapter summaries are a good way to start revising. This includes reviewing textbook questions to keep the various topics current in your mind. The more questions you complete in this subject the faster you will be in an examination and the better your result.

- You must be able to correctly define terms/concepts as specified in the Study Design. Learn these and practice them when writing practical reports or undertaking revision.

- Rote learn the necessary sections of the course e.g. solubility rules; nomenclature rules (IUPAC naming), catalysts and conditions needed for organic chemistry reactions.

- Familiarise yourself with the information provided in the Data Booklet which is incorporated into each VCAA Chemistry examination paper. If you do come across something in the examination that seems incomplete or requires additional information – you will most likely find what is missing in the Data Booklet.

  NOTE: The data booklet was revised this year. Make sure that you've got the most recent version.

- Always use the calculator that you're going to use in the exam during class time and when you're revising.

- You can practice on the appropriate sections of practice examinations throughout the year but make sure you leave at least two VCAA papers to complete during the week before the exam.

Step 2: Practice examinations

While completing questions from textbooks can help you consolidate core concepts, they are rarely complex enough to prepare you thoroughly for the types of questions you'll receive in the exam. Therefore, it's essential that you devote a substantial amount of time to practicing multiple choice and short answer questions from past examination papers.

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This will highlight your strengths and weaknesses and allow you to gain an understanding of how quickly you need to work in order to finish the examination in the allotted time. It will also be a good indicator of the depth to which you need to understand the course.

As you complete each practice paper, annotate your notes with any extra content or additional detail that can be obtained from the solutions. In some short answer questions there are key words or phrases that the examiners look for, so be sure to take careful note of this.

Aim to work through 3 exam papers each week starting at least 5 weeks before the Chemistry exam. Most of the last week before the exam should be spent working through exam questions, so you should be able to complete 3 to 5 papers

You will pick up new concepts and exam traps as you work through practice exams. Use this new information to improve the depth and accuracy of your revision notes.

You should work through at least 15 examination papers in each subject across the year if you're aiming for the higher scores.

Many students struggle to complete the examination within the allocated time so excellent exam technique is critical in this subject. Strategies to maximise examination scores are being addressed in our **"VCE Exam Revision Lectures"** that are being held during the Term 3 school holidays & throughout October.

You should read through the previous Assessment Reports that have been written by the Chief Assessors so that you can secure the best possible examination scores. These reports include valuable information regarding how to set out answers, key phrases and words that are expected in short answer responses as well as common errors made by students.

IMPORTANT NOTE:

There were significant changes to the study design at the end of 2016. While some sections of the course are the same as in the previous study designs, there are some completely new topics as well as some concepts that are no longer required. This means that parts of the exam papers prior to 2017 are no longer relevant.

Topics from past study designs that are no longer required include:

- Kinetic molecular theory
- Heterogeneous equilibrium
- Acid base equilibrium, Ka (acidity constants)
- Back titrations
- Aspirin
- Production of medicines
- DNA
- Paper, Thin layer and Gas chromatography
- Specific details of the industrial production of ammonia, ethene, sulfuric acid or nitric acid
- Ionisation constant of water
- Gas calculations at STP
- Flame tests
- Fractional distillation and cracking of alkanes
- Adding enthalpy equations
- Structure and operation of an Mass Spectrometer, NMR spectrometer, IR spectrometer
- Renewable energy sources such as wind power, hydroelectricity, solar power etc.
- Nuclear fusion and fission
- The Periodic table

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- Development of Atomic Theory and the Periodic Table
- Specific details regarding the electrolytic production of chemicals using the Hall-Heroult, Down's Cell & Diaphragm Cell
- Food additives
- Carbon and Nitrogen cycles
- Transition Metals, complex ions
- Production of elements in the sun
- Radioactive decay

Topics that have been moved to the Year 11 course and are very unlikely to be examined at VCE level:

- pH calculations
- Atomic Absorption Spectroscopy (AAS), UV-Visible Spectroscopy, Flame tests

Additional Advice

The most recent VCAA exams will give you the best indication of what to expect in your examination. You should sit two of the following exam papers in the week before the Chemistry exam: 2019, 2018, 2017.

There are two exam papers that relate to the current study design that have been produced for international VCE students in the northern hemisphere. These exam papers can be found at the following url:

https://www.vcaa.vic.edu.au/assessment/vce-assessment/past-examinations/NHT-past-exams/Pages/NHT-past-exams.aspx

There is also a sample exam that was produced by VCAA when the new study design was implemented in 2017. This additional exam paper can be found at:

https://www.vcaa.vic.edu.au/Documents/exams/chemistry/chemistry-samp-w.pdf

Other sources of credible and realistic exam papers that have been written for the current study design include:

- STAV exam papers (2017 – 2019)
- NEAP exam papers (2017 – 2019)
- TSFX exam papers (2017 – 2019)

Those students who plan to attend the **"VCE Exam Revision Lectures"** will further benefit from exposure to hundreds of additional **potential examination questions**, most of which are **unique questions** designed to expose students to the **finer details** of the Chemistry course, as well as the **possible tricks, traps** and **extended applications** that students could be presented in the examinations.

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General Comments Regarding the Unit 3 & 4 Chemistry Examinations:

Table 1: Examination Score Ranges

Year	A+	A	B+	B	C+	C	Difficulty
Ideal Paper	90%	80%%	70%%	60%%	50%	40%	Ideal
2019	74%	66%	58%	49%	39%	31%	Very Hard
2018	80.8%	73.3%	65.4%	56.3%	45.4%	35.8%	Hard
2017	79.2%	72.1%	65%	57.1%	46.7%	36.7%	Hard
2016	82.5%	74.6%	66.7%	57.5%	47.1%	38.3%	Hard
2015	87.5%	79.6%	70.8%	60.4%	48.8%	38.3%	Ideal
2014	83.3%	75.6	65.4	55.4%	44.6%	35.4%	Slightly Harder
2013	85%	78.3%	70.8%	61.3%	48.8%	39.6%	Ideal
2012*	90%	83.3%	76%	67.3%	56.7%	47.3%	Ideal
2011*	85.4%	79.2%	72.9%	65.3%	54.9%	45.1%	Slightly Harder
2010*	89.3%	82%	74.7%	66	% 56%	46%	Ideal - Easy
2009*	78%	69%	60%	51%	41.8%	32.2%	Hard

***Indicates years in which there were two exam papers.**

The 2019 examination was the hardest Chemistry exam paper we've had in the past decade. (A+ marks were given to students with a lower marks indicating that, overall, students found the paper to be difficult). The 2020 paper should be easier. Statistics for the 2019 results can be found at:

https://www.vcaa.vic.edu.au/Documents/statistics/2019/section3/vce_chemistry_ga19.pdf

Problem Areas in the 2017 – 2019 Examinations

The examiner's report for the 2017 – 2019 examinations can be found at:

https://www.vcaa.vic.edu.au/Documents/exams/chemistry/2019/chemistry_examrep19.pdf

https://www.vcaa.vic.edu.au/Documents/exams/chemistry/2018/chemistryexamrep18.pdf

https://www.vcaa.vic.edu.au/Documents/exams/chemistry/2017/chemistry_examrep17.pdf

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The main areas students had difficulty with in the 2019 exam includes:

- Application of accuracy, precision validity, reliability and uncertainty.
- The relationship between chiral centres and stereoisomers.
- The difference between stereoisomers and structural isomers.
- Naming and representation of organic structures.
- Use of oxidation numbers.
- Interpretation of Maxwell-Boltzmann distribution curves.
- Drawing conclusions from experiments.
- Dealing with dilution factors.
- Using correct units and expressing answers to the correct number of significant figures.

Other areas of the 2019 paper that were poorly addressed include:

- The relationship between flashpoints and structure and bonding.
- Carbon NMR
- Effects of errors in volumetric analyses
- The products of the oxidation of primary and secondary alcohols.
- Sketching concentration time graphs (equilibrium).
- Describing the structure of omega-3 fatty acids.
- Recharging secondary batteries.
- Fuel cells
- Drawing the structure of a molecule from its IR and NMR spectra.
- Biodiesel vs petrodiesel.
- The relationship between intermolecular attractions and viscosity/flow.

Common Problem Areas & Things to Watch Out For

General Problem Areas

- **Not writing succinct and accurate explanations.**
    - Students frequently don't provide enough information to answer the question. For example, stating "ethanol is more polar than ethane and will dissolve in water" rather than "ethanol is capable of H-bonding with water due to its –OH group whereas ethane cannot. Therefore, ethanol will dissolve in water".
- **Not interpreting questions correctly. Examples include:**
    - Answering WHY questions as HOW questions.
    - When asked to name a compound, rather than stating the common name, the systematic name or structural formula is provided.
    - Not showing ALL bonds when asked to. This includes the O – H bond as well.
    - Expressing answers as semi-structural formulae when the question asks molecular formulae.

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- **Inability to apply given information or knowledge to new/different contexts and applications.**

  Basic application and identification of facts is usually addressed well, but many students miss out on marks as they couldn't process an unusual or different question and identify which concepts in Chemistry need to be applied in order to answer the question correctly. To maximise your chance of solving such questions, it's important to gain exposure to as many different questions and applications as possible – and that means working through at least 15 exam papers in each subject.

  Students should keep in mind that well-learned responses are sometimes inaccurate in the context given. Dealing with such applications does require exposure to specific questions and materials (rather than standard questions from text books), and our teachers involved in our **Exam Revision** lectures have spent considerable time compiling unique and targeted questions so as to give students the greatest possible edge in their final exams.

- **Not picking up clues from the question. Examples include:**

  - If told a substance doesn't react with a base then its structure can't be that of an acid.
  - If told that a substance is polyunsaturated, this will affect the way the molecule will react.

- **Insufficient depth of knowledge and attention to detail. For example, not knowing that:**

  - complex compounds with C=C can be involved in addition reactions like simple molecules such as ethene.
  - you can't combust species when they're in the aqueous state.
  - IR radiation does not **initiate** molecular vibration – it causes an **increase** in it.
  - a system in equilibrium is in a state of maximum stability.
  - when a battery goes flat and registers a zero voltage, it is in a state of equilibrium.
  - the area under the Maxwell Boltzman curve is the same at every temperature.

- **Not understanding information when presented in an unusual or new context.**

- **Restating the question rather than answering it.**

Chemical Structures

Common Problems:

- Students often have difficulties describing organic structures and don't provide answers that are specific enough.

  For example: "The molecule has a double bond" is too general.
  Instead, write: "The molecule has a double bond between two carbon atoms".

- Using chemical language and notation incorrectly or inaccurately.

  - Leaving charges off ions.
  - Confusing OH^- with –OH or using one in place of the other.
  - Identifying reactions as hydrolysis instead of hydration.

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Advice:

- Make sure you know the differences between the following types of structures:
    - Empirical formulae
    - Molecular formulae
    - Structural formulae
    - Semi-structural formulae
    - Skeletal equations
- Orientate ester links correctly.
- Develop confidence in drawing and interpreting skeletal structures.
- If you aren't great at drawing molecules using the correct bond angles, then draw structures with bonds at right angles.
- Always look at the given pH when writing reactions (you may need to change the charge distributions on the molecules to reflect acidic or alkaline conditions).

Mole and Stoichiometry

Common Problems:

- Using incorrect states eg. species can't be in an aqueous state in combustion equations.
- Incorrectly balancing equations (particularly oxygen in combustion reactions and electrons in redox equations).
- Identifying and applying mole ratios accurately.
- Identifying appropriate assumptions made in experimental calculations.
- Difficulty using density in calculations.
- Manipulating unusual units or ratios.
- Incorrect use of units and difficulty converting one unit to another.
- Converting concentration units.
  Identifying the correct data to use in calculations.
- Applying dilutions.
- Stating answers to the incorrect number of significant figures.
- Processing calculations when a reaction is not 100% efficient.
- Rounding values at every step.
- Using rounded values in subsequent calculations.

Advice:

- Chemical equations and stoichiometric calculations are an integral part of chemistry. These areas are always going to be examined so make sure that you're proficient in them.
- It is essential that calculations are done accurately and that values are not rounded until the last step. Round answers too frequently and too early in the calculation, will lead to answers that are too inaccurate to be awarded a mark.

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- Never use your rounded values in subsequent calculations. Use the unrounded values.
- Most students seem comfortable with expressing the result of a multiplication or division to the same number of significant figures as the measurement with the fewest significant figures. Many, however, are less familiar with the rule for addition or subtraction of data where the result should have the same number of decimal places as the measurement with the fewest decimal places.
- Concentration units have been poorly handled by students for **many** years. Make sure that you practice these types of questions until you're comfortable with them. There is usually at least one concentration unit conversion in the examination.
- Be able to explain how errors or incorrect techniques will affect the value you are calculating.

Bonding

Common Problems:

- Not being able to clearly identify the types of intermolecular bonding present between molecules.
- Difficulties in drawing accurate diagrams depicting intermolecular bonding. For example, between an organic molecule and water.
- Not understanding how intermolecular bonding affects properties such as melting point, boiling point, volatility and solubility etc.
- Confusion between the difference between intermolecular and intramolecular bonding and which type of bonding is responsible for properties such as the melting/boiling point of a substance.
- Drawing ionic bonds or hydrogen bonds using solid lines. Solid lines can only be used for covalent bonds.
- Not being able to clearly identify and explain the bonding between different sections of proteins.

Advice:

- A strong understanding of intermolecular bonding is essential.
- Revise polarity and become proficient with the following bonds: hydrogen bonding, dispersion forces, dipole-dipole interactions.
- Make sure you can quickly identify the bonds that are formed between organic molecules as well as the interactions between organic molecules and water.
- Be able to explain how the interparticle bonding plays a major role in determining the order in which compounds are eluted in HPLC. Commit the order to memory.

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Fuels

Common Problems:

- Not being able to discuss the advantages, disadvantages, differences and similarities of biodiesl vs petrodiesel .
- Not being able to explain how the different structures of biodiesel and petrodiesel affect the interparticle forces and hence the properties of the fuel.
- Incorrectly writing balanced equations for fuel combustion reactions.
- Applying incorrect terminology eg. carbon neutral vs renewable.

Advice:

- The section on fuels requires quite a bit of rote learning. When reviewing this section, make sure that you have a sound understanding of the terminology involved. In the past, students have mixed up the terms 'renewable' and 'carbon neutral'.

  Do you know the definitions of:

  - Renewable?
  - Non-renewable?
  - Carbon neutral?
  - Biofuel?

- When writing combustion reactions, think carefully about the state of the water produced. Under standard conditions, water will be a liquid. Remember that the enthalpy change of a combustion reaction will be slightly different depending on whether the water is in a liquid or gaseous state.

- Learn combustion, fermentation and respiration reactions involving glucose.

- Know the advantages and disadvantages of biodiesl vs petrodiesel and how the structure of the molecules affects the interparticle forces and hence the fuel's properties

Electrochemical Cells

Common Problems:

- Writing half equations and overall equations for uncommon fuel cells.
- Not understanding the role of the electrodes in fuel cells.
- Application of Faraday's Laws.
- Solving questions where reactions are not 100% efficient or complete.
- Considering the cathode material in electrolytic cells as potential reactants.
- Solving questions involving multiple electrolytic cells connected in series.

Advice:

- Examiners commonly use unusual galvanic cells, electrolytic cells and fuel cells to test student ability to apply their knowledge in a new context. Practice as many of these problems as you can!
- Comparing the similarities and differences of different types of electrochemical cells is a common examination question.
- The Electrochemical Series is almost always written as reduction half equations. If necessary, to answer a redox question, put equations in order of **strongest oxidant** on the top left and **strongest reductant** on the bottom right. The predominant redox reaction occurs between the strongest oxidant and the strongest reductant, which in this case would be the highest species on the left and the lowest species on the right.
- Include all redox half equations that involve water when dealing with an aqueous solution.
- Be specific in your answers. Do not state "deviating from standard conditions" – state how we are deviating from standard conditions.
- Unless otherwise stated or implied, students **MUST** assume that the voltage being applied to an electrolytic cell is sufficient to cause the reaction between the strongest oxidant and strongest reductant to occur.
- Students are not expected to know structural details and components of specific galvanic cells, electrolytic cells or batteries, or the industrial applications of electrolytic cells. Rather, questions will focus on concepts such as:
    - Why does a battery become flat?
    - Can a particular cell be recharged? Why/why not?
    - What is the recharge reaction?
    - What voltage is required to recharge a particular cell?
    - Identify the polarity of the different electrode.
    - Label the direction of electron flow.
- When using the electrochemical series don't assume O_2 is present unless actually stated.
- When writing overall redox equations, remember to balance the number of electrons in the oxidation and reduction equations before adding the half equations together.
- Practice writing overall equations from two half equation and also be able to deduce the missing half equation from the overall equation and one of the half equations. This is often tested in questions about batteries or fuel cells.
- Know how to write redox reactions under alkaline conditions.
- Learn the acidic and alkaline hydrogen-oxygen fuel cells off by heart, including the half and overall reactions.
- At high temperatures, carbon is reactive, meaning that carbon anodes may need to be regularly replaced in electrochemical processes.

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Equilibrium

Common Problems:

- Drawing concentration-time graphs.
- Not being able to explain why reaction rates increase or decrease in terms of the number of effective or successful collisions per unit time.
- Not being able to answer questions concerning competing equilibria involving haemoglobin, oxygen and carbon monoxide.
- Not knowing how to draw or interpret rate-time graphs.

Advice:

- Practice writing concise and accurate answers on rates and equilibrium. There are often key phrases and words that the examiners are looking for in this section.
- Questions on rate – time graphs may appear in the examination. Most students are used to concentration – time graphs but less familiar with rate – time graphs. You should be familiar with both types of graphs.
- Students are generally competent at applying Le Chatelier's principle however, be careful not to confuse rate questions with equilibrium questions.
- Care needs to be taken with concentration-time graphs. These graphs should reflect the mole ratio of the reaction and concentrations should clearly level off at the same time.

Organic Chemistry

Common Problems:

- Incorrect systematic naming of organic compounds.
- Not being able to identify isomers.
- Not being able to explain the properties of an organic species in terms of its interparticle bonding.
- Not learning the common reactions of organic compounds.

Advice:

- Amides, aldehydes and ketones are now part of the study design. Students are required to understand their structures.
- When stating systematic names of organic compounds, students must apply the IUPAC system and ignore what has been accepted in previous Assessment Reports. Students must also be aware of the order of priority of the principle functional groups, something that's not addressed in many VCE textbooks.
- The hydroxyl group is OH not OH^- (this is called the hydroxide ion e.g. as in $NaOH$).
- Reagents and reaction conditions need to be rote learnt for all reaction pathways.

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- A very strong understanding of intermolecular bonding is needed so that the physical properties of organic compounds can be compared and explained accurately. Questions involving bonding and its relationship with properties are usually poorly answered in the exams.

- Learn the formulae of the oxidising agents used in the production of aldehydes, ketones and carboxylic acids as well as their half equations.

$$MnO_{4\,(aq)}^{-} + 8H^{+}{}_{(aq)} + 5e^{-} \rightarrow Mn^{2+}{}_{(aq)} + 4H_2O_{(l)}$$
$$Cr_2O_{7\ (aq)}^{2-} + 14H^{+}{}_{(aq)} + 6e^{-} \rightarrow 2Cr^{3+}{}_{(aq)} + 7H_2O_{(l)}$$

- The reagents and conditions needed for organic reactions should be **thoroughly learnt**.

- Students should be aware that monomers for condensation polymerisation will have functional groups such as –OH, -COOH, -NH_2 and should practice identifying monomers from sections of polymers.

- Practice identifying isomers. Remember that molecules with more than 3 carbons in the chain can have isomers with alkyl side chains. Also, if you 're unsure of whether you have a new isomer or not, try to name it. If it has the same name as one of the other structures you have drawn, then the structure isn't an isomer.

- Students are required to have a thorough understanding of functional groups and linkages. It's important that terminology is used accurately (each year, there's confusion about the terms amide, amine and peptide link).

- Count all the carbon atoms in carboxylic acids when determining the root part of the name.

- When naming organic molecules, the groups mentioned in the prefix **MUST** be arranged in alphabetical order.

- Always relate properties back to bonding and state the bonding type.

Analysis of Organic Compounds

Common Problems:

- Converting concentration units is a common area of difficulty. Make sure you practice this!

- General stoichiometry (volumetric analysis).

Advice:

- Ensure that you are familiar with both normal and reverse phase chromatography.

- Examiners are good at finding new titration errors for you to analyse. Make sure you practice predicting the effect that different errors have on the result of a volumetric analysis. Remember that the effect of the error may change depending on whether the unknown solution is in the burette or in the flask under the burette.

- Students should understand the effects that the radiation used in spectroscopy has on the molecules being investigated (e.g. is it electrons or covalent bonds that are absorbing energy?). You should also know what the results of each type of spectroscopy look like and what they tell you about the sample.

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- Learning the solubility rules is a **MUST**.
- Accurate use and interpretation of calibration curves is needed in this section. Remember, the calibration curve is only accurate within the data points collected. You should not extrapolate at high concentrations as the relationship between absorbance and concentration may not be linear. Examiners are also looking for a high degree of accuracy when reading off a calibration curve, so take care!
- Remember to be accurate and specific when discussing spectral data. Think carefully about the conditions under which data was obtained in order to comment about the validity of the results. Generally, results of two experiments can only be compared if experimental conditions are identical.
- Practice is needed in order to analyse a spectrum accurately. Look for peaks that confirm the presence of functional groups as well as peaks which exclude particular function groups. Also remember to be flexible with your thinking since "perfect spectrums" are not common. Sometimes peaks may be in slightly different positions to what is expected or there may be anomalies (small peaks) which can't be explained but could easily be misinterpreted. Don't forget that you may need to discuss the symmetry in the molecule to accurately discuss the number of peaks in a NMR spectrum.

Food Chemistry

Common Problems:

- Not knowing which bonds are disrupted by denaturing agents. For example, heating disrupts H bonding.
- Understanding the bonding involved in the primary, secondary and tertiary structures of proteins.
- Mixing up ether and ester linkages.
- Mixing up the amino and amide groups.
- Not being able to draw a condensation or hydrolysis reaction using lipids, proteins, carbohydrates and their base units.

Advice:

- Know how to represent the reactions involving proline, as well as drawing the cationic, anionic and zwitterion forms.
- Learn proteins and particularly protein structure and enzymes well. These questions crop up very frequently.
- If you see "ase" think enzyme.
- If you see "ose" think carbohydrate.
- Regarding lipids: Saturation has nothing to do with the $C=O$ bond. Therefore, only look at the bonding between carbon atoms to determine whether a lipid or fatty acid is saturated or not.
- If a carbohydrate is soluble in aqueous solutions, it is because the molecule has exposed OH groups that can form hydrogen bonds with water.
- Fatty acids and glycerol are not monomers as we do not join large numbers of these units to form a long chain or polymer. Production of triglycerides is therefore referred to as condensation, not condensation polymerisation.
- If a protein contains non α amino acids, the protein is not a natural protein.
- The ether linkage can be referred to as the glycosidic bond.

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- If asked to explain why the activity of a protein or enzyme has decreased or disappeared, do not say that the protein/enzyme has been denatured. Denaturation in isolation will not be accepted. Students are required to state that there has been a change in activity to changes in the active site/3 dimensional structure.

- Lock and key in isolation will not be accepted unless this is directly linked to the terms "substrate" and "enzyme".

Evaluating Experimental Data and Methods

In recent years there has been a focus on questions which involve the analysis of experimental data and procedures. It is vitally important that students can explain the implications of experimental procedures and can discuss errors/limitations of practical work in detail.

For example, can you explain:

- Why certain apparatus is weighed?
- Which reactant is in excess and why was it chosen to be in excess?
- When complete drying is necessary and when it is not?
- How can impurities be removed?
- The effect of impurities on the final result?
- Why a titre should not be too large or too small?
- Are the results reliable enough to confirm the hypothesis?
- What are the strengths and weaknesses of the experimental method?
- How could the experiment be improved?
- What steps should have been performed but weren't?
- Were there variables that should have been controlled but weren't?
- Was this the best technique/instrument to use for the given sample?
- The systematic and random errors in the experiment and how their negative effects can be minimised?

During the Examination

- If a theory question is worth two marks then be sure that you have clearly made two distinct points, particularly if it's asking for an explanation.

- **Never ever** move onto a new question in any subject without reading the question that you have just completed. Many students miss out on valuable marks as they didn't provide the required answer.

- If you do come across a question that looks similar to what has appeared in previous exams, proceed with caution. Read the question very carefully as it's quite likely that the requirements or answers being sought are different from what was asked in previous years.

- Use the reading time to analyse the questions in Section B and begin the complex thought processes required to answer these questions adequately.

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- Use the marks and the space provided for the answers as a guide to the amount of information required in a response. Generally, a 2 mark question requires 2 points of information to be given.
- Don't spend too long on a question, particularly if it's only worth 1 mark.
- Formulate an answer that clearly covers all parts of the question and uses the key terminology associated with that topic.
- Read the Assessment Reports to gain a good understanding of which key terms must be mentioned in order to obtain full marks.
- You are more likely to be awarded full marks for a question when answers are clearly expressed and the information included is organised logically and addresses the question directly.
- Read each question thoroughly before putting pen to paper. It may help to underline key words in the question such as best option, glossary words, required data etc.
- Non-standard abbreviations should be avoided as they may be open to misinterpretation.
- Use legible handwriting and correct spelling. If an assessor can't read an answer, the response can't be awarded marks.
- Read the multi-choice questions carefully and answer the question before looking at the options available. Remember that two of the options are generally distracters and are based on common mistakes and/or misconceptions – so tread carefully.
- Remember to be consistent. In a calculation involving more than one stage you will be awarded consequential marks if you correctly use a wrong value from an earlier part.
- Show working in your calculations. Again, you may still be awarded marks even if your final answer is wrong.
- Include units for all numerical answers. Look carefully at units in calculations. In the majority of responses, you will need to convert to SI units before using data in a formula.
- When working through calculation based problems, ensure that final answers for each section are given to the correct number of significant figures. Use standard form if required.
- All equations must be balanced and all states of reactants/products shown.
- Ionic equations don't include spectator ions. Solid ionic substances must not be split into their component ions.
- Know what the question is asking for before attempting to answer it. For example, the amount of substance **does not** mean mass.
- **One Mark Questions.** Even though they are worth one mark, one-word answers are often unlikely to be awarded marks.
- **Name Questions.** If asked to name something, it is important that you do so. It is not necessary to elaborate and if incorrect information is given in your elaboration, the mark won't be awarded.

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- **Using data.** These questions expect you to explain how the data is used to arrive at a conclusion. More successful answers specifically mention numbers from the data.
- **What is the difference?** These questions require you to state a specific feature of the first term mentioned and then a statement on how it is different from the second term. For example, how is a titre different to an aliquot?
- **Supply the right formulae:** A question may ask you to supply your answer using a specific type of formula. Make sure you know the difference between all types of formulae including empirical, molecular, structural and semi-structural.

Additional Advice

Significant Figures:

- Do not count/consider the number of significant figures in data that has been given but hasn't been used.
- The number of significant figures in molar masses must be considered.
- Do not include counting numbers in significant figures e.g. 20 atoms.
- The number 1000 is counted as 4 significant figures in Chemistry – even though rightly, you could express 1000 as $1 \text{x} 10^3$ (which would only count as 1 significant figure)!!!!
- When adding numbers, do not count significant figures. You must state your answers to sums and differences to the same number of decimal places as that present in the information with the smallest number of decimal places. We **only** round answers to the smallest number of significant figures in data being multiplied or divided.
- Students must use their unrounded answers in subsequent parts of a question but remember to take the number of significant figures into account when stating subsequent answers. For example: If the answer to Part (a) is 4.1575 and the answer must be rounded to 3 sf to give 4.16, you must use the value 4.1575 when using this value in Part (b). If the remaining data in Part (b) is written to 5 sf, you will be required to state the answer to Part (b) to 3 sf, as this was the lowest level of significance in the data used to calculate the value 4.1575.

Structural Equations/Formulae:

- You do not need to provide states or show lone pairs or valence electrons in structural formulae and equations.
- Although the current Chief Assessor accepts structural formulae drawn with right angles, we do encourage students to draw molecules showing the appropriate 3-D shape i.e. tetrahedral or triangular etc.
- If asked to show "all bonds", do not forget to expand CH_3 and OH groups etc.
- Always consider the pH of the environment and include the charges that would be found under the given conditions.
- Only use continuous lines for covalent bonds. Use dashed lines for interparticle bonds (dispersion, H, dipole-dipole, ion-dipole etc).

More subject specific advice will be issued to students at our "VCE Exam Revision Lectures".

Good luck with your exam preparations!
TSFX