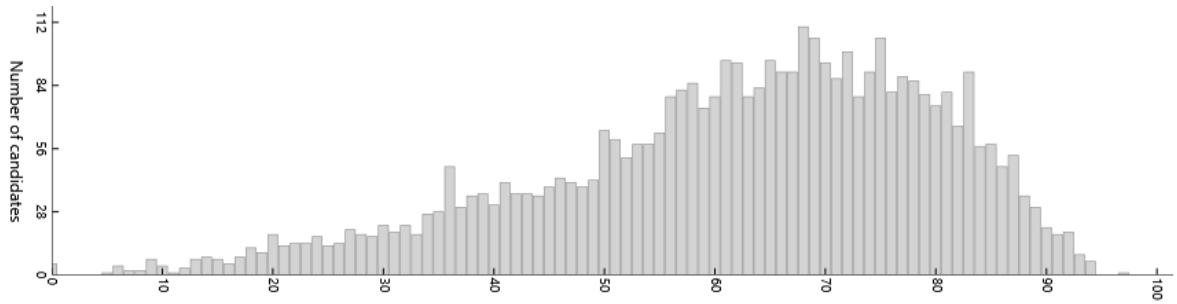
Government of **Western Australia**
School Curriculum and Standards Authority

Summary report of the 2022 ATAR course examination report: Chemistry

Year	Number who sat	Number of absentees
2022	4063	75
2021	4451	76
2020	4464	71
2019	4547	66

The number of candidates sitting and the number attempting each section of the examination can differ as a result of non-attempts across sections of the examination.

Examination score distribution–Written



Summary

The examination was a fair and valid assessment of the course and syllabus content, providing the opportunity to discriminate between candidate responses. The range of questions at various levels of difficulty allowed candidates to access questions at their level of ability.

Attempted by 4062 candidates	Mean 61.84%	Max 97.00%	Min 0.00%
Section means were:			
Section One: Multiple-choice	Mean 70.30%		
Attempted by 4062 candidates	Mean 17.57(/25)	Max 25.00	Min 0.00
Section Two: Short answer	Mean 59.92%		
Attempted by 4051 candidates	Mean 20.97(/35)	Max 35.00	Min 0.00
Section Three: Extended answer	Mean 58.23%		
Attempted by 4048 candidates	Mean 23.29(/40)	Max 38.67	Min 0.00

General comments

The mean score in Section One was comparable to 2021, whilst the mean scores in Sections Two and Three increased from 2021. Candidates answered questions in expected ways.

Advice for candidates

- Examine syllabus points closely, ensuring that you can state, define and explain chemistry terminology contained within them.
- Read questions carefully to determine what is required in your answer.
- Ensure that you use correct chemistry terminology and your answers are concise and appropriate.

- Include units in your calculations where appropriate, even if it is not explicitly requested in the question.
- Convert masses to grams, if required, in calculations and check that you are transferring numbers correctly from the question and through each part of the calculation.
- Use the spare pages to plan longer written responses.
- Know how organic homologous series react with other molecules and ensure you can draw full structures with all bonds attached between the correct elements in the structure.
- When asked to construct a graph, ensure that scales are appropriate and sensible, axes have a title and units (where appropriate), the graph has a title describing both variables, points are plotted in the correct location and that the line/curve of best fit is smooth, not simply from the first point to the last.
- When discussing reasoning for acidic/basic solutions due to salts, ensure you discuss hydroxide/hydronium ion balances in your reasoning.
- Ensure you focus on the chemistry that is occurring in situations such as dissolving, discussing intermolecular forces that are predominantly participating. Do not use statements such as 'like dissolves like'.
- State the words in an acronym in full the first time you use it in a response.
- Use ionic equations where appropriate in solution chemistry.
- Check balancing of equations including charges.
- Ensure you can give explicit properties of primary standard.
- Fully define and give appropriate examples for systematic and random errors.

Advice for teachers

- Ensure that all students know that all aspects of the syllabus are examinable, including the content for Science Inquiry Skills and Science as a Human Endeavour.
- Ensure that students practise answering similar contextual questions, that cannot be answered by rote learned responses.
- Encourage students to be specific in their responses and answer the question asked rather than writing everything they know about a context.
- Teach general concepts from first principles so that students can apply concepts to unfamiliar situations, not just write everything they know.
- Encourage students to present calculation answers in a neat and logical format.
- Teach students to be specific in their choice of nouns such as 'volume' and 'concentration'; do not use the word 'amount' in their place.
- Ensure that students know which atoms connect to which when drawing organic molecules. Make sure that students know when to draw full structures versus condensed structures.

Comments on specific sections and questions

Section One: Multiple-choice (25 Marks)

The Multiple-choice section was answered well, with a mean of 70.30%. Questions 5, 9, 19 and 21 were the most challenging, with mean scores under 50%. Question 5 required candidates to recognise that an acidic buffer is made from a weak acid and its conjugate; with many candidates choosing the distractor that included a strong acid. Question 9 required candidates to know titration techniques that may cause errors; candidates that did not answer correctly were spread across the incorrect distractors. Question 19 required candidates to choose the compound with the highest melting point; distractor (d) was the most popular response. Question 21 required candidates to state the number of isomers for a molecule with a particular formula; whilst (b) was correct, candidates often chose (c).

Section Two: Short answer (71 Marks)
The mean for this section was 59.92%, which was an increase from 2021. Candidates performed best in Question 26, predicting outcomes to changes in equilibrium, and Question 27, graphing and explaining a boiling point trend for amines. Question 28, explaining the difference between solutions formed by two salts, and Question 30, explaining why milk rather than water is more effective to remove the hotness of chillies from the tongue, were the most challenging questions for candidates in this section.

Section Three: Extended answer (90 Marks)
The mean for this section was 58.23%, which was an increase from the 2021 mean of 52.54% and comparable to candidate performance in Section Two. Question 34 (empirical formula) was answered well. Question 38 (titration calculation and technique) was found to be challenging by many candidates.