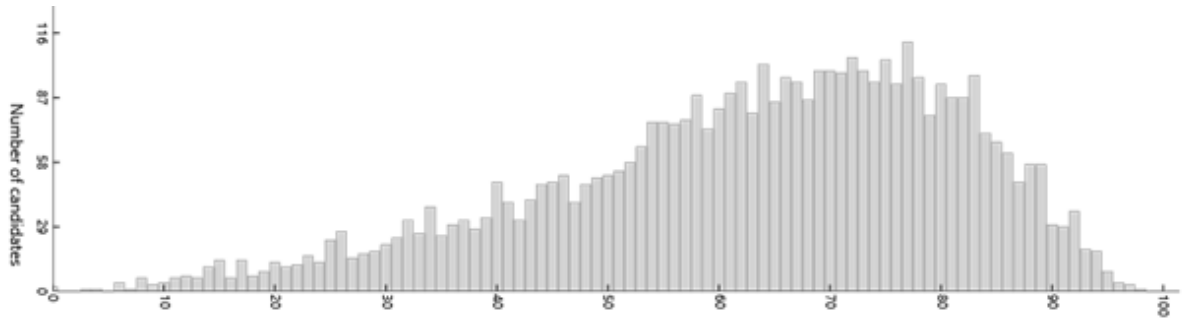
Government of **Western Australia**
School Curriculum and Standards Authority

Summary report of the 2020 ATAR course examination: Chemistry

Year	Number who sat	Number of absentees
2020	4464	71
2019	4547	66
2018	4965	50
2017	5007	54

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

This examination provided good coverage across the syllabus. There was a variety of questions, ranging from those needing a brief statement to those requiring a more detailed explanation. Many questions referred to real life applications of chemistry. Overall, the questions were accessible to candidates, with less reading required than in previous years.

Attempted by 4464 candidates	Mean 62.76%	Max 98.40%	Min 0.00%
Section means were:			
Section One: Multiple-choice	Mean 72.95%		
Attempted by 4462 candidates	Mean 18.24(/25)	Max 25.00	Min 0.00
Section Two: Short answer	Mean 58.48%		
Attempted by 4451 candidates	Mean 20.47(/35)	Max 34.54	Min 0.00
Section Three: Extended answer	Mean 60.14%		
Attempted by 4443 candidates	Mean 24.05(/40)	Max 39.32	Min 0.00

General comments

The increased means across all sections of the paper were a result of the accessible nature of the examination. Teacher and candidate feedback indicated that most were able to complete the examination in the three hours allocated.

Advice for candidates

- Respond to the specific question being asked. For example, if a question needs an explanation then a few words is not going to allow you to do this.
- Do not spend time writing answers that digress from the actual question.
- Textbooks are not the syllabus. Refer to the official syllabus documentation.

- Take care when writing the names of organic compounds. For example, the correct name is pentanamide, not pentamide (Question 26).
- Take care when identifying an amide functional group. It is not a ketone and an amine side-by-side.
- Ensure the lines representing the bonds in organic compounds are drawn carefully. For example, when attaching an alkyl group to a carbon chain, make sure the bond is drawn from the correct carbon atom on the chain to the carbon atom that attaches the alkyl group and not to another atom, such as hydrogen.
- When naming organic compounds, be careful to note that not all compounds with alkyl groups at angles are cis- or trans-.
- Make sure units are included when appropriate, even if there are no explicit statements saying to do so in the question. This includes units for voltage (volts, V) and mass.
- Writing 'like dissolves like' is not sufficient when explaining solubility. Instead, the various forces need to be identified and discussed.
- Avoid using abbreviations such as NVR or NR. Write answers in full e.g. 'no visible reaction' or 'no reaction', or whatever the question instructs.
- Become more familiar with the use of significant figures.
- When explaining the choice of indicator for a particular titration reaction, it is not enough to attribute it to acid/base strengths. The nature of the ions in the solution at the end of the titration need to be considered.
- Do not terminate the ends of polymers.
- Read questions carefully to determine whether collision theory or Le Châtelier's Principle is needed to answer a question. They are different things.
- Do not make a common error in thinking that ocean acidification means that the Earth's oceans are acidic. They are not. Ocean acidification means that the pH of the oceans is decreasing but it is still above 7, with this making it harder for shell formation. Seashells are not dissolving.

Advice for teachers

- All aspects of the syllabus are examinable including the contents of the Scientific Inquiry Skills and Science as a Human Endeavour sections.
- Keep up to date with IUPAC naming rules for organic compounds as changes to the rules can occur. For example, it is common practice to name 2, 3-dimethyl-but-2-ene as just dimethyl-but-2-ene but rule changes now require the '2, 3.'
- Encourage students to be specific in their answers and to avoid adding information just to 'fill up' the space allocated for an answer.
- Encourage students to practice drawing and naming organic structures, particularly when given just the molecular formula as the starting point. Remind students to look for situations involving isomers (structural and geometric).
- Give students the opportunity to practice calculations that don't have a well-practiced standard method for solving (i.e. a method that can be memorised). Encourage students to problem solve because not all calculations follow the same steps.
- Discourage the use of unofficial abbreviations in assessments. For example, NVR and NR are well known abbreviations but they are not official.
- Make sure students are fully aware of the information in the Data Booklet.
- Make students fully aware that Le Châtelier's Principle is a predictive tool and not linked to collision theory.
- Emphasise that ocean acidification does not mean that oceans are acidic/have a pH less than 7 and seashells are not dissolving. Rather, ocean acidification is a decrease in the pH of seawater with this interfering with seashell formation.

Comments on specific sections and questions

Section One: Multiple-choice (25 Marks)

The multiple-choice questions were relatively easy with 11 questions (Questions 3, 6, 8, 9, 14, 15, 16, 21, 22, 24 and 25) being correctly answered by over 80% of candidates. Candidates found questions 4, 13, 17 and 19 the most challenging. Question 4 required candidates to identify all isomers, with the provision of just the molecular formula of the organic compound making this question challenging. Question 13 required candidates to recognise that dispersion forces and hydrogen bonding are, respectively, greater when the hydrocarbon chain is longer and there is 'less crowding' around the alcohol functional group. Question 17 required candidates to read the question carefully because acid-base indicators do not change colour at a specific pH value (the colour change occurs over a pH range). Question 19 required candidates to understand the relationships between oxidation, reduction, oxidising agents, reducing agents, strengths and how this relates to E^0 values.

Section Two: Short answer (76 Marks)

Most candidates did well in this section, demonstrating a good understanding of the course content. The mean was 58.48%, which is about 6% higher than in 2019. Candidates performed best in Question 28 (poly(ethylene adipate),a biodegradable polymer), with a mean of 68.45%. Question 33 was found to be the most difficult in this section (mean of 39.53%), with a number of candidates making no attempt.

Section Three: Extended answer (88 Marks)

Most candidates did well in this section. The mean was 60.14%, which is about 16% higher than in 2019, with this most likely reflecting the greater length of the 2019 examination. Candidates performed best in Question 38 (empirical formula), with a mean of 76.17%. Question 39 proved to be effective in discriminating among candidates, with non-standard methods required in performing calculations.