Course report 2023

Higher Chemistry

This report provides information on candidates' performance. Teachers, lecturers and assessors may find it useful when preparing candidates for future assessment. The report is intended to be constructive and informative, and to promote better understanding. You should read the report in conjunction with the published assessment documents and marking instructions.

The statistics in the report were compiled before any appeals were completed.

Grade boundary and statistical information

Statistical information: update on courses

Number of resulted entries in 2022: 9,565

Number of resulted entries in 2023: 9,684

Statistical information: performance of candidates

Distribution of course awards including minimum mark to achieve each grade

A	Number of candidates	3,160	Percentage	32.6	Cumulative percentage	32.6	Minimum mark required	80
B	Number of candidates	2,311	Percentage	23.9	Cumulative percentage	56.5	Minimum mark required	65
C	Number of candidates	2,062	Percentage	21.3	Cumulative percentage	77.8	Minimum mark required	50
D	Number of candidates	1,397	Percentage	14.4	Cumulative percentage	92.2	Minimum mark required	35
No award	Number of candidates	754	Percentage	7.8	Cumulative percentage	100	Minimum mark required	N/A

Please note that rounding has not been applied to these statistics.

You can read the general commentary on grade boundaries in the appendix.

In this report:

- ‘most’ means greater than 70%
- ‘many’ means 50% to 69%
- ‘some’ means 25% to 49%
- ‘a few’ means less than 25%

You can find more statistical reports on the statistics and information page of SQA’s website.

Section 1: comments on the assessment

Question paper 1: multiple-choice

The multiple-choice paper proved to be less demanding than the 2022 paper. The grade boundaries were adjusted to take account of this.

Statistical evidence showed that there was a range of questions in terms of difficulty, and that questions showed good discrimination.

Question paper 2

The question paper proved to be more demanding than the 2022 paper. The grade boundaries were adjusted to take account of this.

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Assignment

The requirement to complete the assignment was removed for session 2022–23.

Section 2: comments on candidate performance

There were no candidates who achieved all 95 marks in the question paper.

Candidate performance in questions that examined calculations taught as part of the Higher Chemistry course was generally good.

Candidates performed less well in questions that related to practical aspects of the course and in questions where they were required to state or explain terms given in the course specification.

Areas that candidates performed well in

Question paper 1: multiple-choice

Question 2	Most candidates could identify a compound in which hydrogen bonding would **not** occur.
Question 5	Most candidates could calculate the concentration from the given rate in the graph.
Question 9	Most candidates could identify a structure never found in compounds.
Question 18	Most candidates could identify the ball-like structure formed during the cleansing action of a soap.
Question 21	Most candidates could identify a primary alcohol.

Question paper 2

Question 2(a)(ii)	Most candidates could name hydrogen bonding.
Question 2(b)(i)	Most candidates could calculate enthalpy change.
Question 3(b)(i)	Most candidates could state the term for an amino acid that must be obtained through the diet.
Question 3(b)(iii)	Most candidates could name the process by which proteins change shape.
Question 5(a)(ii)	Most candidates could calculate the % alcohol by volume.
Question 5(c)	Most candidates could calculate the mass of quinine.
Question 6(a)(i)(B)	Most candidates could name the activated complex.
Question 6(b)(ii)	Most candidates could show how a catalyst affects the activation energy.

Areas that candidates found demanding

Question paper 1: multiple-choice

Question 13	Some candidates could problem solve based on practical experiments.
Question 23	Some candidates could calculate the number of moles and then convert to molar volume.

Question paper 2

Question 2(b)(iii)	Few candidates could explain fully why silicon oxide has a higher melting point than silicon hydride.
Question 3(a)(iii)	Some candidates could draw a structural formula for a hydroxycarboxylic acid.
Question 3(b)(ii)	Some candidates could draw a structural formula for glutamic acid.
Question 3(c)	Few candidates could state the function of an emulsifier.
Question 3(d)	Some candidates could name the salt of a carboxylic acid.
Question 5(b)(i)	Few candidates could describe a chemical test to distinguish between methanol and propan-2-one.
Question 5(b)(ii)(C)	Few candidates could name a carboxylic acid produced in an ester hydrolysis.
Question 6(b)(i)(A)	Few candidates could suggest what is represented by the area under a kinetic energy distribution curve.
Question 6(c)(ii)(A)	Some candidates could explain how the production of ammonia is affected by the continuous removal of ammonia.
Question 6(d)(i)	Few candidates could write the overall redox equation.
Question 6(d)(ii)	Some candidates could identify a reducing agent.
Question 7(c)(i)	Some candidates could explain the difference in polarities between trichloromethane and tetrachloromethane.
Question 9(a)(ii)	Few candidates could name the strongest type of intermolecular force.
Question 9(e)	Few candidates could name the haloalkane.
Question 10(a)	Some candidates could describe weighing by difference.
Question 10(d)(i)	Some candidates could draw and label a diagram of apparatus.

Section 3: preparing candidates for future assessment

Teachers and lecturers should refer to the Higher Chemistry Course Specification, which is available on SQA's website.

Question paper 1: multiple-choice

Calculations

The paper contains calculations that are taught as part of the course, and general numeracy calculations set in a chemical context. Calculations were mostly done well, but candidates would benefit from further practice of questions where number of moles links to molar volume (question 23) and the use of chemical formulae (question 24).

Questions relating to practical work

As was the case in previous years, candidates tended to perform less well in some of these questions. This was true for the possible products in experiments relating to esters (question 13) and explanation of chromatography results (question 16).

Candidates must be allowed time during the course to develop practical skills associated with Higher Chemistry. Candidates must be specifically taught the proper use of equipment and the techniques listed in the course specification to ensure they gain a full understanding.

Question paper 2

Questions linked to statements in the course specification

Candidates need to be able to accurately recall and use statements from the course specification, for example question 3(c), function of an emulsifier.

Calculations

The paper contains calculations that are taught as part of the course, and general numeracy calculations set in a chemical context.

Calculations that are taught as part of the course were generally well done, for example question 2(b)(ii), percentage yield and 7(c)(ii), bond enthalpy. Calculations linked to practical work such as titration and enthalpy of combustion were also done well.

Candidates should be encouraged to set working out clearly, as partial credit can often be given to those who do not gain full credit for the questions. In question 7(a)(iii), when assigning partial marks, credit was given for $n = c \times v$ being applied correctly and for the stoichiometry of the equation being applied correctly.

General numeracy calculations set in a chemical context were also mostly done well.

Questions requiring more detailed answers

Questions that require more detailed answers are signalled by the words 'explain fully' or 'explain clearly' and are worth a minimum of 2 marks.

Candidates need to be made aware that, to gain full marks for these questions, they need to give a detailed explanation.

When questions are allocated 3 marks, candidates would be expected to make at least three correct points within their answer. For example, in question 2(a)(i) candidates needed to mention that intermolecular forces increase (moving down the group). The second mark was awarded for a correct identification of London Dispersion Forces. The third mark was awarded for an explanation linking strength of London Dispersion Forces to number of electrons.

Open-ended questions

As in previous years, a proportion of candidates did not attempt the open-ended questions.

Candidates would benefit from more opportunities to answer this type of question.

Candidates need to be made aware that, while there are no definitive answers to open-ended questions, their answer should make statements that are relevant to the situation or problem given. For example, answers to question 4 would be expected to include mention of actual experimental procedures.

Candidates can give broad answers covering a number of aspects of a question or focus on one particular aspect and give a detailed explanation.

Candidates are not expected to give a perfect answer to gain the full mark allocation for the question. These questions are marked holistically rather than on a number-of-points basis (for example 1 point, 1 mark; 2 points, 2 marks). Marks are assigned according to whether the candidate's answer displays no understanding (0 marks); limited understanding (1 mark); reasonable understanding (2 marks); or good understanding (3 marks).

Questions relating to practical work

Approximately 10 marks are allocated to the assessment of knowledge and skills relating to practical work. Apparatus and techniques that candidates should be familiar with are listed in the course specification.

As was the case in previous years, candidates tended to perform less well in questions relating to practical work. This was particularly true when describing a procedure to weigh by difference and the practical aspects of titration. The diagram showing assembled apparatus with labels still poses a challenge for some candidates.

Teachers and lecturers must allow candidates time during the course to develop practical skills associated with Higher Chemistry, so that they can understand the proper use of the equipment and techniques listed in the course specification.

Assignment

This course will return to full assessment requirements from session 2023–24 onwards.

Please refer to the course specification for more information on the course assessment structure.

The Higher Chemistry Assignment Assessment Task outlines the assessment conditions for the assignment. Teachers and lecturers must use the most up-to-date version available on the Higher Chemistry subject page of SQA's website. Teachers and lecturers can also refer to the candidate evidence, with accompanying commentaries, that is available on the Understanding Standards website.

The information below, from section 3 of the 2019 course report, may support centres in preparing candidates for the assignment.

Some reports showed that candidates had processed raw data before writing their report. The report, including the processing of experimental data within the report, should be a candidate's own work, and must be completed within the 2-hour writing-up time period.

There was also evidence of some redrafting in a few reports. Centres are reminded that teachers and/or lecturers are not allowed to give feedback on reports, and that candidates are not allowed a draft report or draft sections of the report.

In a few cases, all the candidates from the same centre had identical raw data. Centres are reminded that candidates must carry out their experiments in small groups and that results may not be shared between groups in the same class or centre.

The Higher Chemistry Assignment Assessment Task contains information about how to conduct the research and report stages of the assignment. Particular attention should be paid to the 'conditions of assessment' and 'level of supervision and control' sections. The 'Instructions for candidates' section lists the permitted resources for the report stage. Centres and candidates must adhere to the instructions in the assignment assessment task.

Appendix: general commentary on grade boundaries

SQA's main aim when setting grade boundaries is to be fair to candidates across all subjects and levels and maintain comparable standards across the years, even as arrangements evolve and change.

For most National Courses, SQA aims to set examinations and other external assessments and create marking instructions that allow:

- a competent candidate to score a minimum of 50% of the available marks (the notional grade C boundary)
- a well-prepared, very competent candidate to score at least 70% of the available marks (the notional grade A boundary)

It is very challenging to get the standard on target every year, in every subject at every level. Therefore, SQA holds a grade boundary meeting for each course to bring together all the information available (statistical and qualitative) and to make final decisions on grade boundaries based on this information. Members of SQA's Executive Management Team normally chair these meetings.

Principal assessors utilise their subject expertise to evaluate the performance of the assessment and propose suitable grade boundaries based on the full range of evidence. SQA can adjust the grade boundaries as a result of the discussion at these meetings. This allows the pass rate to be unaffected in circumstances where there is evidence that the question paper or other assessment has been more, or less, difficult than usual.

- The grade boundaries can be adjusted downwards if there is evidence that the question paper or other assessment has been more difficult than usual.
- The grade boundaries can be adjusted upwards if there is evidence that the question paper or other assessment has been less difficult than usual.
- Where levels of difficulty are comparable to previous years, similar grade boundaries are maintained.

Grade boundaries from question papers in the same subject at the same level tend to be marginally different year on year. This is because the specific questions, and the mix of questions, are different and this has an impact on candidate performance.

This year, a package of support measures was developed to support learners and centres. This included modifications to course assessment, retained from the 2021–22 session. This support was designed to address the ongoing disruption to learning and teaching that young people have experienced as a result of the COVID-19 pandemic while recognising a lessening of the impact of disruption to learning and teaching as a result of the pandemic. The revision support that was available for the 2021–22 session was not offered to learners in 2022–23.

In addition, SQA adopted a sensitive approach to grading for National 5, Higher and Advanced Higher courses, to help ensure fairness for candidates while maintaining

standards. This is in recognition of the fact that those preparing for and sitting exams continue to do so in different circumstances from those who sat exams in 2019 and 2022.

The key difference this year is that decisions about where the grade boundaries have been set have also been influenced, where necessary and where appropriate, by the unique circumstances in 2023 and the ongoing impact the disruption from the pandemic has had on learners. On a course-by-course basis, SQA has determined grade boundaries in a way that is fair to candidates, taking into account how the assessment (exams and coursework) has functioned and the impact of assessment modifications and the removal of revision support.

The grade boundaries used in 2023 relate to the specific experience of this year's cohort and should not be used by centres if these assessments are used in the future for exam preparation.

For full details of the approach please refer to the National Qualifications 2023 Awarding — Methodology Report.