Contents

Introduction

The purpose of this document is to provide guidance on constructing assessments for Advanced Higher Chemistry for gathering evidence for candidate estimates. This document should be read alongside *National Courses: guidance on gathering evidence and producing estimates* and *Advanced Higher Chemistry: Guidance on gathering key evidence in session 2020–21*.

The **key pieces** of evidence in chemistry are:

- a question paper, covering as much of the course as possible
- an end-of-course test or top-up question paper that includes the areas of the course not covered in the first examination
- end-of-topic tests that include grade A marks, which may be used as supplementary evidence to support the above question papers

You must gather these pieces of evidence in closed-book conditions and under a high degree of supervision and control. The closer the evidence is to the standard, format and duration of the Advanced Higher Chemistry question paper the more realistic and reliable your estimates should be. You should form holistic judgements when considering candidate evidence and give greater weight to the evidence that mirrors the SQA question paper most closely.

Centres should have a robust evidence base for the grades they submit to SQA. In many subjects, candidate work on unseen tasks in supervised conditions will provide such evidence. How such evidence is generated is for the centre to decide, for example they may decide to split the question paper over a number of lessons. Ideally the centre will provide several opportunities for candidates to demonstrate what they know, understand and can do at appropriate points in the course delivery.

Assessment structure

Assessments should contain approximately 30% grade A marks which require candidates to demonstrate a consistently high performance in relation to the skills, knowledge and understanding for the course. Grade A marks relate to the level of demand of a question rather than the difficulty candidates may have with a question. This usually involves questions testing more complex higher order skills such as analysis and evaluating.

The remaining marks are targeted at grade C candidates, as grade B candidates will achieve most grade C marks and some grade A marks. Questions with grade C marks require candidates to demonstrate successful performance in relation to the skills, knowledge and understanding for the course.

If using SQA past paper questions to produce assessments, care should be taken not to take too many questions from the same past paper. Instead, questions should be drawn from a number of past paper sources. When constructing assessments, it is advised to

construct section 2 (written) of the paper first, then to fill any gaps in coverage using section 1 (objective) questions.

Advanced Higher Chemistry question paper brief

	Marks		
Component	**Knowledge and understanding**	**Skills**	**Total**
Question paper	77+/-6	33+/-6	110

Knowledge and understanding/skills	**Percentage of marks**
♦ demonstrating knowledge and understanding of chemistry by making statements	~ 10
♦ demonstrating knowledge and understanding of chemistry by providing descriptions and explanations	~ 14
♦ applying knowledge and understanding of chemistry to new situations, interpreting information and solving problems	~ 46
♦ planning or designing experiments to test given hypotheses or to illustrate particular effects, including safety measures	~ 30
♦ selecting information	
♦ presenting information appropriately in a variety of forms	
♦ processing information (using calculations and units, where appropriate)	
♦ making predictions and generalisations based on evidence/information	
♦ drawing valid conclusions and giving explanations supported by evidence/justification	
♦ suggesting improvements to experimental procedures	

Additional information

Area Coverage	Inorganic Chemistry	~ 16 %
	Physical Chemistry	~ 22 %
	Organic Chemistry and Instrumental Analysis	~ 36 %
	Researching Chemistry	~ 22 %
	Non-specific	~4%
Two open-ended questions of three marks each.		
Calculations account for approximately 25% of the marks.		
Grade A marks: approximately 30%.		

Breakdown of Advanced Higher Chemistry past papers 2019–2016

The following tables provide the structure of the questions in the SQA Advanced Higher Chemistry past papers (2019–2016) in section 1 and section 2 by key area, knowledge/skill, and grade A marks.

2019 – Section 1

Question	Area of Course	Question Type	Grade A
1	Electromagnetic radiation and atomic spectra	Describing/explaining/integrating knowledge	
2	Gravimetric analysis	Apply knowledge to new situations	
3	Gravimetric analysis	Select information	
4	Atomic orbitals, electronic configurations & periodic table	Accurate recall	
5	Atomic orbitals, electronic configurations & periodic table	Apply knowledge to new situations	
6	Transition metals	Apply knowledge to new situations	
7	Transition metals	Apply knowledge to new situations	
8	Transition metals	Apply knowledge to new situations	
9	Chemical equilibrium	Apply knowledge to new situations	
10	Reaction feasibility	Apply knowledge to new situations	
11	Reaction feasibility	Apply knowledge to new situations (calculation)	
12	Reaction feasibility	Apply knowledge to new situations	
13	Kinetics	Apply knowledge to new situations (calculation)	
14	Kinetics	Apply knowledge to new situations	
15	Molecular orbitals	Apply knowledge to new situations	
16	Molecular structure	Apply knowledge to new situations	
17	Molecular structure	Apply knowledge to new situations	1
18	Stereochemistry	Apply knowledge to new situations	1
19	Synthesis	Apply knowledge to new situations	
20	Synthesis	Apply knowledge to new situations	
21	Synthesis	Apply knowledge to new situations	
22	Synthesis	Apply knowledge to new situations	
23	Experimental determination of structure	Apply knowledge to new situations (calculation)	
24	Experimental determination of structure	Making predictions and generalisations	1
25	Experimental determination of structure	Making predictions and generalisations	1
Question	**Area of Course**	**Question Type**	**Grade A**
26	Pharmaceutical chemistry	Apply knowledge to new situations	

27	Pharmaceutical chemistry	Apply knowledge to new situations (calculation)	
28	Practical skills and techniques	Designing experiments	
29	Practical skills and techniques	Process information (including calculations)	
30	Volumetric analysis	Designing experiments	

2019 – Section 2

Question	Area of Course	Question Type	Grade A
1(a)	Atomic orbitals, electronic configurations & periodic table	Apply knowledge to new situations	
1(b)	Reaction feasibility	Apply knowledge to new situations (calculation)	
1(c)	Chemical Equilibrium	Process information (including calculations)	1
2(a)	Kinetics	Accurate recall	
2(b)(i)	Kinetics	Drawing conclusions	
2(b)(ii)	Kinetics	Apply knowledge to new situations	
2(c)	Kinetics	Process information (including calculations)	1
3(a)	Volumetric analysis	Designing experiments	1
3(b)(i)	Practical skills and techniques	Designing experiments	
3(b)(ii)	Practical skills and techniques	Evaluating and suggesting improvements	1
3(b)(iii)	Carrying out stoichiometric calculations	Apply knowledge to new situations (calculation)	1
4(a)(i)	Chemical equilibrium	Accurate recall	
4(a)(ii)	Chemical equilibrium	Apply knowledge to new situations	
4(b)	Chemical equilibrium	Process information (including calculations)	
4(c)(i)	Chemical equilibrium	Drawing conclusions	
4(c)(ii)A	Carrying out stoichiometric calculations	Apply knowledge to new situations (skills calculation)	
4(c)(ii)B	Chemical equilibrium	Apply knowledge to new situations (calculation)	
4(d)	Chemical equilibrium	Describing/explaining/integrating knowledge	2
5(a)	Electromagnetic radiation and atomic spectra	Describing/explaining/integrating knowledge	
5(b)(i)	Transition metals	Apply knowledge to new situations	
5(b)(ii)	Transition metals	Describing/explaining/integrating knowledge	2
5(c)(i)	Electromagnetic radiation and atomic spectra	Apply knowledge to new situations (calculation)	1
5(c)(ii)	Non-specific	Process information (including calculations)	
Question	**Area of Course**	**Question Type**	**Grade A**
6(a)	Carrying out stoichiometric calculations	Apply knowledge to new situations (skills calculation)	1
6(b)	Volumetric analysis	Evaluating and suggesting improvements	1
6(c)	Volumetric analysis	Evaluating and suggesting improvements	1

6(d)	Volumetric analysis	Designing experiments	
7(a)	Practical skills and techniques	Designing experiments	
7(b)(i)	Molecular orbitals	Accurate recall	
7(b)(ii)	Molecular orbitals	Accurate recall	
7(c)	Molecular orbitals	Describing/explaining/integrating knowledge	1
7(d)(i)	Practical skills and techniques	Evaluating and Suggesting improvements	
7(d)(ii)A	Experimental determination of structure	Describing/explaining/integrating knowledge	1
7(d)(ii)B	Experimental determination of structure	Select information	
7(d)(ii)CI	Electromagnetic radiation and atomic spectra	Apply knowledge to new situations (calculation)	1
7(d)(ii)CII	Electromagnetic radiation and atomic spectra	Apply knowledge to new situations (calculation)	
8	Synthesis	Describing/explaining/integrating knowledge	2
9(a)(i)	Stereochemistry	Apply knowledge to new situations	
9(a)(ii)	Stereochemistry	Accurate recall	
9(b)(i)	Synthesis	Apply knowledge to new situations	
9(b)(ii)	Carrying out stoichiometric calculations	Apply knowledge to new situations (calculation)	
10(a)	Synthesis	Accurate recall	
10(b)(i)	Molecular structure	Present information	
10(b)(ii)	Synthesis	Apply knowledge to new situations	1
10(c)(i)	Synthesis	Apply knowledge to new situations	
10(c)(ii)	Synthesis	Apply knowledge to new situations	
10(c)(iii)	Synthesis	Apply knowledge to new situations	1
10(d)	Stereochemistry	Apply knowledge to new situations	1
10(e)	Experimental determination of structure	Making predictions and generalisations	

2018 – Section 1

Question	Area of Course	Question Type	Grade A
1	Electromagnetic radiation and atomic spectra	Accurate recall	
2	Atomic orbitals, electronic configurations & periodic table	Accurate recall	
3	Atomic orbitals, electronic configurations & periodic table	Apply knowledge to new situations	
4	Atomic orbitals, electronic configurations & periodic table	Apply knowledge to new situations	
5	Transition metals	Apply knowledge to new situations	1
6	Transition metals	Apply knowledge to new situations (calculation)	
7	Chemical equilibrium	Making predictions and generalisations	
8	Chemical equilibrium	Apply knowledge to new situations	
9	Chemical equilibrium	Apply knowledge to new situations (calculation)	
10	Chemical equilibrium	Apply knowledge to new situations	1
11	Chemical equilibrium	Apply knowledge to new situations	
12	Chemical equilibrium	Apply knowledge to new situations	
13	Reaction feasibility	Making predictions and generalisations	1
14	Kinetics	Apply knowledge to new situations	
15	Molecular orbitals	Apply knowledge to new situations	
16	Molecular structure	Apply knowledge to new situations (calculation)	
17	Stereochemistry	Process information (including calculations)	1
18	Synthesis	Apply knowledge to new situations	
19	Synthesis	Apply knowledge to new situations	
20	Experimental determination of structure	Apply knowledge to new situations (calculation)	
21	Experimental determination of structure	Process information (including calculations)	
22	Experimental determination of structure	Select information	
23	Pharmaceutical chemistry	Accurate recall	
24	Volumetric analysis	Apply knowledge to new situations (calculation)	
25	Practical skills and techniques	Designing experiments	
26	Practical skills and techniques	Designing experiments	
27	Practical skills and techniques	Making predictions and generalisations	
28	Gravimetric analysis	Designing experiments	
29	Practical skills and techniques	Apply knowledge to new situations	
30	Practical skills and techniques	Designing experiments	

2018 – Section 2

Question	Area of Course	Question Type	Grade A
1(a)(i)	Electromagnetic radiation and atomic spectra	Select information	
1(a)(ii)	Electromagnetic radiation and atomic spectra	Apply knowledge to new situations (calculation)	
1(a)(iii)	Electromagnetic radiation and atomic spectra	Process information (including calculations)	1
1(b)(i)	Atomic orbitals, electronic configurations & periodic table	Accurate recall	
1(b)(ii)	Atomic orbitals, electronic configurations & periodic table	Apply knowledge to new situations	
2(a)(i)	Chemical equilibrium	Apply knowledge to new situations	
2(a)(ii)	Chemical equilibrium	Process information (including calculations)	1
2(b)(i)	Chemical equilibrium	Apply knowledge to new situations (calculation)	
2(b)(ii)	Synthesis	Drawing conclusions	
3(a)	Volumetric analysis	Describing/explaining/integrating knowledge	
3(b)(i)	Carrying out stoichiometric calculations	Apply knowledge to new situations (calculation)	
3(b)(ii)	Carrying out stoichiometric calculations	Apply knowledge to new situations (calculation)	1
3(c)	Volumetric analysis	Designing experiments	2
4(a)	Transition metals	Accurate recall	1
4(b)	Molecular structure	Present information	1
4(c)	Stereochemistry	Describing/explaining/integrating knowledge	1
4(d)(i)	Reaction feasibility	Apply knowledge to new situations (calculation)	
4(d)(ii)	Reaction feasibility	Apply knowledge to new situations (calculation)	1
4(d)(iii)	Reaction feasibility	Apply knowledge to new situations (calculation)	
5(a)	Molecular orbitals	Accurate recall	
5(b)	Molecular orbitals	Describing/explaining/integrating knowledge	1
5(c)	Molecular orbitals	Describing/explaining/integrating knowledge	
6(a)	Transition metals	Accurate recall	
6(b)(i)	Molecular structure	Apply knowledge to new situations	
6(b)(ii)A	Transition metals	Apply knowledge to new situations	
6(b)(ii)B	Transition metals	Apply knowledge to new situations	
6(c)(i)	Gravimetric analysis	Accurate recall	
6(c)(ii)	Carrying out stoichiometric calculations	Apply knowledge to new situations (calculation)	1
7(a)(i)	Synthesis	Apply knowledge to new situations	1
7(a)(ii)	Synthesis	Apply knowledge to new situations	
Question	**Area of Course**	**Question Type**	**Grade A**
7(a)(iii)	Synthesis	Apply knowledge to new situations	
7(a)(iv)	Stereochemistry	Apply knowledge to new situations	

7(b)	Pharmaceutical chemistry	Apply knowledge to new situations (calculation)	1
7(c)	Practical skills and techniques	Designing experiments	1
8(a)	Pharmaceutical chemistry	Process information (including calculations)	1
8(b)	Practical skills and techniques	Evaluating and Suggesting improvements	1
8(c)	Non-specific	Drawing conclusions	1
8(d)	Synthesis	Describing/explaining/integrating knowledge	2
9(a)	Synthesis	Accurate recall	
9(b)	Synthesis	Describing/explaining/integrating knowledge	3
9(c)	Experimental determination of structure	Drawing conclusions	1
9(d)(i)	Kinetics	Apply knowledge to new situations	
9(d)(ii)	Kinetics	Apply knowledge to new situations (calculation)	1
10(a)	Synthesis	Accurate recall	
10(b)	Transition metals	Apply knowledge to new situations	
10(c)(i)A	Practical skills and techniques	Designing experiments	1
10(c)(i)B	Practical skills and techniques	Accurate recall	
10(c)(ii)	Synthesis	Apply knowledge to new situations	
10(d)	Experimental determination of structure	Present information	

2017 – Section 1

Question	Area of Course	Question Type	Grade A
1	Atomic orbitals, electronic configurations & periodic table	Accurate recall	
2	Atomic orbitals, electronic configurations & periodic table	Apply knowledge to new situations	
3	Atomic orbitals, electronic configurations & periodic table	Apply knowledge to new situations	1
4	Transition metals	Process information (including calculations)	
5	Transition metals	Apply knowledge to new situations	
6	Chemical equilibrium	Apply knowledge to new situations	
7	Chemical equilibrium	Apply knowledge to new situations (calculation)	
8	Reaction feasibility	Making predictions and generalisations	1
9	Kinetics	Apply knowledge to new situations	
10	Kinetics	Apply knowledge to new situations	1
11	Molecular orbitals	Accurate recall	
12	Molecular orbitals	Apply knowledge to new situations	1
13	Stereochemistry	Accurate recall	
14	Synthesis	Apply knowledge to new situations	
15	Synthesis	Apply knowledge to new situations	
16	Synthesis	Process information (including calculations)	
17	Synthesis	Apply knowledge to new situations	
18	Synthesis	Accurate recall	
19	Experimental determination of structure	Making predictions and generalisations	1
20	Experimental determination of structure	Select information	
21	Pharmaceutical chemistry	Accurate recall	
22	Gravimetric analysis	Designing experiments	
23	Practical skills and techniques	Designing experiments	
24	Practical skills and techniques	Process information (including calculations)	
25	Practical skills and techniques	Designing experiments	
26	Practical skills and techniques	Evaluating and suggesting improvements	
27	Carrying out stoichiometric calculations	Process information (including calculations)	1
28	Carrying out stoichiometric calculations	Process information (including calculations)	
29	Carrying out stoichiometric calculations	Apply knowledge to new situations (calculation)	
30	Carrying out stoichiometric calculations	Drawing conclusions	

2017 – Section 2

Question	Area of Course	Question Type	Grade A
1(a)(i)	Electromagnetic radiation and atomic spectra	Describing/explaining/integrating knowledge	
1(a)(ii)	Electromagnetic radiation and atomic spectra	Describing/explaining/integrating knowledge	
1(b)	Electromagnetic radiation and atomic spectra	Apply knowledge to new situations (calculation)	
2(a)(i)	Chemical equilibrium	Apply knowledge to new situations (calculation)	1
2(a)(ii)	Chemical equilibrium	Describing/explaining/integrating knowledge	
2(b)(i)	Atomic orbitals, electronic configurations & periodic table	Apply knowledge to new situations	
2(b)(ii)	Atomic orbitals, electronic configurations & periodic table	Describing/explaining/integrating knowledge	1
3(a)(i)A	Reaction feasibility	Apply knowledge to new situations (calculation)	
3(a)(i)B	Reaction feasibility	Apply knowledge to new situations (calculation)	
3(a)(ii)	Reaction feasibility	Apply knowledge to new situations (calculation)	
3(b)	Non-specific	Designing experiments	2
4(a)(i)	Transition metals	Apply knowledge to new situations	
4(a)(ii)	Transition metals	Apply knowledge to new situations	
4(b)(i)	Kinetics	Apply knowledge to new situations	
4(b)(ii)A	Kinetics	Describing/explaining/integrating knowledge	1
4(b)(ii)B	Transition metals	Accurate recall	
4(c)	Pharmaceutical chemistry	Apply knowledge to new situations (calculation)	
5	Atomic orbitals, electronic configurations & periodic table	Describing/explaining/ integrating knowledge	2
6(a)(i)	Transition metals	Accurate recall	
6(a)(ii)	Transition metals	Making predictions and generalisations	1
6(b)(i)	Synthesis	Accurate recall	
6(b)(ii)	Chemical equilibrium	Accurate recall	
6(b)(iii)A	Gravimetric analysis	Designing experiments	
6(b)(iii)B	Carrying out stoichiometric calculations	Apply knowledge to new situations (calculation)	
6(b)(iii)C	Gravimetric analysis	Evaluating and suggesting improvements	1
7(a)(i)	Practical skills and techniques	Designing experiments	1
7(a)(ii)	Practical skills and techniques	Designing experiments	
7(b)	Carrying out stoichiometric calculations	Apply knowledge to new situations (calculation)	1
8(a)(i)	Molecular structure	Present information	
8(a)(ii)	Experimental determination of structure	Process information (including calculations)	1
Question	**Area of Course**	**Question Type**	**Grade A**
8(b)	Stereochemistry	Describing/explaining/integrating knowledge	1
8(c)(i)	Stereochemistry	Apply knowledge to new situations	

8(c)(ii)	Stereochemistry	Process information (including calculations)	
8(d)(i)	Pharmaceutical chemistry	Apply knowledge to new situations	
8(d)(ii)	Pharmaceutical chemistry	Drawing conclusions	
9(a)(i)	Synthesis	Apply knowledge to new situations	
9(a)(ii)	Synthesis	Describing/explaining/integrating knowledge	1
9(b)	Synthesis	Accurate recall	
Q9(c)	Synthesis	Apply knowledge to new situations	1
Q9(d)	Synthesis	Apply knowledge to new situations	1
10(a)(i)	Carrying out stoichiometric calculations	Apply knowledge to new situations (calculation)	
10(a)(ii)	Carrying out stoichiometric calculations	Apply knowledge to new situations (calculation)	
10(a)(iii)	Volumetric analysis	Evaluating and suggesting improvements	
10(b)	Molecular orbitals	Describing/explaining/integrating knowledge	2
11(a)(i)	Synthesis	Evaluating and suggesting improvements	
11(a)(ii)	Practical skills and techniques	Evaluating and suggesting improvements	
11(b)(i)	Experimental determination of structure	Select information	
11(b)(ii)	Experimental determination of structure	Process information (including calculations)	1
11(b)(iii)	Synthesis	Designing experiments	1

2016 – Section 1

Question	Area of Course	Question Type	Grade A
1	Electromagnetic radiation and atomic spectra	Accurate recall	
2	Atomic orbitals, electronic configurations & periodic table	Accurate recall	
3	Atomic orbitals, electronic configurations & periodic table	Accurate recall	
4	Atomic orbitals, electronic configurations & periodic table	Apply knowledge to new situations	
5	Transition metals	Apply knowledge to new situations	1
6	Chemical equilibrium	Apply knowledge to new situations	
7	Chemical equilibrium	Apply knowledge to new situations	1
8	Chemical equilibrium	Apply knowledge to new situations	
9	Reaction feasibility	Apply knowledge to new situations	1
10	Reaction feasibility	Apply knowledge to new situations	
11	Kinetics	Apply knowledge to new situations	
12	Molecular orbitals	Apply knowledge to new situations (calculation)	
13	Stereochemistry	Apply knowledge to new situations	
14	Synthesis	Apply knowledge to new situations	
15	Synthesis	Apply knowledge to new situations	
16	Synthesis	Apply knowledge to new situations	
17	Non-specific	Process information (including calculations)	
18	Non-specific	Drawing conclusions	
19	Synthesis	Apply knowledge to new situations	
20	Synthesis	Describing/explaining/integrating knowledge	
21	Synthesis	Describing/explaining/integrating knowledge	
22	Synthesis	Apply knowledge to new situations	
23	Synthesis	Apply knowledge to new situations	
24	Experimental determination of structure	Apply knowledge to new situations (calculation)	
25	Pharmaceutical chemistry	Apply knowledge to new situations	
26	Pharmaceutical chemistry	Process information (including calculations)	
27	Volumetric analysis	Accurate recall	
28	Volumetric analysis	Apply knowledge to new situations (calculation)	
29	Gravimetric analysis	Apply knowledge to new situations (calculation)	
30	Volumetric analysis	Apply knowledge to new situations (calculation)	

2016 – Section 2

Question	Area of Course	Question Type	Grade A
1(a)(i)	Reaction feasibility	Apply knowledge to new situations (calculation)	
1(a)(ii)	Reaction feasibility	Apply knowledge to new situations (calculation)	1
1(b)	Reaction feasibility	Apply knowledge to new situations (calculation)	
2(a)	Atomic orbitals, electronic configurations & periodic table	Apply knowledge to new situations	
2(b)	Atomic orbitals, electronic configurations & periodic table	Accurate recall	
2(c)	Atomic orbitals, electronic configurations & periodic table	Apply knowledge to new situations	
3(a)(i)	Transition metals	Apply knowledge to new situations	
3(a)(ii)	Transition metals	Describing/explaining/integrating knowledge	1
3(a)(iii)	Transition metals	Making predictions and generalisations	1
3(b)(i)	Transition metals	Apply knowledge to new situations	
3(b)(ii)	Electromagnetic radiation and atomic spectra	Apply knowledge to new situations	
3(b)(iii)	Transition metals	Describing/explaining/integrating knowledge	2
4(a)(i)	Volumetric analysis	Designing experiments	1
4(a)(ii)	Volumetric analysis	Designing experiments	
4(a)(iii)	Volumetric analysis	Evaluating and suggesting improvements	1
4(b)(i)	Gravimetric analysis	Designing experiments	
4(b)(ii)	Gravimetric analysis	Designing experiments	1
4(c)	Volumetric analysis	Evaluating and suggesting improvements	1
5(a)	Chemical equilibrium	Apply knowledge to new situations	
5(b)(i)	Carrying out stoichiometric calculations	Apply knowledge to new situations (calculation)	
5(b)(ii)	Chemical equilibrium	Apply knowledge to new situations (calculation)	1
6(a)	Electromagnetic radiation and atomic spectra	Apply knowledge to new situations (calculation)	
6(b)(i)A	Kinetics	Apply knowledge to new situations (calculation)	
6(b)(i)B	Kinetics	Apply knowledge to new situations (calculation)	
6(b)(ii)	Kinetics	Apply knowledge to new situations	
6(b)(iii)	Kinetics	Apply knowledge to new situations (calculation)	1
7(a)	Chemical equilibrium	Apply knowledge to new situations	
7(b)(i)	Stereochemistry	Apply knowledge to new situations	
7(b)(ii)	Stereochemistry	Drawing conclusions	1
7(b)(iii)	Molecular structure	Present information	
Question	**Area of Course**	**Question Type**	**Grade A**
7(c)	Synthesis	Process information (including calculations)	1
8(a)	Pharmaceutical chemistry	Accurate recall	

8(b)	Synthesis	Drawing conclusions	
8(c)	Synthesis	Designing experiments	1
8(d)	Synthesis	Apply knowledge to new situations	1
8(e)	Synthesis	Accurate recall	
8(f)	Practical skills and techniques	Describing/explaining/integrating knowledge	2
9(a)(i)	Molecular Structure	Apply knowledge to new situations	
9(a)(ii)	Molecular orbitals	Accurate recall	
9(a)(iii)	Molecular orbitals	Accurate recall	
9(b)(i)	Practical skills and techniques	Present information	
9(b)(ii)	Synthesis	Drawing conclusions	1
9(b)(iii)	Chemical equilibrium	Describing/explaining/integrating knowledge	1
9(b)(iv)	Practical skills and techniques	Accurate recall	1
9(b)(v)	Carrying out stoichiometric calculations	Apply knowledge to new situations (calculation)	
10(a)	Experimental determination of structure	Apply knowledge to new situations (calculation)	
10(b)	Experimental determination of structure	Select information	
10(c)(i)	Experimental determination of structure	Process information (including calculations)	
10(c)(ii)	Experimental determination of structure	Process information (including calculations)	1
10(d)	Experimental determination of structure	Drawing conclusions	1

Marking reliability

Teachers and lecturers should be familiar with the general marking principles for Advanced Higher Chemistry (see Appendix) and the published marking instructions that accompany SQA past papers, as these demonstrate the required marking standard.

Centre-devised marking instructions should follow the same format and standard as those published by SQA. It is good practice to prepare the marking instructions at the same time as the assessment is constructed. Marking instructions can then be refined in light of candidate responses and should be agreed between all markers and applied consistently. Cross-marking of a sample of each markers work should occur to ensure the marking instructions have been applied accurately and consistently.

Some common marking issues include:

- inconsistent application of the marking instructions
- arithmetical errors when totalling marks
- substitution of data
- calculations with a carry forward error
- identifying where a mark has been allocated in open-ended questions.

Marks should only be allocated based on the written response and not what the response infers.

Cut-off scores

The notional cut-off scores for course assessment are:

70% A grade
60% B grade
50% C grade
40% D grade

Cut-off scores should be appropriate to the instrument of assessment. They should be amended to reflect any differences between centre assessments and SQA question papers.

Such differences could include:

- an assessment being split over a number of sessions
- assessments with an insufficient number of grade A marks
- assessments that do not adequately sample the skills, knowledge and understanding of the course
- assessments that do not adequately integrate the skills, knowledge and understanding of the course

You should raise the cut-off scores above notional difficulty to reflect such differences.

It is important to note that sometimes intended grade A marks perform as relatively straightforward marks. The overall performance of the cohort should therefore be reviewed after all candidates' assessments have been marked. If the grade A marks did not perform as intended, you should consider why this might be and whether the grade cut-off score should be adjusted to reflect candidate performance. Some questions requiring accurate recall of words or statements may appear to function as A grade marks but should not be considered as such.

A question that is considered as relatively straightforward may yield responses that are significantly different to the marking instructions, suggesting that the wording of the question caused confusion, or that the question was too challenging. Grade cut-off scores may need to be adjusted to reflect this.

Appendix – General marking principles for Advanced Higher Chemistry

Always apply these general principles. Use them in conjunction with the detailed marking instructions, which identify the key features required in candidates' responses.

(a) Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.

(b) If a candidate response does not seem to be covered by either the principles or detailed marking instructions, and you are uncertain how to assess it, you must seek guidance from your team leader.

(c) Do not award half marks.

(d) Award full marks for the correct response to a calculation (including units, if appropriate) without working. An exception to this is when candidates are asked to 'Find, by calculation' or 'Clearly show your working for the calculation'.

(e) Ideally, numerical values should be given to the correct number of significant figures as shown in the **detailed marking instructions**. Full marks can be awarded for values that have one significant figure fewer and up to two more significant figures than the expected answer. Exceptions to this rule will be given in the detailed marking instructions. Incorrect significant figures would only be penalised once in any paper and cannot be applied if marking instruction **(h)** has already been applied in the paper.

(f) Where a candidate makes an error at an early stage in a multi-stage calculation, award partial marks, as shown in the **detailed marking instructions**, for correct follow-on working in subsequent stages, unless the error significantly reduces the complexity of the remaining stages. Apply the same principle for questions that require several stages of non-mathematical reasoning. The exception to this rule is where the marking instructions for a numerical question assign separate 'concept marks' and an 'arithmetic mark'. In such situations, the marking instructions will give clear guidance on the assignment of partial marks.

(g) Ideally, calculated intermediate values should not be rounded. If the candidate has correctly rounded, the calculated intermediate values can have one significant figure fewer than the data given in the question but no fewer. **For example**, if the data in the question is given to three significant figures, the intermediate value should have no fewer than two significant figures.

(h) In many questions, the unit in which the answer is to be expressed is given. In these questions, the candidate does not need to state a unit in their answer; but if they do, the unit must be correct. The full mark allocation cannot be awarded if an incorrect unit is shown. In these questions, incorrect units would only be penalised once in any paper and cannot be applied if marking instruction **(e)** has already been applied in the paper.

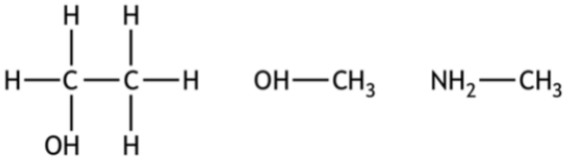
(i) Candidates may fully access larger mark allocations whether their responses are in continuous prose, linked statements, or a series of developed bullet points.

(j) Do not deduct marks for inaccurate or unconventional spelling or vocabulary as long as the meaning of the word(s) is conveyed. **For example**, responses that include 'distilling' for 'distillation', or 'it gets hotter' for 'the temperature rises', are acceptable. Exceptions to this rule will be given in the **detailed marking instructions**.

(k) If a correct response and a wrong response are given, award no marks. **For example**, in response to the question, 'State the colour seen when blue Fehling's solution is warmed with an aldehyde', do not award marks for the response 'red green'. However, if a correct response is followed by additional information which does not conflict with that, ignore the additional information, whether correct or not. **For example**, in response to a question concerned with melting point, 'State why the tube should not be made of copper', the response 'Copper has a low melting point and is coloured grey' **would** gain marks.

(l) Ignore the omission of one H atom from a full structural formula provided the bond is shown. Ignore the omission of one bond provided the attached atom is shown.

If a structural formula is asked for, award marks only if the bond points to the appropriate atom. **For example**, the structural formulae shown below would not be awarded marks



This marking instruction must only be applied a maximum of once per question.

(m) Award marks for a symbol or correct formula in place of a name unless stated otherwise in the **detailed marking instructions**.

(n) When formulae of ionic compounds are given as responses, candidates only need to show ion charges if these have been specifically asked for. However, if ion charges are shown, they must be correct. If incorrect charges are shown, do not award marks.

(o) If an answer comes directly from the text of the question, do not award marks. **For example**, in response to the question, 'A student found that 0·05 mol of propane, burned to give 82·4 kJ of energy. $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(\ell)$. Name the kind of enthalpy change that the student measured', do not award marks for 'burning' since the word 'burned' appears in the text.

(p) A guiding principle in marking is to give credit for correct elements of a response rather than to look for reasons not to give marks.

Example 1: If a structural formula is asked for, CH_3 and CH_3CH_2 are acceptable as methyl and ethyl groups respectively unless the question asks for a skeletal structural formula.

Example 2: If a name is asked for such as 3-methylhexane, then 3, methyl-hexane

would be acceptable although the use of comma and dashes is not correct.

(q) Unless the question is clearly about a non-chemistry issue, for example costs in an industrial chemical process, do not award marks for a non-chemical response. **For example**, in response to the question, 'Why does the (catalytic) converter have a honeycomb structure?', do not award a mark for 'To make it work'. This response may be correct but it is not a chemical response.

(r) Only award marks for a valid response to the question asked. Where candidates are asked to:

- **identify**, **name**, **give** or **state**, they must only name or present in brief form.
- **describe**, they must provide a statement or structure of characteristics and/or features.
- **explain**, they must relate cause and effect and/or make relationships between things clear.
- **compare**, they must demonstrate knowledge and understanding of the similarities and/or differences between things.
- **complete**, they must finish a chemical equation or fill in a table with information.
- **determine** or **calculate**, they must determine a number from given facts, figures or information.
- **draw**, they must draw a diagram or structural formula, for example 'Draw a diagram to show the part of a poly(propene) molecule formed from two propene molecules.'
- **estimate**, they must determine an approximate value for something.
- **predict**, they must suggest what may happen based on available information.
- **evaluate**, they must make a judgement based on criteria.
- **suggest**, they must apply their knowledge and understanding of chemistry to a new situation. A number of responses are acceptable: award marks for any suggestions that are supported by knowledge and understanding of chemistry.
- **use their knowledge of chemistry or aspect of chemistry to comment on**, they must apply their skills, knowledge and understanding to respond appropriately to the problem/situation presented (for example by making a statement of principle(s) involved and/or a relationship or equation, and applying these to respond to the problem/situation). Candidates gain marks for the breadth and/or depth of their conceptual understanding.
- **write**, they must complete a chemical or word equation, for example 'Write the word equation for the complete combustion of ethanol.'