Questions and answers

Changes to assessment in Advanced Higher Chemistry

1 Advanced Higher Chemistry course

Will students be able to be entered for freestanding units?

Yes. As with National 5 and Higher courses, you can still enter candidates for freestanding units providing they meet the requirements for the unit assessment. The units that were previously part of the Advanced Higher course will now be available as freestanding units at SCQF level 7 and you can still use the existing unit assessment support packs to assess these units. However, if you choose to present candidates for the freestanding units, be aware that the content will not be updated to reflect any changes being made to the Advanced Higher course. The unit assessments should not be changed as they reflect the course content of the freestanding unit at SCQF level 7.

Will the day book be assessed?

The day book, now called lab book, will not be assessed as part of the course assessment but would still be required if the Researching Chemistry unit at SCQF level 7 was to be completed as a freestanding unit.

Will visiting verification still happen?

Yes. There are currently no plans to change the visiting verification process for the Researching Chemistry unit at SCQF level 7.

When will the data book be updated?

The data booklet is currently being updated and will be available in electronic format in due course (hopefully in the autumn), with hard copies being distributed to centres as part of the examination stationary for 2020. The proposed changes are minor and involve only corrections and updates to data and so the current data booklet will still be valid to use with the course for 2019-2020.

2 Advanced Higher Chemistry question paper

Would you be able to give examples of the IUPAC naming changes to transition metal complexes?

The International Union of Pure and Applied Chemistry (IUPAC) naming rules are available on the IUPAC website – 'A Brief Guide to the Nomenclature of Inorganic Chemistry'.

A straightforward example would be for the complex – cis platin. Under the previous naming system this would have been cis-diamminedichloroplatinum(II), with formula $[PtCl_2(NH_3)_2]$, as the negatively charged ligands would be listed first. This is now cis-diamminedichloridoplatinum(II), with formula $[PtCl_2(NH_3)_2]$, but this is because the Cl^- ligand comes alphabetically as it appears in the formula, before the NH_3 ligand, and not because the Cl^- ligand is negatively charged.

Another example would be pentaammineaquacobalt(III). In previous exams the accepted formula for this complex would have been $[Co(H_2O)(NH_3)_5]^{3+}$. Under the IUPAC rules this should be $[Co(NH_3)_5(OH_2)]^{3+}$. The ligands are listed alphabetically as it appears in the formula. The aqua ligand is written OH_2 rather than H_2O as the atom bound to the transition metal should always be listed first and so in this case NH_3 comes first in the formula as N comes before O.

Regarding the updated IUPAC rules for ligands in transition metal complexes, for example, application of chlorido not chloro as previously, should candidates apply the same naming convention to organic compounds, so dichloridoethane instead of dichloroethane? Is this only restricted to AH level?

The change to naming of ligands applies only to transition metal complexes and is in line with the current IUPAC naming rules. Naming of organic compounds remains unchanged. The name for CH_2Cl_2 will remain dichloromethane, for example. This means that the naming of the ligands will only apply to the Advanced Higher course, as at other levels, naming of transition metal complexes is not part of the course specification.

If H^+ is used instead of H_3O^+ would marks be lost?

The change to the emphasis was to achieve consistency – current arrangements use H_3O^+ for the relationship for indicator solutions and H^+ for all others.

As currently H^+ and H_3O^+ would both be considered acceptable in situations where they are interchangeable and so marks would not be lost – there will be, as there is currently, questions where care would need to be taken to ensure that swapping formulae would still result in a correct answer, for example, in a balanced equation.

3 Advanced Higher Chemistry project

Will there still be a 10% allowance in the word count?

Yes. The maximum word count is 4500 with a 10% allowance as stated in the project assessment task document 'If the word count exceeds the maximum by more than 10%, a penalty is applied.'

What is the penalty for being below the minimum 2500 words?

There is no penalty for a word count below the minimum although a project of less than 2500 words is unlikely to be able to access all of the project marks.

Would a redox titration with a standardisation be deemed complex enough to access the four marks for data analysis?

The data analysis will be marked holistically. Candidates have to do sufficient analysis of data or analysis at a sufficient level to access all of these marks. In other words, they will have to do something to be awarded these marks. The project assessment task provides examples of what is meant by analysis at an appropriate level:

- complex chemical calculation commensurate with the demands of Advanced Higher Chemistry, for example those needed to process back titration, kinetics and equilibrium data
  or
- calculations of more than one type, for example, a titration calculation and a percentage yield calculation
  or
- calculations from two different procedures, for example two different titration methods
  or
- processing large quantities of data using a calculation, for example if the candidate has a wide range of variables and these have been duplicated, generating a large quantity of data
  or
- chemical calculation and an appropriate analysis of a graph, chromatogram or spectrum.

Based on these examples, standardisation of a solution used in a redox titration (along with the redox titration) could be considered sufficiently complex, in terms of the analysis of the data, to be awarded four marks as this would involve two different calculations being carried out using two different balanced equations and corresponding mole ratios.

Why are the marks awarded for AH Chemistry project different to Physics and Biology? If the candidate loses 1 mark in Chemistry, they lose more marks proportionally compared to the other science.

All three subjects are scaled to the same percentage but yes, a one mark difference for chemistry will be a slightly higher overall percentage difference to the final mark – this applies if a candidate is awarded one mark higher as well. Reducing the marks available for the project by five will bring it more in line with marks for the other Advanced Higher sciences. Non-functioning marks and non-discriminating marks have been removed from the assessment grid.

What is regarded as a suitable range of samples / values?

There is no requirement for a graphical analysis to be carried out and so it will very much depend on the project topic and the type of analysis that is to be carried out.

Certainly, carrying out a repeat experiment would be recommended over, say extending the range of samples.

If a graphical analysis is to be carried out for bar charts, then three bars would be the minimum and generally for scatter graphs three data points would be the minimum, five would be preferred **but** there are cases where less than five data points would be unsuitable, for example, a calibration graph.

What is the difference between achieving concordancy and duplication?

Carrying out a titration by pipetting a volume from a diluted solution and repeating this process would be considered to be titrating to achieve concordancy. A titration like this would be duplicated using a second diluted solution – so the diluted solution would need to be prepared again.

If a titration is carried out using an unprocessed sample, such as orange juice from a carton that has not been diluted, ideally a duplicate should be performed using a second carton of orange juice. However, for the purposes of the Advanced Higher project, it is considered to be a duplicate if a second sample of orange juice is pipetted from the same carton – in this case – concordancy would not be considered important as these are duplicate experiments.

Are projects such as making dyes, analysis of organic unknowns or synthesis projects still viable?

Yes. Care will be needed during the planning stage, as there is a requirement, as part of the data analysis section, to have a chemical calculation. This may mean that a percentage yield calculation is carried out or an R_f value is determined. To ensure that the data analysis is of Advanced Higher level, candidates may also wish to consider including an analysis of any chromatograms or spectra.

Are candidates allowed to redraft their report and what is meant by 'reasonable assistance' for the reporting stage?

As currently, candidates can draft their project as often as they require, however you must not mark drafts or any part of the candidates write up. Nor should you give directed feedback. The wording in the project assessment task is:
'Teachers or lecturers should not adopt a directive role or provide specific advice on how to re-phrase, improve responses or provide model answers'.

Marking or providing specific feedback would be considered to be taking a directive role.

The *Guidance on conditions of assessment* available on the subject page of the SQA website gives examples of reasonable assistance. These include:

- drawing out or teasing out points without leading candidates
- exploring options with a candidate
- asking candidates to re-read or check something previously taught

Does one of the three references need to be the literature/internet source?

No, there only needs to be three references cited in the text and the same three listed correctly at the end of the report – using an acceptable referencing system and using it consistently.

Can they use the value on the box, for example, for aspirin or iron tablets?

Using the value on the box for the comparison analysis is fine and there is no requirement for this to be referenced. As the box will not have any of the required information for a reference, in this instance, we would recommend that there be three other cited references included in the report. A website reference for the information on the box, from say a supermarket, would however be easy to list.