Qualification Verification Summary Report

NQ Verification 2018–19

01 Section 1: Verification group information

Verification group name:	**Chemistry**
Verification event/visiting information	**Event and visiting**
Date published:	**June 2019**

National Courses/Units verified:

H21G 73	National 3	Chemical Changes and Structure
H21J 73	National 3	Nature's Chemistry
H21G 74	National 4	Chemical Changes and Structure
H21J 74	National 4	Nature's Chemistry
H21M 74	National 4	Chemistry Assignment — added value unit
H21G 75	SCQF level 5	Chemical Changes and Structure
H4KH 76	SCQF level 6	Chemical Changes and Structure
H21J 76	SCQF level 6	Chemical Changes and Structure
H4KK 76	SCQF level 6	Researching Chemistry
H7XR 77	Advanced Higher	Researching Chemistry

02 Section 2: Comments on assessment

Assessment approaches

National 3, National 4, SCQF level 5, SCQF level 6 and Advanced Higher units

Almost all centres verified had used the published unit assessment support packs (UASPs) which meant that there were generally few problems concerning the approach to assessment. A small number of centres had chosen to use prior-verified assessments, and these were used appropriately to assess candidates.

Most centres were using the unit-by-unit approach. Almost all centres verified were using a test with a 50% cut-off score to assess outcome 2 rather than ensuring that 50% or more of the knowledge statements made by a candidate were correct and at least one correct response was made for each of the problem solving skills.

A small number of centres had chosen to use the portfolio approach. Centres are advised that in order to pass outcome 2 for a unit, candidates must be given the opportunity to attempt questions on all key areas. A unit pass cannot be achieved unless all key areas are included in the instrument of assessment. For SCQF level 6 freestanding units, and the corresponding UASPs, the content of the units differs from the order in which key areas are now arranged in the course specification documents. Centres should refer to the appropriate freestanding unit specifications in order to determine which key areas are found in each unit. It is not a valid approach to move key areas between UASPs. For example, the key area 'Controlling the Rate' should be assessed in H4KH 76 Chemical Changes and Structure, not H21J 76 Chemistry in Society.

When a centre accepts responses other than those in the marking guidance there should be annotations to the marking guidance to reflect the additional correct responses. Some centres made annotations to the marking guidance which was helpful during verification. However, in a few cases the additional responses recorded on the marking guidance were incorrect. Centres should therefore ensure that any additional responses added to the marking guidance are appropriate.

Centres are advised to refer to the general marking principles for National 5, Higher and Advanced Higher for additional guidance when using unit assessments at these levels.

H21M 74 National 4 Chemistry Assignment — added value unit

All centres had assessed the National 4 Chemistry Assignment (added value unit) using the unit assessment support package *Chemistry Assignment (National 4) Added Value Unit* (April 2018). This document exemplifies how marks are allocated to each of the five assessment standards giving a total mark out of 14. Candidates must achieve 7 marks or more to pass.

Of the centres verified this year there were common topics relating to a key area of the National 4 course. This included energy from fuels, rates of reaction and electrochemical cells.

During verification there was some evidence that centres were assessing candidates' reports until a total of 7 marks was achieved. At this point, they did not make judgements on the remaining assessment standards. It is good practice to ensure that evidence is judged against all assessment standards.

It should be noted that a National 5 assignment can be used as evidence for the added value unit. If a centre does use a National 5 assignment for a candidate's evidence for the added value unit then an assessor must judge this evidence using the marking criteria for the added value unit, applying marks out of 14. If a candidate fails to achieve 7 marks or more they can be given the opportunity to re-draft their report.

Where a centre is assessing a National 5 assignment for the National 4 added value unit and submitting the National 5 assignment for external assessment

purposes the evidence should not be assessed until after the National 5 assignment has been submitted. This ensures the conditions of assessment are maintained, ie no teacher/lecturer feedback on the report and no re-drafting.

H4KK 76 Researching Chemistry (SCQF level 6)

There are two outcomes for this unit at SCQF level 6: outcome 1 (assessment standard 1.1) which involves candidates gathering and recording information from two sources related to their research topic and outcome 2 (assessment standards 2.1 and 2.2) which involves planning and carrying out practical research.

All centres verified this session for the Researching Chemistry Unit had used the SQA UASP and there were no issues with the approach to assessment.

The chosen research topic should draw on one or more key area(s) of the Higher Chemistry course. Research topics included the concentration of vitamin C in fruit juices, and factors affecting the rate of a chemical reaction. All topics verified were appropriate to SCQF level 6 Chemistry.

H7XR 77 Researching Chemistry (Advanced Higher) Unit

There are two outcomes for this unit. Event verification focused on outcome 2, which has one assessment standard (2.1). Visiting verification focused on outcome 1 which has three assessment standards (1.1, 1.2 and 1.3).

All centres verified this session for the Researching Chemistry Unit had used the SQA UASP and there were no issues with the approach to assessment.

For Advanced Higher visiting verification, a wide variety of research topics were observed. Some were common to several centres such as synthesis of organic compounds including aspirin and benzocaine, iron tablet analysis, calcium carbonate content of shells, copper determination and wine analysis. All topics verified were appropriate to Advanced Higher Chemistry.

Assessment judgements

On the vast majority of candidate evidence submitted there were clear marking annotations and clear judgements where the assessment standards had been achieved. These were often by both assessors and internal verifiers. However, a small number of centres had chosen only to indicate when a response was correct, and not make any annotation next to an incorrect response. This makes it more difficult to determine the overall assessment judgement for a candidate, as it is not always clear if a response is incorrect, or has been overlooked by the assessor. It is good practice to ensure that all candidate responses are annotated appropriately.

The majority of assessment judgements were accurate and reliable. Most centres submitted candidate record sheets to record the assessment decisions which aided the external verification process.

National 3

Centres which were verified were found to have made reliable assessment judgements, in all cases, and applied the marking guidance consistently throughout.

National 4

Centres which were verified were overall found to have made reliable assessment judgements, and applied the marking guidance consistently throughout. A small number of centres had assessed candidates through additional oral questioning, in order to clarify written answers, which is acceptable. If this is done, both the question asked and the candidate response should be recorded on the candidate evidence.

H21M 74 National 4 Chemistry Assignment — added value unit

Assessment standard 1.1 requires candidates to clearly state what is being investigated and why the issue is relevant to the environment/society. Assessment judgements for this assessment standard were generally reliable.

Assessment standard 1.2 requires candidates to select at least two relevant sources and record at least two sources in a way that they can be retrieved by a third party. Assessors should ensure that information is relevant to the issue before awarding a mark for a source. Although no formal referencing system is required, assessors should only award a mark for being able to retrieve information/data when the full URL is included. If one of the sources is a practical then the title and aim should be recorded. There is no requirement for one of the sources to be an experiment; it is acceptable for a candidate to provide two other relevant sources.

Assessment standard 1.3 requires candidates to present information/data from one of their sources in a different way. Candidates must include the correct headings, labels and units. In addition almost all (90%) the processing must be correct to be awarded all 3 marks for this assessment standard. A number of candidates were incorrectly being awarded all 3 marks for this assessment standard. Common errors included examples of candidates being awarded marks where units were missing and where one or more bars of out four on a graph was incorrectly plotted. Points or bars on graphs should be plotted to within plus/minus a half box tolerance. If a graph requires a line of best fit, joining the points would be treated as an incorrect processing point. Where candidates have calculated averages for their data, these should be checked as part of the processing. Some candidates were awarded marks for correct headings, labels and units even when one of the sources had not been presented in a different format.

Assessment standard 1.4 requires candidates to explain/describe underlying chemistry which relates to the issue. In addition, candidates should explain/describe at least one impact on the environment/society using some underlying chemistry. There were several examples of candidate evidence being presented which had little or no underlying chemistry, meaning that candidates

were not able to access marks allocated to this assessment standard. However, a number of centres still awarded marks to candidates for this assessment standard when there was no chemistry at an appropriate level. Additionally, some centres were using the same piece of information to award candidates marks for both assessment standard 1.1 and 1.4.

Assessment standard 1.5 requires candidates to communicate their findings clearly and concisely in an appropriate structure. There were examples of report and posters. A mark should only be awarded for summing up findings when the findings are backed up by evidence included in the report. A number of centres had awarded marks for this assessment standard although candidates had failed to link their findings to the issue being investigated.

Assessors should only award a mark for structure for a report where the report has clear sections. There is no requirement for these sections to have sub-headings. Additional information added at the end of a report can cost candidates a mark from structure when it is inserted out of sequence. For example, if further underlying chemistry is inserted after references rather than being included in the body of the report the report may no longer be appropriately structured.

SCQF levels 5 and 6 freestanding units

Only a small number of centres were verified for freestanding units at SCQF levels 5 and 6. Centres were generally found to have made reliable assessment judgements, although there were some common issues.

There were a number of instances of candidates providing incorrect units, but being credited with the full mark allocation for a question. Most questions do not require units to be stated, but if provided by a candidate, units must be correct. This should only be penalised once per paper. The general marking principles for National 5 and Higher provide guidance on this. Additionally, a small number of candidates had rounded final answers incorrectly, but were awarded marks by assessors. If rounding answers, the rounding must be correct for a mark to be awarded.

H4KK 76 Researching Chemistry (SCQF level 6)

Assessment standard 1.1 requires candidates to give a clear description of the chemistry appropriate to their research topic. Most centres verified this year had made use of a ‘day book’ approach where candidates had recorded key terms including appropriate chemical equations and structures. However, the underlying chemistry provided by a small number of candidates was very minimal. References were either contained within the description of the chemistry or in a separate reference section. Assessment judgements for this assessment standard were generally reliable with the majority candidates including sufficient chemistry and referencing sources which could be retrieved by a third party.

Assessment standard 2.1 requires candidates to plan their practical investigation. Assessment judgements were generally reliable for this assessment standard. Most candidates included clear instructions in their plan. Where candidates were

working in a group, details of the roles and responsibilities of each group member were not always provided.

Assessment standard 2.2 requires candidates to follow procedures safely and record observations/measurements. Assessment judgements for this assessment standard were generally reliable. Most candidates verified had included observations and/or raw data in their day book. Centres had annotated candidate evidence or log sheets to state that safety procedures were followed. Centres should ensure that candidates repeat procedures where appropriate. For candidates to achieve assessment standard 2.2, all raw data must be recorded including initial and final burette volumes for each titration.

Advanced Higher units

Centres verified were generally found to have made reliable assessment judgements although there were some common issues.

When assessing outcome 1 of the Chemical Changes and Structure unit, the majority of candidates had achieved at least 5 out of the 6 assessment standards (1.1 to 1.6). However, a small number of candidates had failed to include all the raw data with their report, and had thus not achieved assessment standard 1.3. Raw data should include all masses if weighing by difference, or a statement to indicate a balance was tared. For titrations, initial and final burette readings are required.

When assessing outcome 2 of the Chemical Changes and Structure and Researching Chemistry units, there were a number of instances of candidates providing incorrect units, but being credited with the full mark allocation for a question. One common example was the use of ‘k’ rather than ‘K’ for Kelvin. The general marking principles for Advanced Higher state that ‘in most questions units are not required. However, if the candidate writes units then they must be correct. An incorrect unit would not be acceptable and one mark would not be awarded’. The general marking principle regarding significant figures was also inconsistently applied by some centres. This states that ‘If the data in a question is given to three significant figures, the final answer should also have three significant figures. However one less significant figure and up to two more significant figures is acceptable.’

Centres should ensure that they are familiar with the general marking principles for Advanced Higher, and are applying these consistently when marking candidate evidence.

H7XR 77 Researching Chemistry (Advanced Higher)

Assessment standard 1.1 requires candidates to demonstrate a clear understanding of the chemistry related to their research topic. Judgements for this assessment standard were generally reliable. Candidates tended to include sufficient underlying chemistry explaining techniques employed in their practical, or background theory to the investigation. However, the underlying chemistry

provided by a small number of candidates was insufficient to be awarded this assessment standard.

Assessment standard 1.2 requires candidates to plan/design their practical giving a detailed description of how the practical should be carried out including risk assessments and a record of work. Assessment judgements for this were generally reliable. Since the plan must be sufficient detail for another person to follow it should include volume and concentrations of the chemicals used. Centres should also ensure that candidates include concentrations in risk assessments since the hazard for a particular solution can depend on the concentration being used.

Assessment standard 1.3 requires candidates follow procedures safely, record observations/measurements and maintain a record of work. Assessment judgements for this were generally reliable. Centres can either provide an observation checklist for the experimental stage or include a statement that a particular candidate was observed to have performed all procedures safely. Centres should ensure that candidates record all raw data to achieve assessment standard 1.3. A small number of centres had awarded this assessment standard despite candidate evidence lacking raw data or the appropriate units for this data. Raw data should include all masses if weighing by difference, or a statement to indicate a balance was tared. For titrations, initial and final burette readings are required. In addition, candidates are required to duplicate their experiments where appropriate and record the raw data for the duplicates.

03 Section 3: General comments

In round 1 this session, centres were selected for verification in Chemistry for units at National 3, National 4 and Advanced Higher. The vast majority of centres were found to be using a valid approach and made reliable assessment judgements. In round 2 this session, centres were selected for verification in Chemistry for the Researching Chemistry units at SCQF level 6 and Advanced Higher, or units for SCQF levels 5 and 6, or for the National 4 added value unit.

The majority of centres verified in this session have a good understanding of the national standard. Almost all centres provided candidate evidence which was internally verified by cross-marking. It was observed that centres will often show clearly which judgements are made by an assessor and which are made by the internal verifier since different colours of pen are used. Undertaking internal verification activity in this way aids the process of external verification. Most centres also included comments and notes on professional dialogue between assessors and internal verifiers and this was very helpful. However, in a small number of centres it was not clear what the final mark or judgement was. Where cross-marking leads to a difference of judgement between assessors and internal verifiers it should be clear what the final assessment judgement was.

In some centres, the process of internal verification was not entirely effective. In these cases, both the original assessor and internal verifier awarded marks

incorrectly to candidates. This was particularly true for assessment standards where processing of data required to be checked.

Although the marking guidance provided in the UASPs is not intended to be exhaustive and can be modified, centres must ensure that any modifications are of an equivalent standard to the existing guidance. If a correct answer is followed by a wrong answer then this should be treated as a cancelling error and no marks should be awarded.