



# **NQ Verification 2013–14**

## **Key Message Reports**

<b>Verification group name:</b>	Chemistry
<b>Levels</b>	N3 to N5
<b>Date published:</b>	July 2014

**This Report combines all Verification Key Messages for the academic session 2013-14.**



# NQ Verification 2013–14

## Key Messages Round 1

01

### Section 1: Verification group information

Verification group name:	Chemistry
Verification event/visiting information	Event
Date published:	January 2014

#### National Courses/Units/Awards verified:

Chemistry (National 3, National 4 and National 5) Unit assessments

02

### Section 2: Comments on assessment

#### Assessment approaches

Centres should ensure that they are making use of the most recent Unit assessment support packs and the appropriate Evidence Requirements.

Centres should note that each key area has a suggested range for the number of opportunities to make accurate statements. Details for each level can be found in *Package 3: the portfolio approach*.

Some centres have supplemented the Unit assessment support pack material with additional questions. The additional questions are increasing the number of opportunities to make accurate statements above and beyond the suggested level by SQA. In some centres, the additional questions are of a higher level of demand than required.

Centres should be cautious when adding questions, in order to avoid over-assessment of Assessment Standard 2.1 or presenting unnecessary barriers to candidates achieving a Unit pass.

In some centres, additional questions are being wrongly assigned as Assessment Standard 2.1 when in fact they are assessing Assessment Standard 2.4. Centres should use the grids provided in the Unit assessment support packs to help with classifying questions appropriately.

When utilising the portfolio approach, the smallest 'chunk' that can be assessed is a key area.

Centres which are devising their own assessments are advised not to include too many multiple-choice questions; one or two per Unit, especially if they only have one distractor per question, is appropriate.

Candidates should be given the opportunity to make accurate statements for all the key areas of each Unit.

Outcome 1: Centres should ensure that the practical work relates to a key area of the Course at the correct level. For example, if candidates carry out a practical activity related to rates of reaction then the average rate is required at National 5.

Assessment Standards 2.2 and 2.3: owing to acid rain being included in the draft documentation as a suggested topic for assessment of 2.2 and 2.3, SQA will accept reports on this topic for this year. In future, it could be used for assessment of 2.3 on its own (ie Describing a chemical issue in terms of the effect on the environment/society) but not 2.2 (Describing an application of chemistry).

## Assessment judgements

To pass Assessment Standard 2.1, at least half of a candidate's responses must be correct **across** each Unit. The marking instructions in each Unit assessment support pack, along with the grid that identifies the question type and the key area, clearly indicate what is classed as an opportunity to make a statement. For example, in a question asking candidates about nuclide notation both the number of protons and the number of neutrons must be correct — this would count as one opportunity to make an accurate statement.

Centres should be careful if allocating marks to Unit assessments. The example given above would be counted as one accurate statement and not broken down into two 'marks'. Under no circumstances should half marks be used; the use of half marks has been discontinued in the CfE qualifications. Similarly, for problem solving questions, marks should not be allocated for intermediate stages; the response is either correct or incorrect.

Candidates do not have to achieve 'at least half correct responses' within each key area provided at least half of their responses are correct **across** each Unit. This applies whether the centre is following the Unit by Unit approach, the portfolio approach or the combined approach.

It is important that where centres accept additional correct responses to questions in Unit assessments, they annotate the marking instructions to reflect this. Centres should be careful not to accept responses that would not be accepted in an examination.

For Assessment Standards 2.2 and 2.3, the candidate's short report should contain sufficient chemistry at the appropriate level. For example, 'when fossil fuels burn they give off sulfur dioxide', would not be sufficient chemistry at National 5 to pass the Assessment Standards.

Centres should make both their assessment decisions and internal verification decisions clear. It was not always possible to tell what the final decision was on evidence submitted for verification.

A number of centres demonstrated good practice by indicating on the candidates' reports where the evidence for each Assessment Standard had been overtaken.

To pass Assessment Standard 2.4, candidates need evidence that they have passed each problem solving skill **not** 50% of the skills. Where a test contains more than one opportunity for a problem solving skill, eg it contains three questions asking candidates to select information; candidates would need to get 50% or more of the questions correct. In the example given, the candidate would need to get two of three selecting information questions correct.

03

## Section 3: General comments

### Outcome 1: A scientific report of an experiment

To aid verification, assessors should be encouraged to identify (on candidate materials) where a particular Assessment Standard has been achieved as illustrated in the exemplar in the *Course Support Notes*:

1.1 A diagram on its own is not sufficient for the method. Sufficient information should be provided which would allow another candidate to follow the method, and replicate the experiment.

Safety points should be noted in the scientific report.

1.2 An observation checklist to record assessor comments is sufficient.

1.3 Candidates should be encouraged to use tables, with appropriate headings and units, to list data.

1.4 Candidates should use SI units and standard abbreviations where appropriate ( $\text{cm}^3$  *not* ml and s *not* sec).

1.5 In producing a conclusion, candidates should refer to the aim of the experiment.

1.6 For National 5, an evaluation should be supported by justification. At least one possible improvement to the experiment should be provided.

Students can redraft the investigations but centres should not provide excessive guidance.

Assessment Standards for Outcome 1 can be achieved in different practicals.

For National 5 Outcome 1, an experiment must be repeated and an average calculated.

### **Assessment Standards 2.2 and 2.3: A short report of a research investigation**

To aid verification, assessors should be encouraged to identify (on candidate materials) where a particular Assessment Standard has been achieved as illustrated in the exemplar in the *Course Support Notes*.

Acid rain has been a common research application. This will only be accepted in the current session (2013–14) as evidence for 2.2 and 2.3. In future, it could provide evidence for 2.3 on its own.

In submitting a research report on acid rain, candidates at National 5 should discuss the chemistry of how acid rain is formed.

Appropriate chemistry from a key area of the Unit should be included in the report, for example the use of chemical structures, chemical equations and chemical terms.

Many candidates at National 5 are providing reports with more detail than is actually required for the Unit assessment.

If a candidate has been assessed orally then a record of the questions asked and the candidate's responses should be provided to allow verification of the assessment decision(s).

While 2.2 and 2.3 need not be done together, it is usually better to do so as providing a chemical explanation for 2.3 alone may be difficult for some topics.

### **Assessment Standard 2.4: Solving problems**

Centres should note that each problem solving skill must be demonstrated.

At National 3 and National 4 there are three types of problem solving skill:

- ◆ make predictions/generalisations
- ◆ select information
- ◆ process information

At National 5 there are four types of problem solving skill:

- ◆ make predictions/generalisations
- ◆ select information
- ◆ process information
- ◆ analyse information

Candidates are only required to demonstrate each skill on one opportunity. If candidates have more than one opportunity they must demonstrate a particular skill on at least half of those opportunities.

Centres may wish candidates to have many opportunities to practise a particular problem solving skill in preparation for the external exam at National 5, but multiple opportunities are not required to achieve Assessment Standard 2.4.

If a candidate achieves a particular problem solving skill in one Unit, and is given further opportunities to demonstrate that same skill in another Unit but fails to do so, this will not cancel out the earlier achievement. Once Assessment Standard 2.4 has been achieved, it cannot be removed.

Please note that presenting data is not a problem solving skill in Assessment Standard 2.4 at any level.

Exemplification will be provided to support aspects of this key messages document in due course.

# NQ Verification 2013–14

## Key Messages Round 2

01

### Section 1: Verification group information

Verification group name:	Chemistry
Verification event/visiting information	Event
Date published:	March 2014

#### National Courses/Units verified:

Chemistry (National 3, National 4 and National 5) Unit assessments

02

### Section 2: Comments on assessment

#### Assessment approaches

Most centres are using the Unit assessment support packs produced by SQA or the prior verified assessments. A small number of centres are using centre-devised assessments. Centres are reminded that SQA offers a prior verification service where assessments can be approved before being used.

Some centres are not using the most recent Unit assessment support packs. The most recent Unit assessment support packs should be used and are available from the SQA secure site.

For Outcome 1, centres should ensure that the practical work relates to a key area of the Course at the correct level. For example, if candidates carry out a practical activity related to rates of reaction then the average rate is required at National 5. Whereas for National 4, investigating factors affecting rate or looking at the change in rate as the reaction progresses, is appropriate.

For National 5, there were several examples of centres using rates of reaction experiments but with no average rate being calculated, which is not acceptable at this level.

Many centres are using the combustion of alcohols as a suitable investigation to produce a scientific report. Centres should ensure that experiments are repeated to allow an average to be calculated for each alcohol.

Centres should ensure they are selecting investigations that have a dependent and an independent variable. For some investigations/experiments it was very difficult to determine what these were, which put candidates at a disadvantage, and in some cases an experiment had been chosen that did not have a dependent variable.

When devising Unit assessments, centres are reminded that the number of opportunities for each key area for Outcome 2.1 is noted in the assessment documents for the portfolio approach. This should be used as a guide and not more than five opportunities should be given per key area to avoid over-assessment.

Some centres have supplemented the Unit assessment support packs with additional questions to assess Assessment Standard 2.1. Centres should ensure that additional questions are of the correct level of demand. If past paper questions are used for Assessment Standard 2.1, centres should be mindful that such questions will often be of a greater level of difficulty than is appropriate for Unit assessment. Centres should also ensure that in adding additional questions they haven't made the assessment unbalanced or more onerous than it should be.

For Assessment Standards 2.1/2.4, it is recommended that no more than 20% of an assessment for a Unit is multiple-choice questions and that this type of question should have four options (A–D) from which to choose the correct answer.

In marking Assessment Standard 2.1, centres are reminded that to pass Assessment Standard 2.1 a candidate must achieve at least half correct responses across each Unit. There was clear evidence that centres now have a better understanding of how to pass 2.1. Where centres decide to attribute marks to questions assessing 2.1, care should be taken in how marks are allocated. Some questions require more than one piece of information for a correct response, eg nuclide notation, and it would not be appropriate to allocate more than one mark to such a question.

Candidates are not required to achieve at least half correct responses within each key area. Candidates may be weaker on some key areas and stronger on others; if they achieve at least half correct responses across a whole Unit they pass Assessment Standard 2.1 for that Unit. This applies whether a centre is following a Unit-by-Unit approach or a portfolio approach.

Candidates should be given the opportunity to make accurate statements for all the key areas of each Unit. If a candidate needs to be re-assessed for 2.1 then there are two possible approaches to re-assessment; the candidate could be

given another test covering all of the key areas within a Unit and if they get 50% or more of the responses correct they would pass 2.1, or the centre could analyse the candidate's performance in each key area in the first test and then re-assess the candidate on those key areas in which the candidate performed poorly (taken to be less than half the opportunities correct). In the second example, the candidate would pass if they scored 50% or more of this re-assessment. You would not add the original assessment and the re-assessment together and apply a 50% threshold.

To illustrate this second point, suppose a test for 2.1 covered a Unit with four key areas and the number of questions in each key area was 1, 4, 4, and 3 respectively. In the test, the candidate scored 1/1, 1/4, 2/4 and 1/3, so they scored 5/12 and therefore hadn't passed 2.1 for the Unit. The centre could then choose to re-assess this candidate on the second and fourth key areas. If the centre re-assessment for this candidate consisted of, for example, three questions on each of these two key areas and the candidate scored 3/6 in this re-assessment, they have passed Assessment Standard 2.1.

One centre was found to have split key areas when assessing 2.1. It should be noted that when using the portfolio approach the smallest amount that can be assessed in one opportunity is a key area.

For Assessment Standards 2.2/2.3, a short report of a research investigation is required. Acid rain as a topic will only be accepted in the current session (2013–14) for assessing both 2.2 and 2.3. It may be used in the future for assessing 2.3 on its own but not 2.2.

Some centres are combining the laboratory report for Outcome 1 with evidence for Assessment Standards 2.2 and 2.3, thus reducing the overall assessment. For example, candidates could investigate the combustion of different alcohols for Outcome 1 and include a short report on a suitable application of alcohols (eg as fuels) and the impact on society/environment to achieve 2.2 and 2.3.

Assessment Standard 2.4 requires the assessing of problem solving skills. Centres should note that each problem solving skill must be demonstrated. At National 3 and National 4, there are three types of problem solving skill. At National 5, there are four types of problem solving skill. Centres may wish candidates to have many opportunities to demonstrate a particular problem solving skill in preparation for the external exam at National 5 but multiple opportunities are not required to achieve Assessment Standard 2.4.

There were some centres presenting evidence for the National 4 Added Value Unit. It should be noted that there must be appropriate chemistry relating to a key area of the National 4 Course.

There was evidence of a variety of approaches to generate evidence for the Added Value Unit. Some centres submitted reports, information leaflets and PowerPoint presentations.

During the research stage centres should ensure that the evidence produced is the candidate's own work. This could be done through the use of regular checks/progress meetings or checking candidate's log book/blogs. There was some evidence at verification of candidates producing a log book for collecting evidence.

Centres are reminded that for a candidate to achieve Assessment Standard 1.2 of the Added Value Unit, they must record at least two relevant sources of information in such a way that they could be retrieved by a third party. If one source is a practical activity then the title and the aim should be recorded.

## **Assessment judgements**

To aid verification assessors and internal verifiers should be encouraged to identify on candidate materials where a particular Assessment Standard has been achieved — as illustrated in the exemplar in the *Course Support Notes*.

For the Added Value Unit there needs to be evidence that the candidate has a record of research for Assessment Standard 1.2, eg log sheet or day book that has been signed by the teacher. It would be helpful if this were included in evidence sent in. As a minimum, at least some indication needs to be made by the centre as to how the Assessment Standard 'researching the issue' had been carried out and judged pass or fail. The final communication is not evidence of this.

For Outcome 1 in the 'content based' Units, an entire Assessment Standard must be passed within one investigation and should not be split, eg Assessment Standard 1.1 at National 5 requires the following pieces of evidence. The plan should include:

- ◆ an aim
- ◆ a dependent and independent variable
- ◆ key variables to be kept constant
- ◆ measurements/observations to be made
- ◆ the resources
- ◆ the method including safety considerations

All of these must be correct in one plan to achieve this Assessment Standard. If, for example, a candidate has an incorrect aim they could be re-assessed for this Assessment Standard either by redrafting their aim after appropriate remediation or by producing a plan for another investigation in which all six pieces of evidence are correct.

Candidates do not specifically have to use the words dependent and independent variable as long as the description is clear in that it identifies the variable being altered and how it is being altered, and the variable being measured and how it is being measured. The plan should be described in enough detail so that another

candidate could replicate the experiment. Also, the main safety points should be noted in the scientific report.

Different Assessment Standards within an Outcome can be evidenced through different investigations or pieces of evidence, so a candidate may pass Assessment Standard 1.1 with a plan for one investigation but pass Assessment Standard 1.2 in a different investigation/practical. For 1.2, an observation checklist to record assessor comments is sufficient to evidence that this Assessment Standard has been met.

When assessing Assessment Standard 1.3, Candidates should be encouraged to use tables to list data, and for Assessment Standard 1.4 candidates should use SI units and standard abbreviations where appropriate. Please note, in the verification key messages document from Round 1, it stated that candidates should use  $\text{cm}^3$  and not ml. Although not an SI unit, the use of ml is appropriate in Chemistry, especially given that much of the apparatus within centres may be marked in ml. So the earlier message should be disregarded. Centres should still encourage their candidates not to use abbreviations such as secs for seconds.

For Assessment Standard 1.5, when producing a conclusion it should clearly relate to the aim.

For Assessment Standard 1.6 at National 5, an evaluation should be supported by justification. At least one possible improvement to the experiment should be provided.

For Outcomes 2.2/2.3, if centres require to re-submit these Assessment Standards they do not necessarily need to get candidates to redraft the original piece of evidence. They can submit another example of 2.2/2.3 report from these candidates that is of the correct standard. As a rule of thumb, for National 5 standard you would expect to see formulae (structural where appropriate) and balanced equations.

For Assessment Standard 2.4, candidates are only required to demonstrate each skill on one opportunity. If candidates have more than one opportunity in a test they must demonstrate a particular skill on at least half of those opportunities. For example, if a test contains three 'processing' questions, the candidate must get two correct to evidence 'processing'.

03

## Section 3: General comments

Centres are advised to be very cautious about adopting the approach of using questions embedded in a prelim as evidence for Unit assessment. The centre would need to:

- ◆ ensure that all key areas within the Unit being assessed were covered appropriately within the prelim (using the table provided in the portfolio)

- approach to determine the number of questions for each key area, in order to avoid skewing the assessment to particular key areas or omitting others)
- ◆ identify which questions were related to each key area or problem solving skill (for example, using a grid similar to those included in Unit assessment support packs)
  - ◆ clearly identify for verification purposes which questions were being considered for each Unit or for each 2.4 problem solving skill
  - ◆ identify the appropriate parts of the marking instructions to be considered and ensure that only C grade questions were being included in making the decision about whether a candidate has passed a Unit assessment

Centres should also consider the fact that a prelim will contain A grade questions as part of extended questions and/or multiple choice, and where a candidate struggles with an A grade question it may have an effect on whether they are able to tackle some of the more straightforward questions. It is not uncommon for candidates to struggle with an A grade question and then decide they also cannot do the following part, which may actually be an easier question. The centre may well be putting unnecessary barriers in the way of candidates achieving a Unit pass.

Candidates should not be given an assessment that covers both National 4 and National 5 work together unless it is clearly indicated which questions applied to which level, and this information is clearly communicated for both internal and external verification purposes.

Centres should only submit evidence for a candidate at the level they indicate on the Verification Sample Form. For example, if a centre is submitting evidence for a candidate they are entering for National 4, they should not submit failed National 5 evidence for this candidate or evidence marked as a pass at National 3.

Prompting is an acceptable level of help but care needs to be taken that candidates are not given model answers or prompts that give an inappropriate amount of guidance. Some scripts received clearly showed teachers' annotations/corrections and the candidate had then just copied these as part of their redrafting for re-assessment in order to be awarded a pass. For example, identifying to a candidate that they haven't passed Assessment Standard 1.4 as the units in their table are incorrect and they need to correct these, would be an appropriate level of support for re-assessment. Saying to a candidate 'the units in your table should be ml, you need to correct this' would not be appropriate.

Redrafting of internally assessed Outcome 1 and Assessment Standards 2.2/2.3 is acceptable but not for the National 5 Assignment.

Centres must ensure that pupils are not simply cutting and pasting or writing down information word for word from the internet or literature sources.

When using Unit assessment support packs, centres should indicate on the copy of their marking instructions any changes that they have made. There are a few mistakes in the published marking instructions for the Unit assessment support packs (eg National 4, Unit 1, Q1 (b) (iii) should be 54+2 not 56) which will be amended by SQA in due course.

When submitting evidence, centres should ensure that the print of material is clear — particularly PowerPoint presentations where the background of slides is dark. Some evidence submitted was difficult to read because of this issue.

# NQ Verification 2013–14

## Key Messages Round 3

### 01 Section 1: Verification group information

Verification group name:	Chemistry
Verification event/visiting information	Event
Date published:	June 2014

#### National Courses/Units verified:

National 4Chemistry Added Value Unit (H21M 74)

### 02 Section 2: Comments on assessment

#### Assessment approaches

All centres that were verified used the assignment approach following the Assessment Standards in the Unit assessment support pack. Submitted evidence demonstrated that candidates were undertaking assignments on a number of topics including de-icers, fertilisers, alcohols, medicines, alloys and metals.

There was evidence of a variety of approaches to generate evidence for the Added Value Unit. Some centres submitted reports, information leaflets and PowerPoint presentations.

Centres should ensure that during the research stage the evidence produced is the candidate's own work. This could be done through the use of regular checks/progress meetings or checking the candidate's log book/blog. There was some evidence at verification of candidates producing log books for collecting evidence.

Centres are reminded that for a candidate to achieve Assessment Standard 1.2 of the Added Value Unit, they must record at least two relevant sources of

information in such a way that they could be retrieved by a third party. If one source is a practical activity then the title and the aim should be recorded.

## Assessment judgements

For Assessment Standard 1.1 to be achieved, candidates must justify why they have chosen a particular issue in chemistry and clearly state the issue they are researching. For this Assessment Standard candidates are required also to clearly show how the issue is relevant to the environment/society.

For Assessment Standard 1.2, candidates can use experimental data from various sources, eg a group experiment, a teacher demonstration, or an experiment performed by a lab technician or from the internet. However, the title and aim should always be stated.

For Assessment Standard 1.3, if a summary is being used rather than a table or a diagram then the information gained from the research needs to be processed rather than just copied, in order to prove that the candidate has understood the chemistry they were presenting. When presenting graphical data using the program Excel, candidates need to ensure that they use appropriate scales and include sufficient detail, eg grid lines, labels, units, etc to allow the accuracy to be checked. Candidates should not be penalised if there are only minor omissions/errors to the presentation as long as there is sufficient detail to convey the information.

To achieve Assessment Standard 1.4, candidates need to explain about the impact(s) on society/environment using chemistry that is relevant and they must make reference to the processed data they have presented.

Candidates do not need an overall conclusion to achieve Assessment Standard 1.5, they need only sum up ideas, issues or findings; but when they present data they do need to make conclusions from that.

03

## Section 3: General comments

Some centres passed assignments for this Unit that contained no relevant chemistry but just reported on socio/economic issues without referring to or presenting chemical information. To achieve a pass in all the Assessment Standards for this Unit, candidates must investigate a chemical issue where they can accurately present relevant knowledge of chemistry at National 4 level or above.

Assessors should mark on scripts where each Assessment Standard has been achieved.