



**National Qualifications 2013
Internal Assessment Report
Chemistry (Revised): Higher**

The purpose of this report is to provide feedback to centres on verification in National Qualifications in this subject.

National Qualifications (NQ) Units

Titles/levels of NQ Units verified:

Revised Higher/Researching Chemistry/ FE4J/12 (visiting verification)

(All verification of this Unit took place between February and March 2013.)

General comments

All centres used one of the two SSERC investigation briefs from the Education Scotland website (Alcohols or Antioxidants). Each brief contains five investigations and each investigation contains a number of focus questions. Outcome 1 (the focus question) and Outcome 3 (the scientific communication) are individual tasks, Outcome 2 (the investigation) is carried out in groups.

Outcome 1: all centres encouraged candidates to produce answers which were clear, accurate and related directly to the focus question. Redrafting was used to improve accuracy and improve the standard of English. Staff found that it was time consuming and difficult to check all internet references cited in the focus question report, however, they found that having the references sent to the class teacher via the internet made it much easier to check their validity. A free shared website called Edmodo was used in some centres. Most centres verified checked all the references; some centres checked a sample of approximately 50%.

Assessment of work done online requires a checklist which can be initialled and, preferably, dated when the PC has been overtaken. The majority of centres downloaded and adapted the record sheet from either page 87 of the Chemistry (Revised) Higher Course Specification (December 2010) or from page 14 of the NAB document FE4J 12/001 V1 (March 2012) to include a column for the date and further columns to record evidence of internal verification.

Outcome 2: each brief contains an experimental procedure so Outcome 2 PC(a) 'planning' means distributing tasks amongst the group, collecting apparatus and deciding how and when to take and record results, as well as any adaptations that may be appropriate. Centres used a variety of ways to ensure that all candidates were involved in both the planning and the experimental work. Some centres used jotters as day books others used folders which included 'lab pages' of rough working as an audit trail to show participation in planning and carrying out the investigation. It is important to have procedures in place to record the date on which each individual candidate overtakes this Outcome.

Outcome 3: The majority of centres made use of the support material from the Education Scotland website, often customising the documents and using them as teaching aids before starting work on Outcome 3. The majority of Outcome 3 evidence was in the form of a lab report and, although there is no need to include a procedure as the exemplars provide one, the majority of centres preferred to use the traditional format and included a procedure directly after the aim. In 25%

of centres verified the Outcome 3 reports were of a much higher standard than is required for this half Unit, being modelled, as they were, on an AH investigation report. All centres encouraged candidates to use correct English and all insisted on redrafting if the English was poor. It is essential that the conclusion [PC(c)] is clearly stated and is related to the aim [PC(a)]. Assessment of Outcome 3 PC(d) was found to be problematic. There was ongoing debate as to the extent of evaluation needed to overtake this PC at this level. Of the seven bullet points exemplifying [PC(d)] on page 8 of the NAB document (NAB/FE4J 12/001 V1, published March 2012), it was felt there needed to be evidence of at least two being considered by the candidate for the PC to be overtaken.

Unit specifications, instruments of assessment and exemplification materials

Assessors in all centres were familiar with the Unit specification, found on pages 76 to 88 of the Arrangements document (December 2010) on the SQA website (*chemistry/revised higher/arrangements, dec 2010*) and with the instrument of assessment consisting of three Outcomes and eight Performance Criteria exemplified in the Unit specification. All centres were using the National Assessment Bank pack, Revised Chemistry (Higher), Researching Chemistry FE4J 12/NAB001 available on the SQA secure site. Assessors were all familiar with the additional exemplification materials found on the Education Scotland website (*educationscotland/search for chemistry/page 2/Higher Chemistry: Learning and Teaching-All resources/scroll down to Researching Chemistry*).

Several centres had created more user-friendly material by summarising documents from the ES site, eg Preparing a Scientific Communication, and focusing on the sections needed by candidates as they tackled Outcome 3.

Evidence Requirements

There is a clear understanding of the requirements for Outcomes 1 and 2, but the Evidence Requirements for Outcome 3 are less clear.

Administration of assessments

The assessment instruments for FE4J/12 are provided by SQA along with advice on how to administer them. All centres verified used their intelligence, initiative and professional judgement in interpreting this advice. In all centres there was evidence of a continual discussion between class teachers/lecturers about the standards required. Standards were agreed by a variety of methods, eg pre-Unit discussion, marking sample scripts, central marking, cross-marking and, in some cases, a final check of standards by the PT. As departmental procedural expectations were frequently discussed, they were consistently applied.

At the time of verification all centres had discussed standards, as described above. Twenty-five per cent of centres had delayed signing-off the final internal verification in anticipation of the verification visit. In other centres, rigorous procedures for internal verification were in place and internal verification had

picked up the fact that some candidates needed to re-draft the Outcome 3 report in order to overtake all four PCs; in some cases two re-drafts had been necessary. In these centres, 20% of candidates had been cross-marked. In each case the candidate evidence was initialled and dated by the Internal Verifier who had, in most cases, also provided feedback for the candidates.

Areas of good practice

Outcome 2 involves group work and each member of the group must contribute towards planning and carrying out the experiment if they are to overtake this Outcome. One centre issued candidates with two pro forma slips for Outcome 2, asking them to write down examples of 'the contribution of each group member to the planning and carrying out of the experiment' and a second slip to comment on 'how I contributed to planning and carrying out the experiment'. This, plus class discussions prior to starting the work, made each candidate aware of the need to be actively involved in order to overtake Outcome 2. It was interesting to note the views of each individual on their personal contribution as opposed to the opinion of other members of the group on that same contribution.

Some candidates from one centre produced scientific conference posters as a vehicle which allowed them to successfully overtake Outcome 3.

In 25% of centres, rigorous and imaginative procedures were in place to prepare candidates for the Researching Chemistry Unit. Support materials from the Education Scotland website were customised and used through the autumn term to teach methods of 'Planning and carrying out an investigation', 'Communicating scientific information', 'Processing and analysing results' etc. This work was done in a jotter and the information acquired was then used to plan experiments, list apparatus and chemicals, write procedures and record and analyse results in the same jotter, which was effectively used as a day book. This excellent Outcome 2 material was marked (with initials and dates) and there was ample evidence of advice designed to improve the quality of the Outcome 3 report being given by class teachers. In most instances an Introduction and Discussion were drafted in the 'day book' before being used in the final Outcome 3 report.

Very good procedures for internal verification had been set up by a small presenting centre. The school had arrangements in place for the class teacher to visit another presenting centre where staff will meet to verify the assessment decisions. The host centre has staff with SQA experience at this level.

All centres encouraged candidates to thoroughly research their focus question (for Outcome 1) on the internet and to write their responses in their own words. A wide range of websites were referenced and their urls showed that reliable sites had been accessed — and that pupils were aware of bias.

Several centres used the assessment sheet from page 6 of the NAB document to assess Outcome 1. This has the advantage of keeping the focus question in front of the candidates as they type their answers.

In the majority of centres, rigorous procedures for internal verification were in place and internal verification had picked up the fact that some candidates needed to re-draft the Outcome 3 report in order to overtake all four PCs; in some cases two re-drafts had been necessary. In these centres, 20% of candidates had been cross-marked. In each case the candidate evidence was initialled and dated by the Internal Verifier who had, in most cases, also provided feedback for the candidates.

Specific areas for improvement

FE4J 12/001 is the NAB for the Higher half Unit Researching Chemistry and, as such, it should be marked as the NAB tests for the other three Units are marked. This means there should be an indication, in the candidate evidence, of where each PC has been deemed to be overtaken. It is good practice to date any entry in a candidate's daybook.

Best practice is for Outcome 2 evidence for each candidate to be dated to show when the individual overtook each PC. This can be achieved by dating, rather than ticking, each box on the Assessor observation checklist from either page 87 of the Chemistry (Revised) Higher Course Specification (December 2010) or from page 14 of the NAB document FE4J 12/001 V1 (March 2012).

Outcome 3 PC(b): Titration results should include initial and final burette readings so that the titre calculation can be checked. Raw results should be recorded and, where they are presented in a table, suitable headings and correct units should be used. Graph axes should be correctly labelled and have units.

O3PC(d): The NAB document states:

Your evaluation may include:

- ◆ an assessment of the effectiveness of your experimental procedure
- ◆ a discussion of the variables controlled
- ◆ possible improvements in the experimental procedures
- ◆ possible sources of error
- ◆ suggestions for further work
- ◆ predictions or generalisations based on your results
- ◆ an assessment/explanation of the relevance of your results

It is not necessary to include all of these points in the evaluation, but it should be remembered that, as stated on page 82 of the Chemistry (Revised) Higher Course specification, 'the external examination for this Course contains questions.....' on this Unit so some, or all, of these areas could be useful teaching points for the final exam.