

National Unit Specification: general information

UNIT	Chemical Reactions (Higher)
NUMBER	D071 12
COURSE	Chemistry (Higher)

SUMMARY

The unit seeks to develop knowledge and understanding, problem solving and practical abilities in the context of the chemical industry; Hess's law; equilibrium; acids and bases; redox reactions; and nuclear chemistry.

OUTCOMES

- 1 Demonstrate knowledge and understanding related to *Chemical Reactions*.
- 2 Solve problems related to *Chemical Reactions*.
- 3 Collect and analyse information related to *Higher Chemistry* obtained by experiment.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates will normally be expected to have attained one of the following:

- Standard Grade Chemistry at Grades 1 and 2
- the Intermediate 2 Chemistry course or its component units

together with

- Standard Grade Mathematics at Grades 1 and 2 or Intermediate 2 Mathematics.

(The preferred entry level from Standard Grade is based on achievement in the Knowledge and Understanding and Problem Solving elements.)

Administrative Information

Superclass:	RD
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National Unit Specification: general information (cont)

UNIT Chemical Reactions (Higher)

CREDIT VALUE

1 credit at Higher.

CORE SKILLS

There is no automatic certification of core skills or core skills components in this unit.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Chemical Reactions (Higher)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Demonstrate knowledge and understanding related to *Chemical Reactions*.

Performance criteria

- Knowledge and understanding of the chemical industry is clearly shown in appropriate ways.
- Knowledge and understanding of Hess's Law is clearly shown in appropriate ways.
- Knowledge and understanding of equilibrium is clearly shown in appropriate ways.
- Knowledge and understanding of acids and bases is clearly shown in appropriate ways.
- Knowledge and understanding of redox reactions is clearly shown in appropriate ways.
- Knowledge and understanding of nuclear chemistry is clearly shown in appropriate ways.

Evidence requirements

Evidence of an appropriate achievement from a closed-book test with items covering all of the following aspects of the above performance criteria.

Knowledge and understanding of the chemical industry

Further detail not needed

Knowledge and understanding of Hess's Law

Further detail not needed

Knowledge and understanding of equilibrium

- The concept of dynamic equilibrium
- Shifting the equilibrium position

Knowledge and understanding of acids and bases

- The pH scale
- The concept of strong and weak
- The pH of salt solutions

Knowledge and understanding of redox reactions

- Oxidising and reducing agents
- Redox titrations
- Electrolysis

Knowledge and understanding of nuclear chemistry

- Types of radiation
- Half-lives
- Radioisotopes

National Unit Specification: statement of standards (cont)

UNIT Chemical Reactions (Higher)

OUTCOME 2

Solve problems related to *Chemical Reactions*.

Performance criteria

- (a) Relevant information is selected and presented in an appropriate way.
- (c) Conclusions drawn are valid and explanations given are supported by evidence.
- (d) Experimental procedures are planned, designed and evaluated in an appropriate way.

Note: The lettering system for PCs is common to all units in the Higher Chemistry course. Not all of the PCs feature in all of the units. For example, PCs (b) and (e) do NOT feature in this unit, although they do feature in other units in the course.

Evidence requirements

Evidence of an appropriate level of achievement from a closed-book test with items covering all of the above performance criteria.

OUTCOME 3

Collect and analyse information related to *Higher Chemistry* obtained by experiment.

Performance criteria

- (a) The information is collected by active participation in the experiment.
- (b) The experimental procedures are described accurately.
- (c) Relevant measurements and observations are recorded in an appropriate format.
- (d) Recorded experimental information is analysed and presented in an appropriate format.
- (e) Conclusions drawn are valid.

Evidence requirements

A report of one experimental activity is required, covering the above performance criteria and related to the contents and notes specified for Higher Chemistry. The report must be the individual work of the candidate and based on an experiment in which the candidate has been involved. Depending on the activity, the collection of the information may be group work.

National Unit Specification: support notes

UNIT Chemical Reactions (Higher)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

The recommended content together with suggested activities for this unit are detailed in the course specification. The subheadings in these tables correspond to the aspects mentioned in the evidence requirements for Outcome 1. The prescribed practical activities for the unit are listed in the *Course Contents*.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

General advice is contained in the course specification and more detailed advice will be contained in the Subject Guide for chemistry.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2

It is recommended that a holistic approach is taken for assessment of these outcomes. Outcomes 1 and 2 can be assessed by an integrated end of unit test with questions covering all the performance criteria. Within one question, assessment of knowledge and understanding and problem solving can occur. Each question can address a number of performance criteria from either Outcome 1 or 2. Appropriate assessment items are available from the National Assessment Bank.

Outcome 3

Opportunities to generate evidence for attainment at Outcome 3 will arise during the practical work related to the prescribed practical activities.

Related to PC (a), the teacher/lecturer checks by observation that the candidate has taken part in the collection of information by experiment.

Candidates should provide a structured report with an appropriate title. The report should relate to the performance criteria as follows:

- b) As experiments will follow a given procedure or method there is no need for a detailed description. The procedure, or the steps in the procedure, should be described briefly in outline. The impersonal passive voice should be used. The following should be used as appropriate:
- aim of the experiment
 - a labelled diagram, description of apparatus, instruments used
 - how measurements were taken or observations made
 - comments on safety.

National Unit Specification: support notes (cont)

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- c) Readings or observations (raw data) should be recorded using the following, as appropriate:
- a table with correct headings and appropriate units
 - a table with headings/observations entered correctly
 - a statement of results.
- d) Readings or observations (raw data) should be analysed/presented using the following, as appropriate:
- a table with suitable headings and units
 - a table with ascending or descending independent variable
 - a table showing appropriate computations
 - a correct calculation
 - a graph with independent and dependent variables plotted on horizontal and vertical axes respectively
 - a graph with suitable scales and axes labelled with quantities and units
 - a graph with data correctly plotted with a line or curve of best fit.
- e) Conclusions should contain, as appropriate:
- the overall pattern to readings
 - the trends in analysed information or results
 - the connection between variables
 - an analysis of the observations
 - the findings from completed calculations.

The bullet points under each performance criterion give an indication of what should be addressed to achieve a pass. The relevance of the bullet points will vary according to the experiment. These bullet points are intended as helpful guidance. The decision of pass or fail is to be made by the professional judgement of the presenting centre (subject to moderation) against the performance criteria.

Redrafting

It is appropriate to support candidates in producing a report to meet the performance criteria. Redrafting of reports after necessary supportive criticism is to be encouraged both as part of the learning and teaching process and to produce evidence for assessment. Redrafting is only required for the specific performance criteria identified in need of further attention, ie the entire report does not require to be rewritten.

Conditions required to complete the report

Candidates may complete their reports outwith class time provided reasonable measures are taken to ensure that the report is the individual work of the candidate.

Teachers and lecturers may wish candidates to write up reports under their direct supervision so that they can provide appropriate advice and support. However, they may feel confident that any redrafting required need not be undertaken under such close supervision as it will be evident in the candidate's response that it is his or her unaided work. Under such circumstances it would be acceptable for such redrafting to take place outwith class time.

National Unit Specification: support notes (cont)

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Use of IT

Candidates may, if they wish, present their reports in a word-processed format. Candidates may use Excel or any other suitable data analysis software when tackling Outcome 3. However, candidates must not be given a spreadsheet with pre-prepared column headings or formula since they are being assessed on their ability to enter quantities and units into a table and to make decisions about appropriate scales and labels on graph axes.

Transfer of evidence

If candidates are taking this unit as part of a course and produce only one report for Outcome 3 across the course, then that report must be on a Unit 1 (Energy Matters) prescribed practical activity.

Candidates who are repeating a year may use evidence of an appropriate standard generated in a previous year.

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).