SCOTTISH QUALIFICATIONS AUTHORITY

CHEMISTRY
Access 3

Third edition – published June 2002

NOTE OF CHANGES TO ARRANGEMENTS
THIRD EDITION PUBLISHED JUNE 2002

CLUSTER TITLE:	Chemistry (Access 3)
CLUSTER NUMBER:	C012 09
National Unit Specifications	
All units:	Units and aspects of Outcome 1 performance criteria numbered in content tables. Clarification of assessment requirements for Outcome 3. Aspects of Outcome 1 performance criteria numbered. Advice on the assessment of Outcome 3 expanded and clarified.

National Cluster

CHEMISTRY (ACCESS 3)

CLUSTER NUMBER C012 09

STRUCTURE

The programme of study has three mandatory units, as follows:

D063 09	***Chemistry in Action (Acc 3)***	***1 credit (40 hours)***
D064 09	***Everyday Chemistry (Acc 3)***	***1 credit (40 hours)***
D065 09	***Chemistry and Life (Acc 3)***	***1 credit (40 hours)***

These three units are based on units available at the Intermediate 1 level, with the outcomes modified to meet the needs of candidates who may be achieving at Access 3. The titles of the units at the Access 3 level have been kept the same as the corresponding Intermediate 1 units.

It is envisaged that appropriate groups of candidates can be taught at the Intermediate 1 level using the content, contexts, applications, illustrations and activities provided in the Intermediate 1 course specification. Candidates can then be assessed to provide evidence of their actual level of achievement ie, to determine whether this is at Intermediate 1 or Access 3. Appropriate assessment material will be provided through the National Assessment Bank.

The design of the programme of study necessitates that the Chemistry in Action (Acc 3) unit be studied first.

In common with all courses, this programme of study includes 40 hours over and above the 120 hours for the component units. This may be used for induction, extending the range of learning and teaching approaches, support, consolidation and integration of learning. This time is an important element of the programme of study and advice on its use is included in the cluster details.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

Administrative Information

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 03

National Cluster: general information (cont)

CLUSTER Chemistry (Access 3)

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

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

SPECIAL NEEDS

This 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).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Chemistry in Action (Access 3)

NUMBER D063 09

CLUSTER Chemistry (Access 3)

SUMMARY

The unit seeks to develop knowledge and understanding, problem solving and practical abilities in the context of substances; chemical reactions; and acids and alkalis.

OUTCOMES

1 Demonstrate knowledge and understanding related to *Chemistry in Action*.
2 Solve problems related to *Chemistry in Action*.
3 Collect and analyse information related to *Access 3 Chemistry* obtained by experiment.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Access 3.

Administrative Information

Superclass: RD

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 03

National Unit Specification: general information (cont)

UNIT Chemistry in Action (Access 3)

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

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 Chemistry in Action (Access 3)

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 Chemistry in Action.

Performance criteria

(a) Knowledge and understanding of substances is clearly shown in appropriate ways.
(b) Knowledge and understanding of chemical reactions is clearly shown in appropriate ways.
(c) Knowledge and understanding of acids and alkalis is clearly shown in appropriate ways.

Evidence requirements

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

Knowledge and understanding of substances

(i) Elements
(ii) Compounds and mixtures
(iii) Solutions
(iv) Hazards

Knowledge and understanding of chemical reactions

(i) Identification
(ii) Speed of reactions
(iii) Word equations

Knowledge and understanding of acids and alkalis

(i) The pH scale
(ii) Common acids and alkalis
(iii) Neutralisation
(iv) Acid rain

National Unit Specification: statement of standards (cont)

UNIT Chemistry in Action (Access 3)

OUTCOME 2

Solve problems related to Chemistry in Action.

Performance criteria

(a) Relevant information is selected and presented in an appropriate way.
(b) Conclusions drawn are valid and explanations given are supported by evidence.

Evidence requirements

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

OUTCOME 3

Collect and analyse information related to *Access 3 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) Conclusions drawn are valid.

Evidence requirements

A report of one experimental activity is required covering the above performance criteria and related to one of the following experiments:

- the effect of temperature changes on dissolving speed
- the effect of concentration changes on reaction speed
- testing the pH of solutions.

The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from active participation in an experiment involving the candidate planning the experiment; deciding how it is managed; identifying and obtaining the necessary resources, and carrying out the experiment. Depending on the activity, the collection of the information may be group work.

Evidence submitted in support of attainment of PC(c) must be in the format of a table or graph(s) as appropriate.

Conclusions drawn should be based on evidence and include an evaluation. The evaluation should cover all stages of the experiment including the initial analysis of the situation, planning and organising the experimental procedures and reviewing the strengths and weaknesses of the procedures.

National Unit Specification: support notes

UNIT Chemistry in Action (Access 3)

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 CONTENT AND CONTEXT FOR THIS UNIT

The Content Statements given in the left-hand column of the tables on the following pages describe in detail the knowledge and understanding associated with that unit of the programme of study. Achievement will require to be shown in a variety of ways, that is, candidates will be expected to 'state', 'describe', 'explain', 'identify', etc., as appropriate. The right-hand column gives Suggested Activities related to the Content Statements. Opportunities to make use of information technology are indicated by (ITO).

It should be noted that the content has been arranged to tie in with the Outcome 1 performance criteria and evidence requirements of the unit. Teacher/lecturers may wish to reorder for learning and teaching purposes.

All candidates will be expected to carry out the prescribed practical activities listed below. These are highlighted in italics under Suggested Activities. The list may be subject to additions or deletions. The awarding body would give notice of any such change before the start of the session in which it would apply.

ACTIVITY	UNIT
The Effect of Temperature Changes on Dissolving Speed	1
The Effect of Concentration Changes on Reaction Speed	1
Testing the pH of Solutions	1

GUIDANCE ON TEACHING AND LEARNING 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.

National Unit Specification: support notes (cont)

UNIT Chemistry in Action (Access 3)

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 three unit tests 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.

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 readings/observations entered correctly
- a statement of results.

d) Conclusions should contain at least one of the following:

- the overall pattern to readings
- the trends in analysed information or results
- the connection between variables
- an analysis of the observations.

Conclusions should also include evaluation of the experimental procedures and could make reference to one of the following:

- effectiveness of procedures
- control of variables
- limitations of equipment
- possible improvements
- possible sources of error.

The bullet points under each performance criteria 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. Re-drafting 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.

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.

Transfer of evidence

A report on an Intermediate 1 Unit 1 (Chemistry in Action) prescribed practical activity may be used as evidence to meet the Outcome 3 requirements of this unit.

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

National Unit Specification: support notes (cont)

UNIT Chemistry in Action (Access 3)

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).

National Unit Specification

UNIT Chemistry in Action (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
Unit 1: Chemistry in Action	
(a) Substances	
(i) Elements	
Everything in the world is made from about 100 elements.	Refer to different versions of Periodic Tables.
Each element has a name and a symbol.	Examine as many samples of elements as possible, and write a description of some.
Chemists have arranged elements in the Periodic Table.	
Many elements are solid at room temperature.	Use a database to obtain information (ITO).
Mercury and bromine are liquid at room temperature.	Set up a simplified database (ITO).
Some elements are gases at room temperature.	Examine samples or photographs to make a key to identify selected elements (ITO).
Elements can be classified as metals or non-metals.	
There are more metals than non-metals.	
Some elements, including gold, silver and copper, have been known for a long time.	Make a table to show the year of discovery of some elements (ITO).
The most recently discovered elements have been made by scientists.	Find out about how the discovery of the elements was related to social and industrial factors. Make a list of some elements which have been made by scientists; find out the origins of their names.
Many elements have everyday uses.	Make a collection of elements in everyday use and record uses in a table. Refer to a Periodic Table. Use a database to obtain information (ITO).
(ii) Compounds and mixtures	
Compounds are formed when elements react together.	React pairs of elements and compare compounds formed with the elements. Classify substances as element or compound from names and formulae and record information in a table. Examine samples of common compounds and record names and elements contained in a table. Use models.

National Unit Specification

UNIT Chemistry in Action (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
Mixtures occur when two or more substances come together without reacting. Air is a mixture of gases. The test for oxygen is that it relights a glowing splint. There is not enough oxygen in the air for the test to be positive. **(iii) Solutions** A solution is formed when a substance dissolves in a liquid. A substance which dissolves in a liquid is soluble; a substance which does not dissolve is insoluble. Carbon dioxide gas is dissolved in some drinks to make them fizzy. The test for carbon dioxide is that it turns lime water milky.	Make a list of everyday mixtures. Make some mixtures and compare with the elements in the compound. Separate mixtures by chromatography. Use models. Draw a chart to show the distribution of gases in the air (ITO). Find out, by experiment, the test for oxygen. Demonstrate what happens when making cups of tea and coffee. Demonstrate conservation of mass in dissolving. Separate a sand and salt mixture. Evaporate sea water to dryness to show the dissolved solids. Investigate what happens when different everyday solids and liquids are added to water and other liquids. *Investigate factors which affect the speed of dissolving (ITO).* Investigate the amounts of salt in snack foods. Find out, by experiment, the test for carbon dioxide. Identify carbon dioxide as the gas dissolved in lemonade. Investigate the effect of temperature on dissolved carbon dioxide in fizzy drinks.

National Unit Specification

UNIT Chemistry in Action (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
Chlorine is dissolved in drinking water to kill bacteria. Sodium fluoride is dissolved in drinking water to help to prevent tooth decay. Lead compounds in drinking water can be harmful to health.	Detect fluoride in water samples. Refer to public information leaflets to find out about the links between fluoride in water and lower levels of tooth decay. Make a table to list the percentages of sodium fluoride in different toothpastes. Carry out calculations to find out which toothpaste, in terms of fluoride, represents the best value for money. Investigate the effect of fluoride toothpaste on egg-shell. Investigate the solubility of lead in different water samples. Find out about the effects of lead poisoning. Produce a poster or a public information leaflet to make the case for the treatment of drinking water or to warn about the dangers of lead water-piping (ITO).
(iv) Hazards Regulations on the use of chemicals exist for the safety of everyone who uses chemicals at work. Each hazard of toxic, corrosive, flammable, harmful/irritant is given a simple symbol which can be easily recognised. Hazard warning labels are attached to all appropriate chemicals. Hazard symbols are on road tankers to indicate dangers in the event of spillage.	Draw the symbols on the hazard labels. Categorise common chemicals from labels.

National Unit Specification

UNIT Chemistry in Action (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(b) Chemical reactions	
(i) Identification	
All chemical reactions involve the formation of one or more new substances. Chemical reactions can be identified by changes in appearance of substance, including colour change, gas evolved, precipitate formed.	Carry out/demonstrate a selection of experiments.
A wide variety of chemical reactions occur in the world around us.	Make a list of everyday chemical reactions. View a videotape.
(ii) Speed of reactions	
Changes in particle size and temperature affect the speed of reactions, both in the laboratory and in our everyday life.	*Investigate the effect of particle size and temperature on the speed of reactions (ITO).* Make a list of everyday reactions which are affected by changes in particle size, temperature and concentration. Investigate the effect of a catalyst and/or an enzyme on reaction rate. Make a list of everyday uses of catalysts and enzymes.
(iii) Word equations	
A chemical reaction can be described by a word equation	Write word equations from descriptions of chemical reactions with all reactants and products listed.

National Unit Specification

UNIT Chemistry in Action (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(c) Acids and alkalis	
(i) The pH scale	
The pH scale ranges from below 0 to above 14.	
Universal indicator, pH paper or a pH meter can be used to find the pH of solutions.	Test the pH of solutions and classify as acid/neutral/alkali. Make a pH chart (ITO).
Acids have a pH of less than 7; pure water and neutral solutions have a pH equal to 7; alkalis have a pH of more than 7.	Extract and use natural indicators.
The lower the pH of an acid, the greater the acidity; the higher the pH of an alkali, the greater the alkalinity.	Investigate the effect on pH of diluting acids and alkalis.
Diluting acids and alkalis decreases the acidity and alkalinity.	
(ii) Common acids and alkalis	
Acids and alkalis are in common use in the home, in industry and the laboratory.	
Common laboratory acids include hydrochloric acid, sulphuric acid and nitric acid.	Make a table of names and formulae. Identify the hazard label(s).
Common laboratory alkalis include sodium hydroxide, lime water and ammonia solution.	
Common household acids include vinegar, lemonade, soda water and Coca Cola.	*Test the pH of household solutions.*
Common household alkalis include baking soda, oven cleaner, dishwashing powder, bleach and soaps.	Identify the hazard label(s).
(iii) Neutralisation	
Alkalis neutralise acids to form water and a salt.	Investigate changes in pH in acid/alkali neutralisations.
Neutralisation moves the pH of the acid up towards 7.	Prepare a salt.
Neutralisation moves the pH of the alkali down towards 7.	

National Unit Specification

UNIT Chemistry in Action (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
Everyday examples of neutralisation include reducing soil acidity, reducing acidity in lakes and treatment of indigestion.	Investigate the effect of adding lime to soil and acid rain water. Investigate the neutralising effect of indigestion tablets. Use audio-visual material to find out about everyday examples of neutralisation.
(iv) Acid rain Carbon, sulphur and nitrogen react with oxygen to produce carbon dioxide, sulphur dioxide and nitrogen dioxide respectively. Carbon dioxide, sulphur dioxide and nitrogen dioxide dissolve in water to form acidic solutions.	Burn carbon and sulphur and test the pH of solutions of the oxides. Demonstrate the sparking of air. Demonstrate the solubility of sulphur dioxide in water.
Sulphur dioxide, produced by the burning of fossil fuels, and nitrogen dioxide, produced by the sparking of air in car engines, dissolve in water in the atmosphere to produce acid rain. Acid rain has damaging effects on buildings made from carbonate rock, structures made of iron or steel, soils and plant and animal life.	Use audio-visual material to find out about the causes and effects of acid rain and the social and economic implications. Test the pH of water samples from different places. Investigate the effect of acid on different rocks. Investigate the effect of sulphur dioxide on different materials. Investigate the effect of sulphur dioxide on plant growth. Prepare an advert for a newspaper or a public information leaflet on the effects of acid rain (ITO).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Everyday Chemistry (Access 3)

NUMBER D064 09

CLUSTER Chemistry (Access 3)

SUMMARY

The unit seeks to develop knowledge and understanding, problem solving and practical abilities in the context of metals; personal needs; fuels; and plastics.

OUTCOMES

1 Demonstrate knowledge and understanding related to *Everyday Chemistry*.
2 Solve problems related to *Everyday Chemistry*.
3 Collect and analyse information related to *Access 3 Chemistry* obtained by experiment.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Access 3.

Administrative Information

Superclass: RD

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 03

National Unit Specification: general information (cont)

UNIT Everyday Chemistry (Access 3)

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 Everyday Chemistry (Access 3)

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 Everyday Chemistry.

Performance criteria

(a) Knowledge and understanding of metals is clearly shown in appropriate ways.
(b) Knowledge and understanding of personal needs is clearly shown in appropriate ways.
(c) Knowledge and understanding of fuels is clearly shown in appropriate ways.
(d) Knowledge and understanding of plastics is clearly shown in appropriate ways.

Evidence requirements

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

Knowledge and understanding of metals

(i) Uses
(ii) Reactions
(iii) Corrosion
(iv) Batteries

Knowledge and understanding of personal needs

(i) Keeping clean
(ii) Clothing

Knowledge and understanding of fuels

(i) Fire
(ii) Finite resources
(iii) Important processes
(iv) Pollution problems

Knowledge and understanding of plastics

(i) Uses
(ii) Advantages and disadvantages
(iii) Thermoplastic/thermosetting plastics

National Unit Specification: statement of standards (cont)

UNIT Everyday Chemistry (Access 3)

OUTCOME 2

Solve problems related to Everyday Chemistry.

Performance criteria

(a) Relevant information is selected and presented in an appropriate way.
(b) Conclusions drawn are valid and explanations given are supported by evidence.

Evidence requirements

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

OUTCOME 3

Collect and analyse information related to *Access 3 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) 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 Access 3 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. Teacher/lecturer support by demonstration of the principle aspects of the activity is acceptable.

National Unit Specification: support notes

UNIT Everyday Chemistry (Access 3)

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 Content Statements given in the left-hand column of the tables on the following pages describe in detail the knowledge and understanding associated with that unit of the programme of study. Achievement will require to be shown in a variety of ways, that is, candidates will be expected to 'state', 'describe', 'explain', 'identify', etc., as appropriate. The right-hand column gives Suggested Activities related to the Content Statements. Opportunities to make use of information technology are indicated by (ITO).

It should be noted that the content has been arranged to tie in with the Outcome 1 performance criteria and evidence requirements of the unit. Teacher/lecturers may wish to reorder for learning and teaching purposes.

All candidates will be expected to carry out the prescribed practical activities listed below. These are highlighted in italics under Suggested Activities. The list may be subject to additions or deletions. The awarding body would give notice of any such change before the start of the session in which it would apply.

ACTIVITY	UNIT
Electrical Conductivity	2
Reaction of Metals with Dilute Acid	2
Factors which Affect Lathering	2

GUIDANCE ON TEACHING AND LEARNING 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.

National Unit Specification: support notes (cont)

UNIT Everyday Chemistry (Access 3)

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 three unit tests 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.

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 readings/observations entered correctly
- a statement of results.

d) Conclusions should contain at least one of the following:

- the overall pattern to readings
- the trends in analysed information or results
- the connection between variables
- an analysis of the observations.

The bullet points under each performance criteria 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.

National Unit Specification: support notes (cont)

UNIT Everyday Chemistry (Access 3)

Redrafting

It is appropriate to support candidates in producing a report to meet the performance criteria. Re-drafting 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.

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.

Transfer of evidence

A report on an Intermediate 1 Chemistry prescribed practical activity may be used as evidence to meet the Outcome 3 requirements for this unit. Care should be taken in the choice of the prescribed practical activity used as evidence if a particular core skill profile is required.

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).

National Unit Specification

UNIT Everyday Chemistry (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
Unit 2: Everyday Chemistry	
(a) Metals	
(i) Uses	
Some metals, including gold, silver and copper, are found uncombined in the Earth's crust. Most metals are found combined with other elements.	Make a list of some metals found uncombined. Examine samples of ores/minerals and make a table to show the elements in them. Extract a metal from its ore by heating with carbon.
Metal elements and carbon (graphite) are conductors of electricity, and most non-metal elements are non-conductors of electricity.	*Investigate the electrical conductivity of metals and non-metals.*
The specific properties of metals, including density, thermal and electrical conductivity, malleability and strength, are related to their uses.	Use audio-visual material. Investigate the properties of different metals.
An alloy is a mixture of metals, or of metals with non-metals. Alloys, including brass, solder and 'stainless' steel have important uses.	Find out about the composition and uses of alloys. Compare the properties of alloys with those of the constituent elements.
(ii) Reactions	
Metal oxides are produced in the reactions of metals with oxygen.	*Investigate the reactions of metals with oxygen and dilute acid*
Reactions of metals with acid produce hydrogen.	Prepare a salt.
The test for hydrogen is that it burns with a 'pop'.	Find, by experiment, the test for hydrogen. Demonstrate that hydrogen is less dense than air. Find out about the use of hydrogen in balloons.

National Unit Specification

UNIT Everyday Chemistry (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(iii) Corrosion	
Corrosion is a chemical reaction which involves the surface of a metal changing from an element to a compound. Rusting is the corrosion of iron.	Examine different metals/materials left exposed to the atmosphere. Use audio-visual material. Look for signs of corrosion in the local environment. Find out about the economic costs of corrosion.
Rusting results in a loss of structural strength.	Carry out test-tube experiments.
Both oxygen (from the air) and water are required for rusting.	Investigate the effect of acid rain and salt on the rusting process.
Rust indicator can be used to show the extent of the rusting process. Acid rain increases the rate of corrosion. Salt spread on roads increases the rate of corrosion on car bodywork.	
Painting, greasing, tin-plating and coating with plastic give a surface barrier to air and water which can provide protection against corrosion.	Find out about corrosion prevention. Carry out test-tube experiments. Electroplate a metal. View a videotape.
(iv) Batteries	
In a battery, electricity comes from a chemical reaction. Batteries require to be replaced due to the chemicals being used up in the reaction. Examples of rechargeable batteries include the lead-acid battery and the nickel-cadmium battery.	Examine a wide variety of batteries, including rechargeable batteries. Set up and use a lead-acid cell. Demonstrate that electrical energy can be obtained from a chemical reaction.

National Unit Specification

UNIT Everyday Chemistry (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(b) Personal needs	
(i) Keeping clean	
When cleaning hair, skin and clothes the main problem is oil and grease; this is because oil and grease are insoluble in water alone.	Find out about how improvements in the way in which people keep themselves and their clothes clean have helped to improve public health.
Cleaning chemicals are required to break up the oil and grease into tiny droplets which can then mix with water; this happens because cleaning chemicals are soluble in both water and oil and grease.	Mix oil and water and examine the effect of adding a few drops of washing-up liquid.
Examples of manufactured products which contain cleaning chemicals include soaps, detergents, shampoos, washing-up liquids and powders.	Make a list of manufactured products which can be used for cleaning skin, hair, clothes and dishes. Use models to illustrate the cleansing action of soap. Use audio-visual material. Demonstrate the making of soap. *Investigate factors which effect the lathering of soaps and detergents.*
Some soaps form a scum with hard water. Soapless detergents are used to form a lather with hard water.	Test the suitability of soaps and detergents for use in hard water areas. Compare the hardness of water samples.
(ii) Clothing	
Clothing fabrics are made from thin strands called fibres.	Make a table to list some natural and synthetic fibres.
Natural fibres come from plants and animals.	Find out about how some natural fibres are formed.
Synthetic fibres are made by the chemical industry.	Make a list of some important properties of clothing fabrics.
Examples of natural fibres include silk, wool and cotton; examples of synthetic fibres include nylon and polyesters, eg, Terylene.	Investigate the important properties of different fabrics. Demonstrate/carry out the making of nylon.
Synthetic fibres can be used to make fabrics with specific properties.	Investigate the strength of different fibres.
Dyes are coloured compounds which are used to give bright colours to clothing.	Extract natural dyes from strongly coloured plants and investigate the effectiveness of the dyes. Investigate the effectiveness of synthetic dyes. Demonstrate the selectivity of dyes.

National Unit Specification

UNIT Everyday Chemistry (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(c) Fuels	
(i) Fire	
A fuel is a chemical which is burned to produce energy. When a substance burns it reacts with oxygen.	Demonstrate the burning of a fuel using the Arculus technique. Demonstrate the combustion of iron wool. Investigate burning using candles (ITO). Compare the temperature of different flames.
A fire needs a fuel, oxygen (usually from the air) and a temperature high enough to start the fire and keep it going; take away any one of the three and the fire goes out. Fire-fighting methods in the lab and the home include the use of a fire blanket, sand, water, and carbon dioxide gas and foam. Different methods are used in different situations. Water must not be used with oil, petrol and electrical fires.	Make a drawing of the fire triangle and demonstrate the effect of removing one side. Find out about how to deal with different kinds of fires in the lab and at home. Make a fire extinguisher. Visit a fire station or invite a speaker from a fire station.
(ii) Finite resources	
Fossil fuels are formed from animal and plant remains over a very long period of time. There are many examples of fossil fuels, including coal, natural gas, oil and peat.	Make a list of different fossil fuels and give a use for the energy which can be obtained from each. Investigate the ease of burning of different fuels. Investigate the energy produced on burning different fuels (ITO).
Fossil fuels are finite resources, ie, they cannot be replaced. Over-use of fossil fuels may lead to a fuel crisis. Oil spillages can cause great damage to marine life and the environment.	Use audio-visual material. Find out about fuel conservation.

National Unit Specification

UNIT Everyday Chemistry (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(iii) Important processes Crude oil is a mixture of compounds. A fraction is a group of compounds with boiling points within a given range. The different fractions are used as different fuels.	Use audio-visual material. Demonstrate fractional distillation of simulated crude oil and compare evaporation rate, viscosity and flammability of fractions.
(iv) Pollution problems Carbon, and carbon monoxide, a poisonous gas, can be produced when hydrocarbons burn in a low supply of oxygen. Lead compounds which are added to petrol cause pollution. Soot particles produced by the incomplete combustion of diesel are harmful. Air pollution from the burning of petrol can be reduced by the use of catalytic converters which convert the pollutant gases to harmless gases.	Refer to newspaper articles. Find out about attempts to reduce pollution associated with internal combustion engines.

National Unit Specification

UNIT Chemistry in Action (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(d) Plastics	
(i) Uses	
Plastics are synthetic materials, ie, made by the chemical industry. Most plastics are made from oil.	
	Use audio-visual material.
Examples of plastics include polythene, polystyrene, perspex, PVC, nylon, Kevlar, Bakelite, formica and silicones.	Examine samples of plastics and write a description of some. Find out about the uses of plastics in and around the modern home and how the uses of plastics are related to their properties.
The everyday uses of plastics are related to their properties**.**	Obtain information from a database (ITO). Demonstrate the addition of acetone to polystyrene.
(ii) Advantages and disadvantages	
For some uses, plastics have advantages over natural materials and vice versa.	Investigate the properties of plastics. Make a list of natural and synthetic materials used for the same purpose.
Biodegradable materials are broken down by bacteria in the soil and rot away. Most plastics are not biodegradable and their durability and lightness can cause environmental problems.	Observe the litter left by people in the local environment. Design an advert for a paper or a public information leaflet aimed at reducing litter (ITO).
Some plastics burn or smoulder to give off toxic fumes, including carbon monoxide.	Refer to newspaper articles.

National Unit Specification

UNIT Everyday Chemistry (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
Options for disposal of plastics include incineration, recycling and burying. With incineration the heat generated can be used as a source of energy but there are problems with emissions. Since oil is a finite resource, recycling is to be encouraged and chemists are looking for renewable sources of plastics. Recycling can be difficult because of the many different kinds of plastic in common use.	Find out about the local arrangements for refuse disposal. Find out about recycling initiatives including the use of a coding system. Make a table to show the advantages and disadvantages associated with the different options for disposal.
(iii) Thermoplastic/thermosetting plastics Plastics can be either thermoplastic or thermosetting. A thermoplastic is one which can be reshaped on heating. A thermosetting plastic cannot be reshaped by heating. The uses of thermosetting plastics are related to their heat and electrical insulation properties.	Make a list of uses for thermosetting plastics. Investigate the effect of a hot nail on different plastics. Use a database to obtain information (ITO).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Chemistry and Life (Access 3)

NUMBER D065 09

CLUSTER Chemistry (Access 3)

SUMMARY

The unit seeks to develop knowledge and understanding, problem solving and practical abilities in the context of photosynthesis and respiration; the effects of chemicals on the growth of plants; food and diet; and drugs.

OUTCOMES

1 Demonstrate knowledge and understanding related to *Chemistry and Life*.
2 Solve problems related to *Chemistry and Life*.
3 Collect and analyse information related to *Access 3 Chemistry* obtained by experiment.

RECOMMENDED ENTRY

Entry is at the discretion of the centre.

CREDIT VALUE

1 credit at Access 3.

Administrative Information

Superclass: RD

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 03

National Unit Specification: general information (cont)

UNIT Chemistry and Life (Access 3)

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 Chemistry and Life (Access 3)

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 Chemistry and Life.

Performance criteria

(a) Knowledge and understanding of photosynthesis and respiration is clearly shown in appropriate ways.
(b) Knowledge and understanding of the effects of chemicals on the growth of plants is clearly shown in appropriate ways.
(c) Knowledge and understanding of food and diet is clearly shown in appropriate ways.
(d) Knowledge and understanding of drugs is clearly shown in appropriate ways.

Evidence requirements

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

Knowledge and understanding of photosynthesis and respiration

(i) Photosynthesis
(ii) Respiration
(iii) The greenhouse effect

Knowledge and understanding of the effect of chemicals on the growth of plants

(i) Using chemicals to save plants
(ii) Fertilisers

Knowledge and understanding of food and diet

(i) Elements in the body
(ii) Different carbohydrates
(iii) Reactions of carbohydrates
(iv) Fats and oils
(v) Proteins
(vi) Fibre, vitamins and food additives

Knowledge and understanding of drugs

(i) Alcohol
(ii) Other drugs

National Unit Specification: statement of standards (cont)

UNIT Chemistry and Life (Access 3)

OUTCOME 2

Solve problems related to Chemistry and Life.

Performance criteria

(a) Relevant information is selected and presented in an appropriate way.
(b) Conclusions drawn are valid and explanations given are supported by evidence.

Evidence requirements

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

OUTCOME 3

Collect and analyse information related to *Access 3 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) 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 Access 3 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. Teacher/lecturer support by demonstration of the principle aspects of the activity is acceptable.

National Unit Specification: support notes

UNIT Chemistry and Life (Access 3)

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 CONTENT AND CONTEXT FOR THIS UNIT

The Content Statements given in the left-hand column of the tables on the following pages describe in detail the knowledge and understanding associated with that unit of the programme of study. Achievement will require to be shown in a variety of ways, that is, candidates will be expected to 'state', 'describe', 'explain', 'identify', etc., as appropriate. The right-hand column gives Suggested Activities related to the Content Statements. Opportunities to make use of information technology are indicated by (ITO).

It should be noted that the content has been arranged to tie in with the Outcome 1 performance criteria and evidence requirements of the unit. Teacher/lecturers may wish to reorder for learning and teaching purposes.

All candidates will be expected to carry out the prescribed practical activities listed below. These are highlighted in italics under Suggested Activities. The list may be subject to additions or deletions. The awarding body would give notice of any such change before the start of the session in which it would apply.

ACTIVITY	UNIT
Solubility	3
Burning Carbohydrates	3
Testing for Starch	3

GUIDANCE ON TEACHING AND LEARNING 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.

National Unit Specification: support notes (cont)

UNIT Chemistry and Life (Access 3)

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 outcome. Outcomes 1 and 2 can be assessed by three unit tests 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 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.

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 readings/observations entered correctly
- a statement of results.

d) Conclusions should contain at least one of the following:

- the overall pattern to readings
- the trends in analysed information or results
- the connection between variables
- an analysis of the observations.

The bullet points under each performance criteria 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.

National Unit Specification: support notes (cont)

UNIT Chemistry and Life (Access 3)

Redrafting

It is appropriate to support candidates in producing a report to meet the performance criteria. Re-drafting 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.

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.

Transfer of evidence

A report on an Intermediate 1 prescribed practical activity may be used as evidence to meet the Outcome 3 requirements of this unit. Care should be taken in the choice of the prescribed practical activity used as evidence if a particular core skills profile is required.

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).

National Unit Specification

UNIT Chemistry and Life (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
Unit 3: Chemistry and Life	
(a) Photosynthesis and respiration	
(i) Photosynthesis	
Plants make their own food by taking in substances from the environment.	Investigate the effect of absence of light, chlorophyll and carbon dioxide on growth of plants.
Plants use light energy to produce glucose from carbon dioxide and water in a process called photosynthesis; oxygen gas is also produced.	Investigate water levels in soils (ITO).
During photosynthesis carbon dioxide is absorbed through the leaves of plants.	Demonstrate that plants produce oxygen.
Water is drawn up through the roots and oxygen gas is released into the air through the leaves.	
The light energy required for photosynthesis is absorbed by the chlorophyll in the leaves.	
(ii) Respiration	
Animals require sources of energy for use in a number of ways, including warmth and movement.	Demonstrate/carry out the combustion of a carbohydrate.
Animals can obtain energy by the reaction of glucose with oxygen to produce water and carbon dioxide in a process called respiration.	Breathe out into lime water and onto a cold surface.
Animals obtain glucose by eating food which has come from plants.	
Respiration is the reverse of photosynthesis.	Design a poster to show the relationship between respiration and photosynthesis (ITO).
The processes of photosynthesis and respiration maintain constant amounts of oxygen and carbon dioxide in the air.	

National Unit Specification

UNIT Chemistry and Life (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(iii) The greenhouse effect Carbon dioxide in the atmosphere causes the greenhouse effect. Extensive clearing of forests reduces the amount of carbon dioxide removed from the atmosphere by photosynthesis. Increased levels of carbon dioxide in the air may also be due to increased combustion of fuels. An increase in the level of carbon dioxide in the atmosphere could cause the atmosphere to retain more of the sun's energy as heat, a process known as global warming.	Refer to newspaper and magazine articles. Demonstrate the greenhouse effect (ITO).
(b) The effects of chemicals on the growth of plants **(i) Using chemicals to save plants** The yield of healthy crops can be reduced in the following ways: crops are eaten by pests, eg, insects and slugs bacteria and fungi can cause plants to become diseased weeds can inhibit growth of plants by using up essential substances in the soil	Classify some of the products which are sold in garden centres.
Pesticides are used to control pests, fungicides prevent diseases and herbicides kill weeds.	Find out about the properties of the ideal pesticide.
Pesticides are toxic and so must be used with care. Natural predators can also be used to safely control pests.	Find out about the damage which can result from the careless use of pesticides. Find out about the use of natural predators.

National Unit Specification

UNIT Chemistry and Life (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(ii) Fertilisers	
Nitrogen, phosphorus and potassium are essential elements for healthy plant growth. These elements are taken in through the roots of plants as compounds which are in solution.	Obtain trade names of fertilisers and identify NPK content. Make a fertiliser by neutralisation followed by evaporation. View a videotape.
In areas of natural vegetation, decay of vegetable and animal remains returns all essential elements to the soil. Harvesting of crops prevents the natural return of essential elements to the soil. Fertilisers are added to the soil to restore essential elements. Examples of natural fertilisers include compost and manure.	Investigate the amounts of organic materials in the soil (ITO).
Increased demand for food has resulted in the use of artificial fertilisers. Artificial fertilisers are made by the chemical industry.	Investigate the effect of ammonium, nitrate, phosphate and potassium compounds on the growth of plants.
To be effective, fertilisers must be soluble in water.	*Investigate the solubility of ammonium salts, potassium salts, nitrates and phosphates.*
The extensive use of nitrate fertilisers may have increased the levels of nitrate in rivers and lochs, and the public water supply. The presence of large quantities of nitrates can leave the water lifeless.	Find out about the effects of increased levels of nitrates in water. Use a computer program.

National Unit Specification

UNIT Chemistry and Life (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(c) Food and diet	
(i) Elements in the body	
A balanced diet provides the body with all the essential elements and compounds.	Refer to public information leaflets to find out about the requirements of a balanced diet.
	Produce a poster or a public information leaflet to raise awareness about the importance of healthy eating (ITO).
Elements are present in the diet and in the body as chemical compounds, and not as free elements.	Make a table or chart to show nutritional information on food labels (ITO).
Essential compounds include carbohydrates, fats and proteins.	Make a table or chart to show the average percentages of elements in the body (ITO).
More than 60% of body weight is made up of water.	Use a computer program.
Minerals supply the body with small quantities of calcium for bones and teeth and iron for the blood, as well as trace elements.	Find out about the effects of mineral deficiencies.
	Extract iron from breakfast cereals.
(ii) Different carbohydrates	
Carbohydrates form an important class of food made by plants.	Make a list of foods which are high in carbohydrate.
Carbohydrates are used by the body to produce energy.	Refer to published data to draw a bar graph to compare energy values of different foods.
	Investigate the energy released on burning different carbohydrates (ITO).
	Demonstrate the explosive combustion of a carbohydrate.
Carbohydrates can be divided into sugars and starches.	Make a table giving the names of carbohydrates and their formulae.
Examples of sugars include glucose and sucrose (table sugar).	Examine models of carbohydrate molecules.
	Demonstrate the addition of concentrated sulphuric acid to sucrose.
Starch can be distinguished from other carbohydrates by the iodine test.	Find out, by experiment, the test for starch.
	Test for starch in foods.

National Unit Specification

UNIT Chemistry and Life (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(iii) Reactions of carbohydrates	
Sugars are carbohydrates with small molecules.	Use models.
Starch is a large molecule made of many glucose molecules linked together.	
Plants convert the glucose into starch for storing energy.	Use models.
	Investigate the effect of amylase and/or acid on rate of breakdown of starch.
During digestion starch is broken down to glucose which is carried by the blood stream to body cells where respiration occurs.	
(iv) Fats and oils	
Fats and oils form an important class of food obtained from both plants and animals.	Make a list of foods which are high in fats and oils.
	Make a table or chart to compare energy values of different foods.
Fats and oils are much more concentrated sources of energy than carbohydrates.	Compare burning of fats and oils.
	Make a table or chart to compare average percentages of fats in different foods.
Fats and oils can be detected by a filter paper test.	Test for fats and oils in foods.
Saturates are believed to increase the cholesterol level in the bloodstream and this in turn may cause heart disease.	Refer to nutritional information on labels to make a table to show the masses of saturates and unsaturates in fats and oils; carry out calculations to find the percentages.
Polyunsaturates are considered to be less potentially harmful to the heart.	
Medical opinion suggests that total fat consumption should be reduced and, where possible, foods with polyunsaturates should be eaten.	Refer to information from medical leaflets to find out about the links between saturates/polyunsaturates and heart disease.
(v) Proteins	
Proteins form an important class of food obtained from both plants and animals.	Make a list of foods which are high in proteins.
	Make a table or chart to compare the average percentages of proteins in different foods.
Proteins provide material for body growth and repair.	
In the body, animals make particular proteins for specific purposes.	

National Unit Specification

UNIT Chemistry and Life (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(vi) Fibre, vitamins and food additives	
Fibre keeps the gut working well, preventing constipation. Fibre absorbs water and swells; this provides bulk for the gut muscles to work on as food is squeezed along.	Make a list of foods which are high in fibre. Investigate the amounts of fibre in cereals. Make a list of foods with vitamin supplements.
Vitamins are complex carbon compounds which are required to keep the body healthy. Lack of important vitamins can cause poor health.	Make a table to show the effects of deficiency of vitamins A, B, C and D. Investigate the effect of cooking on vitamin C (ITO). Investigate the levels of vitamin C in foods.
Food additives can be used to supply or enhance the nutritional value of food.	Identify food additives and the classes to which they belong from the lists of ingredients on food labels. Separate food colours by paper chromatography.
Food additives can be used only if they have been tested and approved.	Find out about the issues related to using animals for testing food additives.
(d) Drugs **(i) Alcohol** A drug is a substance which alters the way the body works. Drugs can damage health because of the way they can affect the body and lifestyle.	
Alcohol is a drug which, if taken in excess, can have many harmful effects on the body, particularly the liver and the brain.	Refer to public information booklets to find out about the affect of alcohol on the body and the links between the use of alcohol and road accidents. Make a table to list the advantages and disadvantages of random breath-testing. Demonstrate the breathalyser reaction.

National Unit Specification

UNIT Chemistry and Life (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
A bottle of alcopop or a pint of beer contains approximately 2 units of alcohol; a pub measure of spirit or a glass of wine contains approximately 1 unit of alcohol. Alcohol is broken down by the body at about 1 unit per hour.	Carry out calculations to find out the length of time required to lose alcohol after different patterns of drinking.
Alcoholic drinks can be made by the fermentation of starch and sugars present in fruit and vegetables. The type of alcoholic drink varies with the plant source of the carbohydrate.	Carry out the fermentation of a glucose solution/fruit juice. View a videotape. Make a table to show the source of the sugars in different alcoholic drinks.
Distillation is a method of increasing the alcohol concentration of fermentation products. Water and alcohols can be partially separated by distillation because they have different boiling points.	Distill a water/alcohol mixture. Make a table to show the percentage of alcohol in different drinks. Find out about the whisky industry.

National Unit Specification

UNIT Chemistry and Life (Access 3)

CONTENT STATEMENTS	SUGGESTED ACTIVITIES
(ii) Other drugs Some drugs, including medicines, alcohol, nicotine and caffeine are legal; others, including cannabis, LSD and ecstasy are illegal. Being unable to manage without a drug is called addiction. Chemical reactions are going on all the time to keep the body working properly. Medicines contain drugs which help the body when it is not working correctly. Some drugs, including antibiotics, can fight micro-organisms which interfere with the chemical reactions. Medicines are usually made up of many chemicals and only the active ingredient works on the body.	Make a table to list legal and illegal drugs. Refer to public information booklets to find out about the dangers of illegal drugs. Produce a poster or a public information leaflet to raise awareness about the harmful effects of drugs (ITO). Make a table of common medicines and their uses. Refer to the packaging of medicine to make a table to show the ingredients, including percentage of active ingredients.