



National 5  
Course Assessment  
Specification



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# National 5 Chemistry Course Assessment Specification (C713 75)

**Valid from August 2013**

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Please refer to the note of changes at the end of this Course Assessment Specification for details of changes from previous version (where applicable).

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## Course outline

<b>Course title:</b>	National 5 Chemistry
<b>SCQF level:</b>	5 (24 SCQF credit points)
<b>Course code:</b>	C713 75
<b>Course assessment code:</b>	X713 75

The purpose of the Course Assessment Specification is to ensure consistent and transparent assessment year on year. It describes the structure of the Course assessment and the mandatory skills, knowledge and understanding that will be assessed.

### Course assessment structure

Component 1 — question paper	80 marks
Component 2 — assignment	20 marks
<b>Total marks</b>	<b>100 marks</b>

This Course includes six SCQF credit points to allow additional time for preparation for Course assessment. The Course assessment covers the added value of the Course.

### Equality and inclusion

This Course Assessment Specification has been designed to ensure that there are no unnecessary barriers to assessment. Assessments have been designed to promote equal opportunities while maintaining the integrity of the qualification.

For guidance on assessment arrangements for disabled learners and/or those with additional support needs, please follow the link to the Assessment Arrangements web page: [www.sqa.org.uk/sqa/14977.html](http://www.sqa.org.uk/sqa/14977.html).

Guidance on inclusive approaches to delivery and assessment of this Course is provided in the *Course Support Notes*.

# Assessment

To gain the award of the Course, the learner must pass all of the Units as well as the Course assessment. Course assessment will provide the basis for grading attainment in the Course award.

## Course assessment

SQA will produce and give instructions for the production and conduct of Course assessments based on the information provided in this document.

## Added value

The purpose of the Course assessment is to assess added value of the Course as well as confirming attainment in the Course and providing a grade. The added value for the Course will address the key purposes and aims of the Course, as defined in the Course Rationale. It will do this by addressing one or more of breadth, challenge, or application.

In this Course assessment, added value will focus on the following:

- ◆ breadth — drawing on knowledge and skills from across the Course
- ◆ challenge — requiring greater depth or extension of knowledge and/or skills
- ◆ application — requiring application of knowledge and/or skills in practical or theoretical contexts as appropriate

This added value consists of:

- ◆ a question paper, which requires learners to demonstrate aspects of breadth, challenge and application; learners will apply breadth and depth of skills, knowledge and understanding from across the Course to answer questions in chemistry
- ◆ an assignment, which requires learners to demonstrate aspects of challenge and application; learners will apply skills of scientific inquiry, using related knowledge, to carry out a meaningful and appropriately challenging task in chemistry and communicate findings

## Grading

Course assessment will provide the basis for grading attainment in the Course award.

The Course assessment is graded A–D. The grade is determined on the basis of the total mark for all Course assessments together.

A learner's overall grade will be determined by their performance across the Course assessment.

**Grade description for C**

For the award of Grade C, learners will have demonstrated successful performance in all of the Units of the Course. In the Course assessment, learners will typically have demonstrated successful performance in relation to the mandatory skills, knowledge and understanding for the Course.

**Grade description for A**

For the award of Grade A, learners will have demonstrated successful performance in all of the Units of the Course. In the Course assessment, learners will typically have demonstrated a consistently high level of performance in relation to the mandatory skills, knowledge and understanding for the Course.

In addition, learners achieving a Grade A will have demonstrated a high overall level of performance by:

- ◆ retaining knowledge and understanding over a long period of time
- ◆ showing a deeper level of knowledge and understanding
- ◆ integrating and applying skills, knowledge and understanding across the three component Units of the Course
- ◆ displaying problem solving skills in less familiar and more complex contexts
- ◆ applying skills of scientific inquiry and analytical thinking in complex contexts that involve more complex data

**Credit**

To take account of the extended range of learning and teaching approaches, remediation, consolidation of learning and integration needed for preparation for external assessment, six SCQF credit points are available in Courses at National 5 and Higher, and eight SCQF credit points in Courses at Advanced Higher. These points will be awarded when a grade D or better is achieved.

## Structure and coverage of the Course assessment

The Course assessment will consist of two Components: a question paper and an assignment. The question paper will have two Sections. The assignment will have one Section.

### Component 1 — question paper

The purpose of the question paper is to assess breadth and depth of knowledge and understanding from across the Units.

The paper will assess scientific inquiry skills, analytical thinking skills and the impact of applications on society and the environment.

The question paper will give learners an opportunity to demonstrate the following skills, knowledge and understanding by:

- ◆ demonstrating knowledge and understanding of chemistry by making statements, describing information, providing explanations and integrating knowledge
- ◆ applying knowledge of chemistry to new situations, interpreting information and solving problems
- ◆ planning or designing experiments to test given hypotheses or to illustrate particular effects, applying safety measures
- ◆ selecting information and presenting information appropriately in a variety of forms
- ◆ processing information (using calculations and units, where appropriate)
- ◆ making predictions and generalisations based on evidence/information
- ◆ drawing valid conclusions and giving explanations supported by evidence/justification
- ◆ identifying sources of uncertainties and suggesting improvements to experiments

The mandatory skills and knowledge are specified in the 'Further mandatory information on Course coverage' section at the end of this Course Assessment Specification.

The question paper will have 80 marks out of a total of 100 marks. This is 80% of the overall marks for the Course assessment.

The question paper will have two Sections.

**Section 1** (Objective Test) will have 20 marks.

**Section 2** will contain restricted and extended response questions and will have 60 marks.

Marks will be distributed approximately proportionally across the Units.

The majority of the marks will be awarded for applying knowledge and understanding. The other marks will be awarded for applying scientific inquiry, scientific analytical thinking and problem solving skills.

A data booklet containing relevant data and formulae will be provided.

## Component 2 — assignment

This assignment requires learners to apply skills, knowledge and understanding to investigate a relevant topic in chemistry and its effect on the environment and/or society. The effect may be positive and/or negative. The topic should draw on one or more of the key areas of the Course, and should be chosen with guidance from the assessor.

The assignment will assess the application of skills of scientific inquiry and related chemistry knowledge and understanding. The assignment will give learners an opportunity to demonstrate the following skills, knowledge and understanding by:

- ◆ applying knowledge of chemistry to new situations and interpreting information
- ◆ selecting information and presenting information appropriately in a variety of forms
- ◆ processing the information (using calculations and units, where appropriate)
- ◆ drawing valid conclusions and giving explanations supported by evidence/justification
- ◆ communicating findings/information

The assignment will have 20 marks out of a total of 100 marks. This is 20% of the overall marks for the Course assessment.

The majority of the marks will be awarded for applying scientific inquiry and analytical thinking skills. The other marks will be awarded for applying knowledge and understanding related to the topic chosen.

The assignment offers challenge by requiring skills, knowledge and understanding to be applied in a context that is one or more of the following:

- ◆ unfamiliar
- ◆ familiar but investigated in greater depth
- ◆ integrates a number of familiar contexts

This assignment has two stages:

- ◆ a research stage
- ◆ a communication stage

In the course of their assignment, learners are required to:

- ◆ choose, with support, a relevant topic in chemistry that has an effect on the environment and/or society
- ◆ devise an appropriate aim
- ◆ describe the relevant application(s) of chemistry and explain the effect on the environment and/or society
- ◆ research the topic by selecting, processing and presenting relevant data/information
- ◆ draw a conclusion
- ◆ describe underpinning chemistry knowledge and understanding and explain its relevance to the topic researched
- ◆ communicate the findings of the research in a report

## Setting, conducting and marking of assessment

### Question paper

This question paper will be set and marked by SQA, and conducted in centres under conditions specified for external examinations by SQA. Learners will complete this in 2 hours.

### Controlled assessment — assignment

This assignment is:

- ◆ set by centres within SQA guidelines
- ◆ conducted under a high degree of supervision and control

Evidence will be submitted to SQA for external marking.

All marking will be quality assured by SQA.

### Setting the assessment

Set by centres within SQA guidelines.

### Conducting the assessment

The **research** stage will be conducted under some supervision and control.

The **communication** stage will be conducted under a high degree of supervision.

SQA will provide Assignment General assessment information and Assignment Assessment task documents. SQA will specify the material to be taken into the communication stage of the assignment.

The production of the report will be carried out:

- ◆ in time to meet a submission date set by SQA
- ◆ independently by the learner

## Further mandatory information on Course coverage

The following gives details of mandatory skills, knowledge and understanding for the National 5 Chemistry Course. Course assessment will involve sampling the skills, knowledge and understanding. This list of skills, knowledge and understanding also provides the basis for the assessment of Units of the Course.

The following gives details of the skills:

- ◆ demonstrating knowledge and understanding of chemistry by making statements, describing information, providing explanations and integrating knowledge
- ◆ applying knowledge of chemistry to new situations, interpreting information and solving problems
- ◆ planning and designing experiments to test given hypotheses or to illustrate particular effects
- ◆ carrying out experimental procedures safely, recording observations and collecting data
- ◆ selecting information and presenting information appropriately in a variety of forms
- ◆ processing information (using calculations and units, where appropriate)
- ◆ making predictions and generalisations based on evidence/information
- ◆ drawing valid conclusions and giving explanations supported by evidence/justification
- ◆ identifying a sources of uncertainties and suggesting improvements to experiments
- ◆ communicating findings/information

These skills will be assessed, across the Course, in the context of the mandatory knowledge.

The following table specifies the mandatory knowledge for the National 5 Chemistry Course.

<b>Chemical Changes and Structure</b>
<p><b>Rates of reaction</b> A knowledge of the factors affecting rates of reaction. Calculations of the average rate of a chemical reaction from data. Average rate of reaction to show the change in rate of reaction as a reaction progresses.</p> <p><b>Atomic structure and bonding related to properties of materials</b> A knowledge of sub-atomic particles, the periodic table, and diatomic elements. Electron configuration for the first 20 elements in the periodic table. Atoms are neutral as the number of protons is equal to the number of electrons. Isotopes and relative atomic mass. Formation of ions. Determining the number of sub-atomic particles in atoms and ions from nuclide notation. Write nuclide notation for both atoms and ions. Ionic bonds are the electrostatic attraction between positive and negative ions. Ionic compounds form lattice structures of oppositely charged ions. Use of structure and bonding to explain the following physical properties of ionic compounds; melting point and boiling point, solubility and electrical conductivity. In a covalent bond, the shared pair of electrons is attracted to the nuclei of the two bonded atoms.</p>

Draw diagrams to show how outer electrons are shared in covalent molecules. Covalent substances are either discrete molecular or giant network structures. Shapes of simple two-element compounds. Use of structure and bonding to explain the following physical properties of covalent compounds; melting point and boiling point, solubility and electrical conductivity. Experimental procedures are required to confirm the type of bonding present in a substance.

### **Formulae and reaction quantities**

Write chemical and ionic formulae for compounds including those containing group ions. Balanced equations, including state symbols. Calculations to determine the gram formula mass, concentration, volume, mass of a substance and the number of moles present.

### **Acids and bases**

A knowledge of pH including the pH scale, acids and bases, neutralisation reactions and salt formation. Dissociation of water. The pH is a measure of the hydrogen ion concentration. The effect of dilution of an acid or alkali with water is related to the concentrations of hydrogen and hydroxide ions. The effect of adding soluble oxides to water. Identifying the products and writing balanced equations for the reaction of acids with metals, oxides, hydroxides and carbonates. Titration as an analytical technique, including calculations.

## **Nature's Chemistry**

### **Homologous series**

A knowledge of systematic naming, molecular formulae and full structural formulae for straight chain alkanes and alkenes containing up to eight carbons. Definition of a homologous series. General formulae and shortened structural formulae for alkanes and alkenes. Alkanes are described as saturated, alkenes are described as unsaturated. The test for unsaturation. Naming straight chain alkenes to show the position of the double bond. Addition reactions of alkenes with hydrogen and halogens. Cycloalkanes, with no more than eight carbon atoms in their longest chain, can be named from their full structural formulae, shortened structural formulae and molecular formulae. Naming and formulae for branched chain alkanes, branched chain alkenes and cycloalkanes containing up to eight carbons in their longest chain. Combustion reactions for hydrocarbons. Isomers of alkanes, alkenes and cycloalkanes. Isomers have different physical properties. Physical properties of the following homologous series: cycloalkanes, alkanes and alkenes containing up to eight carbons in their longest chain. Uses of cycloalkanes, branched chain alkanes and branched chain alkenes containing up to eight carbons in their longest chain.

## Everyday consumer products

### Alcohols

An alcohol is identified from the hydroxyl group, the –OH group and the ending ‘-ol’.

Naming and formulae for straight chain alcohols containing up to eight carbons in their longest chain.

Explain the physical properties of alcohols in terms of the intermolecular forces of attraction.

Chemical properties of alcohols.

Uses of alcohols as solvents and fuels.

### Carboxylic acids

Carboxylic acids can be identified by the carboxyl functional group, –COOH functional group, and the ‘-oic’ name ending.

Naming and formulae for straight chain carboxylic acids containing up to eight carbons in their longest chain.

Explain the physical properties of carboxylic acids in terms of the intermolecular forces of attraction.

Chemical properties of carboxylic acids.

Uses of carboxylic acids to make esters.

Vinegar and its uses.

### Esters

Esters can be identified by the, –COO– functional group in a structural formula and from the ‘-oate’ name ending.

An ester can be made by reacting a carboxylic acid and an alcohol.

Uses of esters.

### Energy from fuels

Combustion reactions are exothermic reactions. The opposite of this is an endothermic reaction.

Energy from fuels can be determined experimentally and calculated using  $E_h = cm\Delta T$ . The quantities  $c$ ,  $m$  and  $\Delta T$  can be calculated given relevant data.

Calculations based on a balanced equation to determine the quantity of reactants or products.

## Chemistry in Society

### Metals

Metallic bonding can be used to explain the conductivity of metals in terms of delocalised electrons.

Balanced equations, involving ionic formulae, can be written to show the reaction of metals with water, oxygen and acids.

Redox including oxidation reactions, reduction reactions and redox reactions.

Extraction of metals.

The percentage of a particular metal in an ore can be calculated from the formula.

Write ion-electron equations, including those involving non-metals.

The direction of electron flow can be determined for redox reactions including those occurring in electrochemical cells.

Fuel cells and rechargeable batteries are two examples of technologies which utilise redox reactions.

**Properties of plastics**

Plastics can be made by the processes of addition or condensation polymerisation.

Polythene is made by addition polymerisation and polyesters are made by condensation polymerisation.

The structure of a polymer can be drawn given either the structure of the monomer(s) or the repeating unit and vice versa.

The type of polymer, addition or condensation, can be identified from the structure of the polymer.

**Fertilisers**

A knowledge of the use of fertilisers to provide the essential elements, nitrogen, phosphorus and potassium, for healthy plant growth.

The Haber process: to include the balanced equation and catalyst used.

Ammonia is the starting material for the commercial production of nitric acid.

Percentage mass compositions of fertilisers from a formula.

**Nuclear chemistry**

Radioactive decay.

Properties of alpha, beta and gamma radiation.

Nuclear equations can be written to describe nuclear reactions.

Half-life of radioisotopes.

Calculations involving half-life.

Uses of radioisotopes

**Chemical analysis**

A variety of methods exist which enable chemists to monitor the environment both qualitatively and quantitatively, including acid/base titration, precipitation (the formation of an insoluble solid from two aqueous solutions) and flame testing.

# Administrative information

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**Published:** April 2015 (version 2.0)

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## History of changes to Course Assessment Specification

Course details	Version	Description of change	Authorised by	Date
	1.1	Further information and clarification on scope and structure of the question paper/ assignment given in the 'Structure and coverage of Course assessment' section. Setting, conducting and marking of assessment section: wording added to clarify assessment conditions; Further mandatory information section: amendment to wording to clarify activities in skills list, plus changes to wording in Course/Unit content to clarify meaning and benchmarking	Qualifications Development Manager	June 2013
	2.0	Mandatory Information on Course Coverage has had significant clarification added in order to clarify both the meaning and the depth of treatment required.	Qualifications Manager	April 2015

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Note: You are advised to check SQA's website ([www.sqa.org.uk](http://www.sqa.org.uk)) to ensure you are using the most up-to-date version of the Course Assessment Specification.

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