



Higher National Unit specification

General information

Unit title: Fundamental Chemistry: An Introduction (SCQF level 6)

Unit code: H92W 33

Superclass: RD

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Version: 03

Unit purpose

This Unit is designed to give learners an introduction to the basic concepts of chemistry, both theoretically and practically.

Outcomes

On successful completion of the Unit the learner will be able to:

- 1 Describe and use the basic chemical principles associated with atomic structure, chemical formulae, acids and bases, the periodic table, and organic chemistry.
- 2 Perform a range of chemical techniques and report the results accurately.

Credit points and level

1 Higher National Unit credit at SCQF level 6: (8 SCQF credit points at SCQF level 6)

Recommended entry to the Unit

Entry is at the discretion of the centre. There are no specific entry requirements. This Unit is suitable for learners with no prior chemistry knowledge.

Higher National Unit Specification: General information (cont)

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Core Skills

Achievement of this Unit gives automatic certification of the following Core Skills component:

Complete Core Skill	None
Core Skill component	Using Number at SCQF level 5

Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

Higher National Unit specification: Statement of standards

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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 SQA.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Learners should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe and use the basic chemical principles associated with atomic structure, chemical formulae, acids and bases, the periodic table, and organic chemistry.

Knowledge and/or skills

- ◆ Atomic structure, chemical bonding, chemical formulae and balancing equations
- ◆ Periodic table, trends of the common groups
- ◆ Mole and related calculations
- ◆ Concepts of acidity and alkalinity
- ◆ Nomenclature and reactions of alkanes, alkenes, alcohols and carboxylic acids
- ◆ Concepts of isomers and homologous series

Outcome 2

Perform a range of chemical experiments and report the results accurately.

Knowledge and/or Skills

- ◆ Follow instructions to perform a range of chemical experiments
- ◆ Work in a safe manner regarding current health and safety regulations
- ◆ Achieve accurate results
- ◆ Report the results clearly

Higher National Unit specification: Statement of standards (cont)

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Evidence Requirements for this Unit

Outcome 1 will be assessed using a holistic closed-book assessment under supervised conditions. Learners can only have access to the *SQA Databook for HN Chemistry* or any suitable replacement when sitting the assessment.

Outcome 2 will be assessed by means of a laboratory report, laboratory diary or pro forma and a checklist based on practical activities related to the topics in Outcome 1.

Outcome 1

Learners will need to provide evidence to demonstrate their Knowledge and/or Skills showing that they can:

- ◆ Describe the structure of an atom, identify types of bonding in common compounds, determine the chemical formula of compounds which contain up to three elements.
- ◆ Write and balance chemical equations derived from written descriptions.
- ◆ Explain the general trends in the periodic table.
- ◆ Explain the properties of the groups in the periodic table.
- ◆ Carry out calculations involving the relationship between the number of moles and quantity of a compound.
- ◆ Calculate volumes, concentrations of solutions.
- ◆ Explain the basic concepts of acidity and alkalinity.
- ◆ Identify organic functional groups and describe their main reaction types.
- ◆ Explain the concepts of isomers and homologous series.

The questions set in the assessment should cover all of the Knowledge and/or Skills although a representative sample of the topics covered in the support notes could be covered.

Outcome 2

Learners will need evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- ◆ Follow instructions to perform a range of chemical experiments.
- ◆ Work in a safe manner regarding current health and safety regulations.
- ◆ Achieve accurate results.
- ◆ Report the results clearly.

A checklist will be used to record the results of the learner's practical work on at least three occasions. Learners must also complete a laboratory diary or pro forma. For one of the experiments carried out the learner must also produce a laboratory report which demonstrates the learner's ability to plan and evaluate the laboratory exercise.

It is envisaged that the practical work will include several different types of experiment, to ensure that at least one, and not more than two, of the practicals should cover organic chemistry. Learners should be assessed on their laboratory work and their laboratory diary or pro formas.



Higher National Unit Support Notes

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Unit Support Notes are offered as guidance and are not mandatory.

While the exact 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 Unit is intended to be part of the framework for HNC/D Applied Sciences, HND Applied Chemical Sciences and HND Applied Biological Sciences but may be suitable for the inclusion in other HNC/HND awards. The aim is to give learners the underpinning theoretical and practical knowledge required for a basic understanding of chemistry. The Unit is designed to aid progression to the HN Unit H92X 34 *Fundamental Chemistry: Theory and Laboratory Skills*.

Outcome 1 — Describe and use the basic chemical principles associated with atomic structure, chemical formulae, acids and bases, the periodic table, and organic chemistry

Learners should be able to write balanced equations from written descriptions, determine the chemical formula for simple compounds containing up to three elements.

Learners should understand basic atomic structure, the difference between elements, compounds and mixtures.

Learners should have an understanding of the layout of the periodic table, the symbols for common elements and the trends associated with groups and periods in the table.

Learners should be able to perform calculations involving the mole, concentrations and volumes.

The concepts of acidity and alkalinity should be taught, this should include strong, weak acids and bases.

In the organic chemistry section learners should be introduced to IUPAC nomenclature for alkanes, alkenes, alcohols, and carboxylic acids. The concept of isomers and homologous series should be introduced. The common reactions and tests for these compounds should also be taught.

Outcome 2 — Perform a range of chemical techniques and report the results accurately

Learners should perform a range of experiments. The range of experiments should include a variety of laboratories that are relevant to the theory section of the Unit. Some suggested laboratories are: making standard solutions, titrations, testing for simple organic compounds, reactions of organic acids and alcohols, effect of concentration on reaction rate, effect of temperature on reaction rate, and a simple distillation.

Higher National Unit Support Notes (cont)

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A laboratory diary or pro forma will be kept and learners should be introduced to Standard Operating Procedures (SOPs). The laboratory report should be in an appropriate format. Health and safety in regard to risk and Control of Substances Hazardous to Health (COSHH) assessments should be emphasised at all times.

Guidance on approaches to delivery of this Unit

This Unit is designed to form part of a Group Award, which is primarily designed to prepare learners for employment in a science related area. The emphasis should be on encouraging the learner to think about the practical implications of the theory they study.

Independent study should be encouraged by using learner centred, resource based methodologies.

Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Outcome 1

The assessment for Outcome 1 is by a single holistic assessment and could be worth 60 marks and carried out under closed-book conditions with the marks split 20 on organic chemistry and 40 on the remainder of the Outcome. Should learners fail to gain 60%, they should be offered a second attempt after sufficient remediation. The assessment should be completed in 90 minutes and could take the form of a set of short answer or restricted response questions testing learner's knowledge and understanding. The questions set in the assessment should cover a representative sample of the topics covered in the support notes. Learners can only have access to the *SQA Databook for HN Chemistry* or any suitable replacement when sitting the assessment.

Outcome 2

In Outcome 2 learners should be assessed on their ability to perform laboratory work to a required standard. Ideally work should be carried out individually, although resources may lead to some experiments being done in groups. This however should be the exception rather than the norm.

The laboratory report should be clear and concise, with all results and calculations reported. Learners should discuss briefly any sources of error.

It is recommended that the learner should perform a wide range of practical assignments. These should cover a range of techniques. It is envisaged that the practical work will include several different types of experiment, to ensure that at least one, and not more than two, of the practicals should cover organic chemistry. A checklist and the record of results in a laboratory diary should be used to assess performance in the laboratory. A laboratory report for one of the practicals should be produced to assess the learner's ability to plan, analyse and discuss laboratory work.

Higher National Unit Support Notes (cont)

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Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at www.sqa.org.uk/e-assessment.

Opportunities for developing Core and other essential skills

There will be opportunities to develop the Core Skill of *Problem Solving* at SCQF level 5 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

This Unit has the Using Number component of Numeracy embedded in it. This means that when candidates achieve the Unit, their Core Skills profile will also be updated to show they have achieved Using Number at SCQF level 5.

History of changes to Unit

Version	Description of change	Date
03	Duration of assessment for Outcome 1 amended.	23/01/2017
02	Core Skills Using Number at SCQF level 5 embedded.	September 2015

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General information for learners

Unit title: Fundamental Chemistry: An Introduction (SCQF level 6)

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

This is a 1 credit HN Unit at SCQF level 6 intended for learners undertaking an HNC/HND in a Science subject. It is designed to provide you with an introduction to some of the main concepts of chemistry.

On completion of this Unit you should be able to:

- 1 Write a balanced chemical equation from a written description.
- 2 Understand simple atomic structure, and chemical bonding.
- 3 Be able to carry out calculations involving the mole, concentrations and volumes.
- 4 Understand the basic concepts of acids and bases.
- 5 Identify a range of organic compounds, name them and know their typical reactions.
- 6 Carry out a range of chemical experiments safely and to a required standard.

Outcome 1

In this Outcome you will be introduced to the periodic table, the simple structure of an atom and chemical bonding. This will give you the knowledge to work out chemical formula of compounds containing up to three elements. You will learn how to write a balanced chemical equation from a written description.

You will learn about the concept of the mole and how it can be used in calculations.

You will study the concept of acidity and alkalinity.

You will also study some basic organic chemistry and learn how to name the compounds you are studying and how they react.

Outcome 2

In this Outcome you will carry out a range of practical techniques which are related to the theory you will learn in Outcome 1. You will keep a laboratory diary or pro forma with your laboratory experiments. For one of your experiments you will also write a laboratory report.