## SQA Advanced Unit Specification

## General information for centres

## Unit title: Fundamental Chemistry: An Introduction

## Unit code: HV49 46

**Unit purpose:** This unit is designed to give candidates an introduction to the basic concepts of chemistry, both theoretically and practically.

On completion of the unit the candidate should 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 SQA Credit at SCQF level 6: (8 SCQF credit points at SCQF level 6*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from National 1 to Doctorates.*

**Recommended prior knowledge and skills**: Access to this unit will be at the discretion of the centre. There are no specific entry requirements. This unit is suitable for candidates with no prior chemistry knowledge.

**Core skills:** There are 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.

**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.

**Assessment:** Outcome 1 will be assessed using a closed-book assessment. The questions should reflect a representative sample from the context detailed in the support notes.

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.

# SQA Advanced Unit Specification: statement of standards

## Unit title: Fundamental Chemistry: An Introduction

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The sections of the unit stating the outcomes, knowledge and/or skills, and evidence requirements are mandatory.

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. Candidates 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, the periodic table, acids and bases and organic chemistry

### Knowledge and/or skills

- atomic structure, chemical bonding , chemical formula 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

### Evidence requirements

Candidates will need to provide evidence to demonstrate their knowledge and/or skills by 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

Evidence should be gathered using a holistic closed-book assessment under supervised conditions.

The questions set in the assessment should cover all knowledge and skills although a representative sample of the topics covered in the support notes could be covered.

### Assessment guidelines

Outcome 1 will be assessed by a single, closed-book test under supervised conditions which should be completed in about 60 minutes. This assessment could take the form of a set of short answer or restricted response questions testing candidate's knowledge and understanding of the topics listed. The questions set in the assessment should cover a representative sample of the topics covered in the support notes. The pass mark for the test could be 60%.

## 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

### Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

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

Evidence for this outcome will be provided by the candidate performing a range of practical assignments. 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. Candidates should be assessed on their laboratory work and their laboratory diary or pro formas.

### Assessment guidelines

It is recommended that the candidate 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 candidate's ability to plan, analyse and discuss laboratory work.

## Administrative information

**Unit code:** HV49 46

**Unit title:** Fundamental Chemistry: An Introduction

**Superclass category:** RD

**Original date of publication:** November 2017

**Version:** 01

**History of changes:**

| Version | Description of change | Date |
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**Source:** SQA



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# SQA Advanced Unit Specification: support notes

## Unit title: Fundamental Chemistry: An Introduction

This part of the unit specification is offered as guidance. The support notes 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 the SQA Advanced Certificate/Diploma in Applied Sciences, SQA Advanced Diploma in Applied Chemistry, SQA Advanced Diploma in Biotechnology and SQA Advanced Diploma in Applied Biological Sciences, SQA Advanced Diploma in Biomedical Sciences, and the SQA Advanced Diploma in Environmental Sciences, but may be suitable for the inclusion in other SQA Advanced Certificate/Diploma awards. The aim is to give candidates the underpinning theoretical and practical knowledge required for a basic understanding of chemistry. The unit is designed to aid progression to Unit HV4H 47 Fundamental Chemistry: Theory and Practice.

**Outcome 1**

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

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

Candidates 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.

Candidates 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 the candidates should be introduced to IUPAC nomenclature for alkanes, alkenes, alcohols, and carboxylic acids. The concept of isomers and homologus series should be introduced. The common reactions and tests for these compounds should also be taught.

**Outcome 2**

Candidates 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.

A laboratory diary or pro forma will be kept and candidates 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 COSHH assessments should be emphasised at all times.

## Guidance on the delivery and assessment of this unit

This unit is designed to form part of a group award, which is primarily designed to prepare candidates 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 candidate centred, resources based methodologies.

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 candidates fail to gain 60% they should be offered a second attempt after sufficient remediation.

In Outcome 2 candidates 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. Candidates should discuss briefly any sources of error.

## Open learning

If this unit is delivered by open or distance learning methods, additional planning resources may be required for candidate support, assessment and quality assurance.

A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes.

For further information and advice, please see *Assessment and Quality Assurance of Open and Distance Learning* (SQA, February 2001 — publication code A1030).

## 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.

# General information for candidates

## Unit title: Fundamental Chemistry: An Introduction

This is a one-credit SQA Advanced Unit at SCQF level 6 intended for candidates undertaking an SQA Advanced Certificate/Diploma 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.