Course Support Notes

National 3 Chemistry Course Support Notes

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

Contents

Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing the National 3 Chemistry Course. They are intended for teachers and lecturers who are delivering the Course and its Units. They should be read in conjunction with the *Course Specification*, and the *Unit Specifications* for the Units in the Course.

General guidance on the Course

Aims

As stated in the *Course Specification*, the aims of the Course are to enable learners to:

- develop basic knowledge and understanding of chemistry
- develop an understanding of chemistry's role in scientific issues and relevant applications of chemistry in society and the environment
- develop scientific inquiry and investigative skills
- develop scientific analytical thinking skills in a chemistry context
- develop the use of technology, equipment and materials, safely, in practical scientific activities
- develop problem solving skills in a chemistry context
- use scientific literacy in everyday contexts
- establish the foundation for more advanced learning in chemistry

Progression into this Course

Entry to this Course is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by the following or equivalent qualifications and/or experience:

- National 2 Science in the Environment Course or relevant component Units

Experiences and Outcomes
National Courses have been designed to draw on and build on the curriculum experiences and outcomes as appropriate. Qualifications developed for the senior phase of secondary education are benchmarked against SCQF levels. SCQF level 4 and the curriculum level 4 are broadly equivalent in terms of level of demand although qualifications at SCQF level 4 will be more specific to allow for more specialist study of subjects.

Learners who have completed Curriculum for Excellence experiences and Outcomes will find these an appropriate basis for doing the Course.

In this Course, learners would benefit from having experience of the following:

Organisers	Lines of development	
Planet Earth	Biodiversity and Interdependence	SCN 03,
	Energy sources and sustainability	SCN 04
	Processes of the planet	SCN 05
	Space	SCN 06
Forces, electricity and waves	Electricity	SCN 10

Materials	Properties and uses of substances	SCN 15, SCN 16
	Earth's materials	SCN 17
	Chemical changes	SCN 18, SCN 19

More detail is contained in the Chemistry Progression Framework.

The Chemistry Progression Framework shows the development of the key areas throughout the suite of course.

Progression from this Course

This Course or its components may provide progression to:

- National 4 Chemistry
- National 4 in another science subject
- National 3 in another science subject

- Skills for Work Courses (SCQF levels 3 or 4)
- National Certificate Group Awards
- National Progression Awards (SCQF levels 3 or 4)
- employment and/or training

Hierarchies

Hierarchy is the term used to describe Courses and Units which form a structured sequence involving two or more SCQF levels.

It is important that any content in a Course and/or Unit at one particular SCQF level is not repeated if a learner progresses to the next level of the hierarchy. The skills and knowledge should be able to be applied to new content and contexts to enrich the learning experience. This is for centres to manage.

- Chemistry Courses from National 3 to Higher are hierarchical.
- Courses from National 3 to National 5 have Units with the same titles.

Approaches to learning and teaching

The purpose of this section is to provide you with advice and guidance on learning and teaching for National 3 Chemistry.

Teaching should involve an appropriate range of approaches to develop knowledge and understanding and skills for learning, life and work. This can be integrated into a related sequence of activities, centred on an idea, theme or application of chemistry, based on appropriate contexts, and need not be restricted to the Unit structure. Learning should be experiential, active, challenging and enjoyable, and include appropriate practical experiments/activities and could be learner-led. The use of a variety of active learning approaches is encouraged, including peer teaching and assessment, individual and group presentations, role-playing and game-based learning, with learner- generated questions.

When developing your Chemistry Course there should be opportunities for learners to take responsibility for their learning. Learning and teaching should build on learners' prior knowledge, skills and experiences. The Units and the key areas identified within them may be approached in any appropriate sequence, at the centre's discretion. The distribution of time between the various Units is a matter for professional judgement and is entirely at the discretion of the centre. Each Unit is likely to require an approximately equal time allocation, although this may depend on the learners' prior learning in the different key areas.

Learning and teaching, within a class, can be organised, in a flexible way, to allow a range of learners' needs to be met, including learners achieving at different levels. The hierarchical nature of the new Chemistry qualifications provides improved continuity between the levels. Centres can, therefore, organise learning and teaching strategies in ways appropriate for their learners.

Within a class, there may be learners capable of achieving at a higher level in some aspects of the Course. Where possible, they should be given the opportunity to do so. There may also be learners who are struggling to achieve in all aspects of the Course, and may only achieve at the lower level in some areas.

Teachers/lecturers need to consider the *Course Specifications* and *Unit Specifications*, and *Course Assessment Specifications* (to identify the differences between Course levels). It may also be useful to refer to the Chemistry Progression Framework.

When delivering this Course to a group of learners, with some working towards different levels, it may be useful for teachers to identify activities covering common key areas and skills for all learners, and additional activities required for some learners. In some aspects of the Course, the difference between levels is defined in terms of a higher level of skill.

Chemical equations are central to chemistry and are visited in chemical changes and structure, nature's chemistry and chemistry in society. Learners should be given the opportunity to practise writing chemical equations throughout the course. By revisiting chemical equations at different points of the course, learners consolidate earlier learning.

An investigatory approach is encouraged in Chemistry, with learners actively involved in developing their skills, knowledge and understanding by investigating a range of relevant Chemistry applications and issues. A holistic approach should be adopted to encourage simultaneous development of learners' conceptual understanding and skills.

Where appropriate, investigative work/experiments should allow learners the opportunity to select activities and/or carry out extended study. Investigative and experimental work is part of the scientific method of working and can fulfil a number of educational purposes.

All learning and teaching should offer opportunities for learners to work collaboratively. Practical activities and investigative work can offer opportunities for group work. Group work approaches can be used within Units and across Courses where it is helpful to simulate real life situations, share tasks and promote team working skills. However there must be clear evidence for each learner to show that the learner has met the required assessment standards for the Unit or Course.

Laboratory work should include the use of technology and equipment that reflects current scientific use. Appropriate risk assessment must be undertaken.

Learners should also have the opportunity to become familiar with the apparatus, practical techniques and data analysis strategies indicated below. The list builds on the skills from the experience and Outcomes and is not exhaustive.

Learners would benefit from being familiar with the following apparatus, practical techniques and activities:	Learners should be able to process experimental results by:
♦ filtration ♦ evaporation ♦ use of a balance ♦ measuring pH ♦ methods for the testing of gases ♦ safe methods of heating ♦ methods for following rates of reactions	♦ drawing diagrams of apparatus ♦ using tables to present data ♦ calculation of averages for experimental results

Learners would be expected to contribute their own time in addition to programmed learning time.

Effective partnership working can enhance the science experience. Where possible, locally relevant contexts should be studied, with visits where this is possible. Guest speakers from industry, further and higher education could be used to bring the world of chemistry into the classroom.

Information and Communications Technology (ICT) makes a significant contribution to the chemistry Course. In addition to the use of computers as a learning tool, computer animations can be used to demonstrate microscopic particles, reactions, and processes. Computer interfacing equipment can detect and record small changes in variables allowing experimental results to be recorded over short or long periods of time. Results can also be displayed in real time helping to improve understanding. Data logging equipment, cameras and video cameras can be set up to record data and make observations which can then be subsequently downloaded and viewed for analysis.

Assessment should be integral to and improve learning & teaching. The approach should involve learners and provide supportive feedback. Self- and peer-assessment techniques should be encouraged, wherever appropriate. Assessment information should be used to set learning targets and next steps.

Learning about Scotland and Scottish culture will enrich the learners' learning experience and help them to develop the skills for learning, life and work they will need to prepare them for taking their place in a diverse, inclusive and participative Scotland and beyond. Where there are opportunities to contextualise approaches to learning and teaching to Scottish contexts, teachers and lecturers should consider this.

Suggestions for possible contexts and learning activities to support and enrich learning and teaching are detailed in the table below.

The **Key areas** are from the *Unit Specifications*. **Suggested learning activities** are not mandatory. This offers examples of suggested activities from which you could select a range. It is not expected that all will be covered. The contexts for key areas are open to personalisation and choice, so centres are likely to devise their own learning activities. **Exemplification of key areas,** it is not mandatory. It provides an outline of the level of demand and detail of the key areas.

Risk assessment should always be carried out prior to doing any of the experiments and demonstrations listed.

Chemical Changes and Structure		
Key areas	**Suggested learning activities**	**Exemplification of key area**
Rates of Reaction	Learners can carry out a number of small experiments some of which will give signs of a chemical reaction. Glow sticks can be used to show energy and colour change. Teacher demonstrations could include magnesium and silver nitrate, (details can be found on the RSC website) aluminium and iodine, potassium permanganate and glycerol (Practical Chemistry from Nuffield foundation web site). Having discovered the signs of a chemical reaction, cognitive conflict can be given by discussion of physical changes. A series of examples can be used to practice identifying the elements from which a compound was formed as well as simple chemical formulae. Card sorts and games can be used to reinforce these skills.	Indicators of chemical reactions. All chemical reactions result in the formation of one or more new substances. Signs of a chemical reaction include a colour change, gas produced, solid produced, and energy change. There are 4 factors that affect the rate of reaction: temperature, concentration, catalyst and surface area. Increasing the temperature, concentration and surface area will speed up a reaction, decreasing them slows reactions down. Adding a catalyst will speed up a reaction.

Chemical Structure	Learners can categorise samples of substances as elements, compounds and mixtures. Air can be used as an example of a mixture of gases and the gas tests can be used to identify oxygen, carbon dioxide and nitrogen (nitrogen fails both tests). Calcium chloride can also be used to show the presence of water vapour. Simple diagrams can be used to show pictorially the composition of an element, compound or mixture. A mixture of for example copper carbonate and copper sulphate can be separated using solubility, filtration and evaporation. Simple methods such as flotation and magnetism can also be shown for some mixtures. Everyday separation of mixtures can be investigated including water purification, distillation of alcohol and separation of metal waste before recycling. Learners can carry out experiments to investigate the solubility of various chemicals in various solvents. Experiments to show the solubility of gases and liquids can reinforce that a solute can be in any state. Everyday example such as nail varnish remover and dry cleaning can show the use of alternative solvents. Saturated solutions of alum can be used to prepare large crystals whilst also revisiting the effect of temperature on solubility. Particle models/diagrams can be used to show the differences between solids, liquid and gases. A simple experiment can be carried out to identify chemicals based on their melting point (salol, stearic acid and salt) The effect of heat on chocolate and an egg white can be compared as	Elements, compounds and mixtures. Everything is made of atoms. A substances can be describe as an element, if it contains only one kind of atom, a compound, formed when atoms of two or more different elements are chemically joined or a mixture, where more than one type of substance is present but not joined. Mixtures can be easily separated by physical methods such as filtration and evaporation depending on their solubility. A substance is described as soluble when it can be dissolved in a liquid. The terms solute, solvent and solution can be used in relation to solubility. The solubility of a substance can vary depending on the solvent used. A solution in which no more solute can dissolve is described as saturated. For all chemicals there are three states of matter: solid, liquid and gas. The melting point is the temperature at which the solid becomes a liquid or vice versa. The boiling point is the temperature at which a liquid becomes a gas or vice versa. Chemical and physical properties of elements related to position in the periodic table. Elements are arranged in the periodic table, each with its own unique symbol. Elements with similar chemical properties are placed

	described in the Practical Chemistry website from the Royal Society of Chemistry and the Nuffield Foundation. Card sorts of elements can be used to show that symbols of different elements are not the same and are not always directly from the English name. Chemical bingo can be used to help learners familiarise themselves with the periodic table and there are several websites where cards and instructions can be downloaded from. Chemical properties can be shown by demonstration of the alkali metals with water, discussion of the noble gases' lack of reactivity or by showing videos of reactions of the halogens. Elements can be tested for electrical conductivity.	together in vertical groups. Elements can be categorised as metals and non-metals, which can be determined by their electrical conductivity. Carbon is a notable exception in that it is the only non-metal that can conduct electricity in the form of graphite. Chemical formulae (including prefixes) of two element compounds. Chemical reactions can be described by word equations. The name of a two-element compound is derived from the names of the elements, from which it is formed, with a suffix of –ide. Simple chemical formulae can be written from names of compounds where prefixes are present.
Acids and bases	Learners can carry out an experiment to show the effect of dilution by loss of colour or electrical conductivity. Learners should be familiar with the process of identifying an acid or alkali using indicators. Although this can be carried out practically using laboratory and household chemicals, it may be better for learners to make an indicator themselves. (details from Nuffield foundation web site) Universal indicator should be used in order for learners to experience the full range of pHs. Learners may have an appreciation that CO_2 is a by-product of burning fossil fuels but another large contribution is made by cement manufacture required for new buildings. Teachers	A concentrated solution is a solution with a high proportion of solute to solvent; this can be diluted by adding more solvent forming a dilute solution. Solutions can be classified as acidic, alkaline or neutral and can be tested using chemical indicators. An indicator is a chemical that changes colour depending on the solution to which it is added. The pH scale is a continuous number scale from below zero to above 14. Solutions with a pH of less than 7 are described as acidic and

	may wish to use this opportunity to discuss carbon/global footprints resources available from the Education Scotland website. The effect of CO_2 on global warming can be demonstrated by charting the temperature of plastic bottles filled with air, water vapour, CO_2 (and possibly methane) exposed to a heat source over time. The effect of increased temperature on the ability of the oceans to absorb extra CO_2 as well as the effect of reduced pH on shells could also be investigated. (details of a practical investigation of this called 'sea change mystery' can be found on the RSC website) Other non-metal oxide pollutants could be introduced as well as an investigation into the effects of lower pH on cress seed growth and limestone or marble. Learners could investigate the effect of low pH drinks on teeth using pieces of bone. The Sip Smart activity from the British Columbia Paediatric Society describes how to carry out this sort of activity. Positive uses of acids should also be investigated, eg acidity regulators in foodstuffs such as ethanoic acid (E260) and citric acid (E330). Benzoic acid (E210) is a preservative. HCl is used by the body for digestion; lightning storms supply much needed nitrates to the soil of rain forests. Neutralisation reactions can be used to deal with the after effects of acid rain. Examples include the liming of fields in agriculture to reduce the pH of soil. Learners could discuss the clean-up of spilt chemicals and methods used to minimise risk. Everyday uses of neutralisation reactions may include stings, indigestion and teeth cleaning.	with a pH greater than 7 as alkaline. Neutral solutions have a pH of exactly 7. Environmental impact of non- metal oxides. Non-metal oxides play a large role in the environment. Carbon dioxide, sulfur dioxide and oxides of nitrogen are produced as a result of our continued use of fossil fuels. Although these oxides are produced in nature the increased production of these oxides is linked to environmental problems including acid rain, global warming and ocean acidification. Many examples of food and drink have a pH of less than 7. Carbon dioxide is used in the drinks industry to make drinks fizzy. This, along with other natural sources of acids, has an impact on human health. Neutralisation reactions including naming of salts. An acid can be neutralised by an alkali to form water and a salt. The course of this reaction can be followed using a pH indicator, the pH of an acid goes up and the pH of an alkali goes down. Diluting with water will also increase the pH of an acid and decrease the pH of an alkali towards 7. Uses of common neutralisation reactions.

Nature's Chemistry		
Key areas	**Suggested learning activities**	**Exemplification of key areas**
Fuels and energy	Has Scotland won the natural lottery? A debate on Scotland's natural resources. Learners will participate in and be able to identify exothermic and endothermic reactions. Through practical activities learners will demonstrate the principal of the fire triangle and that a fire requires heat, oxygen and fuel. Removing one of these causes the fire to go out. Learners can make their own fire extinguisher. Learners can design a poster or investigate how to prevent fires and extinguish different types of fires. Environmental impact of carbon dioxide can be demonstrated by practical work to show how global warming occurs. Learners could investigate processes associated with reducing the environmental impact of hydrocarbons by society such as carbon capture, uses of detergents in oil spills and how plastics are recycled. Different types of biomass can be burned and the amount of energy released can be compared. Types of biomass can include samples collected from field trips and the surrounding area as well as recycled waste within the school (eg paper, cardboard, sawdust). Learners produce a leaflet promoting advantages or	Environmental impact of using different energy sources. Fuels are substances which, when burned, produce energy. Different substances can be used as fuels. These can include coal, gas, petrol and food based components such as starch, sugars, proteins alcohol and oils. When a fire is extinguished oxygen, heat or the fuel must be removed. Different types of fires require specific methods of treatment in order to be extinguished safely. A hydrocarbon is a substance containing hydrogen and carbon. When a hydrocarbon burns carbon dioxide and water are produced. Both products can be tested for in a laboratory. Water has a pH of 7 and turns blue cobalt chloride paper pink. Carbon dioxide turns lime water milky. Natural resources include fossil fuels such as coal, oil, gas and peat. Disadvantages associated with their use will be discussed. Reasons for the development of alternative sources of energy which are sustainable such as solar power, wind turbines, wave

	disadvantages of a local biomass plant. Models of wind turbines and solar cells can be used to compare the amount of energy produced and identify some of the difficulties associated with maintaining the energy production. Investigation of electricity production in Scotland and creation of a poster or PowerPoint summarising different locations and the method of electricity production. Learners investigate the cost of electricity and costs associated with developing alternative energy sources. Practical to demonstrate products of sugar and methanol combustion. Samples burned and products drawn through a test tube containing cobalt chloride paper and a second test tube containing lime water. Coffee whitener is carefully shaken over a burning spill held in a clamp stand. Demonstrates combustion of energy sources such as carbohydrates and effect of surface area on speed of a reaction. Ensure risk assessment completed beforehand.	machines, biomass, biodiesel, hydrogen and ethanol will be investigated. Scotland used to grow sugar beet. The possibility of this being grown again and used in the development of biofuels will be investigated. There are advantages and disadvantages associated with different types of sustainable energy sources. Energy production from wind turbines and solar cells may be influenced by environmental factors such as weather patterns. There are difficulties associated with maintaining the level of energy production from wind farms or solar panels. Hydro electricity is a method for producing electricity without the necessity of burning fossil fuels. Due to its geography which includes mountains and fast flowing rivers Scotland can provide large amounts of hydro-electricity. Scotland has developed a unique system, called the Ben Cruachan Power station for producing hydroelectricity. There are costs associated with developing sustainable energy sources.

		Other sources of fuels such as alcohols and carbohydrates produce water and carbon dioxide when burned.
Everyday consumer products	Carbohydrates, fats and oils will be identified as source of energy and starting materials for cosmetics Herbs or plant bulbs can be grown +/- fertiliser and the rate of growth can be measured. Plants may be grown in hand decorated plant pots. Investigation of nutrient content of a variety of foods using food labels. Evidence of presence of fat in a variety of foods using filter paper test. Stain on filter paper indicates presence of fat or oil. Vitamin C presence using iodine solution which decolourises. Protein testing where the food sample heated with soda lime produces a gas which is alkaline and turns litmus paper blue. The presence of sugars assessed using Benedict's solution which turns brick-red in presence of a reducing sugar. The presence of starch is tested through the addition of iodine solution which turns blue/black.	Plants for food. Plants are a vital source of nutrients. Fertilisers are chemicals which are used to promote crop growth and to assist with food and drink production. The effect of fertilisers on plant growth may be demonstrated through experimentation. Plant based nutrients such as proteins, carbohydrates, oils, vitamins and minerals have a variety of effects in the body in a way that can promote and maintain human health. Specific nutrients and their function will be investigated in conjunction with the effect of lifestyle on the body's requirements of vitamins and minerals. The role of essential fatty acids and plant based proteins in human health will be investigated. Fermentation is a process which converts sugars into alcohols. Alcohol is separated from solution by distillation and can be used to alter the alcohol content of drinks. Different alcoholic drinks contain differing

		amounts of alcohol. The alcohol content of drinks is measured in units. The maximum recommended amount of units per day varies for men and for women. One small glass of wine contains one unit of alcohol.
Everyday consumer products	The plant content or contribution of plant products to everyday products such as shampoos, soaps and body lotions is identified through analysis of labels. Several herbs are used and learners match fragrance of herb to a well-known use and every day product. Learners are able to identify herbs and research their uses and history, including (eg): Peppermint — toothpaste or mouthwash Thyme — mouthwash Lavender — pillow for sleeplessness, pain relief or skin cream Lemon — hair products, soaps Eucalyptus — antiseptic or sinus inhalant Making perfumes by blending essential oils and noting change in fragrance as different oils are mixed.	Plant products such as carbohydrates, fats and oils are used in the manufacture of cosmetics. Plants provide a variety of chemicals. These include nutrients and essential oils. Essential oils are used to make cosmetics, shampoos, soaps, body lotions and perfumes. Essential oils such as lavender, lemon, orange, geranium, peppermint, ginger, eucalyptus, rosemary and spearmint are extracted by steam distillation using the appropriate part of the plant, fruit or root. By sampling the fragrance of an essential oil it is possible to determine the plant/herb from which the oil was extracted. Everyday uses of essential oil can be identified from product labels. Uses include peppermint and spearmint in toothpaste, lemon, rosemary and orange in shampoos, lavender in hand creams/body lotions and eucalyptus in sinus sprays or with ginger in muscle massage oils.

		Essential oils can be used to make perfumes. Perfumes contain a mixture of notes, such as essential oils with high notes and others with low notes. During blending of essential oils geranium and/or sandalwood must be added in order for perfumes to maintain their fragrance.
Plants to products	Approximately 30% of medicines used today are derived from plants. The label on a medicine or pharmaceutical product describes the contents of the product and what is can be used for. There are a variety of medicines which are legal. While alcohol is also a legal drug there are other drugs which are illegal and may be harmful. Plants such as foxglove, willow, meadowsweet, poppies and *Chinchona* were commonly used in earlier times for the treatment of diseases such as heart disease, inflammatory diseases and malaria. Scottish scientists were instrumental in the development of willow, poppies and *Chinchona* in the treatment of disease. Aspirin is a medicine that is derived from meadowsweet and willow. Morphine, used to treat pain is derived from poppies. Further input and examples are available from Education Scotland.	Practical based activity on products derived from plants which have enhanced everyday life. Many plants are used by chemist in the design and manufacture of many everyday products such as pharmaceuticals, soaps, cosmetics, dyes, medicines, foods or food colourings. Learners will research and investigate how plants are used to make products. For each plant they should cover: where they are found and grown; the identification of the active ingredient; the role of the chemists in extracting the useful chemicals; the variety of uses and applications of plant-based products and how the plant-based products have enhanced everyday life.

Chemistry in Society		
Key areas	**Suggested learning activities**	**Exemplification of key areas**
The properties of materials Properties of solutions	Internet search: Science Enhancement Program, BBC Christmas lectures, National Stem Centre resources, Education Scotland, Royal Society of Chemistry. Investigate the electrical conductivity of metals and non-metals. 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. 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. Make a table to list some natural and synthetic fibres. Find out about how some natural fibres are formed. Make a list of some important properties of clothing fabrics. Investigate the important properties of different fabrics. Demonstrate/carry out the making of nylon. Investigate the strength of different fibres. Examine samples of plastics and write a description of some. Find out about the uses of plastics in and around the home and how the uses of plastics are related to their properties.	Testing the properties of materials and investigating their uses. Investigate a range of different materials to include metals, ceramics, plastics, natural and novel materials. Learners should investigate the physical and chemical properties of these materials in general, and specifically the reactions involving metals (oxygen, water, electrolysis, corrosion, physical methods of protection, effect of salt) In a battery, electricity comes from a chemical reaction. Batteries require to be replaced due to the chemicals being used up in the reaction. Thermosetting and thermoplastics. The importance and use of plastics to everyday life should acknowledge and that they are man-made. Investigate a novel material in terms of properties and applications. Learners should investigate solubility of everyday chemicals such as salt, sugar, wax,

	Obtain information from a database. Demonstrate the addition of acetone to polystyrene. Investigate the effect of a hot nail on different plastics. Learners could look at applications of these chemicals/solutions, eg salt water as an electrolyte, wax for water proofing, baking powder in cooking. Learners could also look at the use of solubility as a method of purification by recrystallisation of salt from rock salt or growing crystals.	alcohol, sand, chalk, baking powder, flour, washing powder etc. They could investigate factors effecting solubility including temperature, volumes/masses involved, type of substance etc.
Chemical Analysis	Learners should identify hazards in the lab and then try and find materials in the home or on transporters going to and from factories/sites. Learners could choose a chemical company and investigate: the source of the chemical(s) and their importance; transport safety including common hazard symbols; environmental location factors for companies dealing with chemical spills and/or monitoring in the environment; consider social and environmental aspects. Examples of companies include; power station, oil refinery, far, fish farm, whisky distilleries, paint factories etc. Internet search: BP educational service Internet search: Scottish Environmental Protection Agency Internet search: Scottish Water Internet search: The Chemical Industry Association Internet search: The Nuclear Industry	Being aware of where we get chemicals from, how they are transported and how the environment is analysed. Learners should be aware of hazards associated with using chemicals in the laboratory and out with the laboratory. Plastics and petrol come from crude oil, metals come from ores, dyes from plants etc. Some chemicals like acids need moved using protective clothing like gloves or petrol tankers need to have hazard symbols on them and the drivers need to be given special training. Learners should also be aware of how to analyse the environment by carrying out tests such as pH and ion testing.

Developing skills for learning, skills for life and skills for work

Learners are expected to develop broad generic skills as an integral part of their learning experience. The *Course Specification* lists the skills for learning, skills for life and skills for work that learners should develop through this Course. These are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and must be built into the Course where there are appropriate opportunities. The level of these skills will be appropriate to the level of the Course.

For this Course, it is expected that the following skills for learning, skills for life and skills for work will be significantly developed:

Numeracy
This is the ability to use numbers in order to solve problems by counting, doing calculations, measuring, and understanding graphs and charts. This is also the ability to understand the results.

Learners will have opportunities to extract, process and interpret information presented in numerous formats including tabular and graphical. Practical work will provide opportunities to develop time and measurement skills.

2.1 Number processes
Number processes means solving problems arising in everyday life.
Learners have the opportunity to develop numeracy skills by carrying out calculations when working out averages and processing experimental results. Learners should deal with data and results from experiments/investigations and everyday class work and make decisions based on the results.

2.2 Money, time and measurement
Using time and measurement in practical work during rates of reaction, the reactions of acids, bases, metals and plants.

2.3 Information handling
Learners will experience Information handling opportunities when dealing with data in tables, charts and other graphical displays to draw sensible conclusions throughout the Course.

Thinking skills
This is the ability to develop the cognitive skills of remembering, understanding, and applying.

The Course will allow learners to develop skills of understanding and applying. Learners can apply knowledge to practical work and demonstrate understanding and apply knowledge to describe and interpret information and data.

5.2 Understanding

Throughout the course, learners should be given the opportunity to develop their understanding of chemical reactions and key areas. They should be given opportunities to use this understanding to demonstrate the meaning of items of information, to explain the order of events in a sequence and to interpret in a different setting or context.

5.3 Applying

Learners should be given opportunities to plan experiments throughout the course and to use existing information to solve problems in different contexts.

In addition, leaners will also have opportunities to develop literacy skills, creating, working with others and citizenship.

Literacy
Learners develop the skills to communicate key chemical ideas, and describe/ chemical issues in various media forms. Learners will have the opportunities to communicate knowledge and understanding with an emphasis on applications and environmental/ social impacts. Learners will have opportunities to develop listening and reading skills when gathering and processing information.

Working with Others
Learning activities provide many opportunities in all areas of the course for learners to work with others Practical activities and investigations offer opportunities for group work, which is an important aspect of chemistry and should be encouraged.

Creating
Through learning in chemistry, learners can demonstrate creativity. In particular, when planning and designing experiments or investigations, learners have the opportunity to be innovative. Learners also have opportunities to make, write, say or do something new.

Citizenship
This course has many opportunities for an extensive range of practical activities which provides learners with the opportunity to work cooperatively with others. Learners will develop citizenship skills when considering the applications of chemistry on society/the environment.

Approaches to assessment

Assessment should cover the mandatory skills, knowledge and understanding of the Course. Assessment is integral to improved learning and teaching. The approach should involve learners and provide supportive feedback. Self- and peer-assessment techniques should be used whenever possible.

See the *Unit Support Notes* for guidance on approaches to assessment of the Units of the Course.

Combining assessment across Units

If an integrated approach to Course delivery is chosen then there may be opportunities for combining assessment across Units. If this approach is used then it is necessary to be able to track evidence for individual Outcomes and Assessment Standards.

Transfer of evidence
Evidence for the achievement of Outcome 1 and Assessment Standards 2.2, 2.3 and 2.4 for this Unit can be used as evidence of the achievement of Outcome 1 and Assessment Standards 2.2, 2.3 and 2.4 in the other Units of this Course.

Exemplification of standards

Assessment Standards can be achieved using one or more pieces of evidence covering work done on different occasions.

Assessors should record evidence of achievement of Outcomes and Assessment Standards. The table on the next page shows one way of recording evidence. This table is not mandatory.

This candidate has passed all five Assessment Standards for Outcome 1.

Assessment Standard	**Evidence**	**Result**
1.1 Following procedures safely	Procedures have been followed safely and correctly	The steps in the method were followed in the correct order.
1.2 Making and recording observations/ measurements accurately	Observations/ measurements taken are correct	Results recorded in a suitable format.
1.3 Presenting results in an appropriate format	Results have been presented in an appropriate format	Table of results with headings.

1.4 Drawing valid conclusions	What the experiment shows, with reference to the aim	Conclusion relates to the aim and results.
1.5 Evaluating experimental procedures	The suggestion given will improve the experiment	Suggestion given is to repeat experiment.

National 3 Outcome1 Student Practical Guide

Comparing the pH of metal oxides with non-metal oxides

In this experiment you are trying to find out if there is a difference in the pH of metal oxides and non-metal oxides. The different colours of pH paper are used to indicate if the chemical is acid, alkali or neutral.
Gases are difficult to use so we are using solutions. :- Sulphuric acid is a solution of sulphur dioxide and nitric acid is a solution of nitrogen dioxide. Carbonic acid is a solution of carbon dioxide.

What to do

1. Collect the solutions listed below, a dimple tile, safety glasses, a dropper and some pH paper.

Solutions to be tested:

Sodium oxide	Sulphur oxide
Potassium oxide	Carbon dioxide
Magnesium oxide	Nitrogen oxide
Calcium oxide	

2. Add four drops of each of the test solutions to a different dimple on the dimple tile. Remember to rinse out your dropper with water between tests.

3. Now test each solution using the pH paper to find out if it is acid, alkali or neutral.

4. Note your **observations** on your record sheet then complete the **results**, **conclusion** and **evaluation** sections.

Candidate 1

Assessment Task 1

Experiment report

Name:

Date:

Title of experiment:

Comparing the pH of metal oxides with non-metal oxides

AIM:

Is there a difference in pH between metal and non-metal oxides.

Method (Inc. labelled diagram, if appropriate):

1. Collect all the equiptment;
   * Dimple Tile
   * Safety Glasses
   * pH Paper
   * Solutions - Sodium Oxide, Potassium oxide, magnesium oxide, Calcium oxide, Sulphur oxide, phosphorus oxide, nitrogen oxide, and hydrogen oxide.
2. Put a few drops of different solutions into each of the dimples in the dimple tray, washing the dropper between each drop
3. Then place pH paper into each of the solutions to find out what pH it is, acid, alkali or neutral.

Unit Assessment Support for Chemical Changes and Structure (National 3) Unit 16

Candidate 1 (contd)

Results:

Chemical Name	Colour and pH	acid, alkali, neutral
Sodium oxide	blue - pH 10	alkali
Potassium oxide	blue - pH 11	alkali
Magnesium oxide	blue - pH 11	alkali
calcium oxide	blue - pH 11	alkali
Sulphur oxide	red - pH 3	acid
phosphorus oxide	red - pH 4	acid
Nitrogen oxide	red - pH 4	acid
hydrogen oxide	neutral green, pH 7	neutral

1·2
1·3

Conclusions:

There is a difference between the pH, it being all metal oxides are alkali and non-metal oxides are acid, except from hydrogen oxide which is neutral.

1·4

Evaluations:

The experiment went well, proof of this is that the results were very clear. This may have been because we washed the dropper between each solution to avoid any unwanted mixing to occur.

1·5

Unit Assessment Support for Chemical Changes and Structure (National 3) Unit 17

Candidate 2

Assessment Standards 2.2 and 2.3 can be achieved using one or two pieces of evidence covering work done on different occasions.

Assessors should record evidence of achievement of Outcomes and Assessment Standards. The table below is one way of recording the evidence. This table is not mandatory.

This candidate has passed both Assessment Standards 2.2 and 2.3.

Use of an acid

Acid can be used to neutralise alkalis. For example a wasp sting is an alkali and when added a weak acid like lemon juice neutralises the alkalis. This is a good effect on society as people will not feel as much pain when stung by a wasp.

Assessment standard	Evidence Required	Evidence Produced
2.2 Describing a given application	Appropriate chemistry knowledge is used to describe a given application	Identification of an acid to neutralise the wasp sting.
2.3 Describing a given chemistry issue in terms of the effect on the environment/ society	Appropriate chemistry knowledge is used describe it's effect	Relevant effect stated, Reduced pain, wasp sting is neutralised.

Equality and inclusion

The following should be taken into consideration:

Situation	Reasonable Adjustment
Carrying out practical activities	Use could be made of practical helpers if learners have: ♦ physical disabilities, especially difficulty with manual dexterity when carrying out practical techniques ♦ visual impairment - difficulty in distinguishing colour changes or other visual information
Reading, writing and presenting text, symbolic representation, tables, graphs and diagrams	Use could be made of ICT, enlarged text, alternative paper and/or print colour and/or practical helpers for learners with visual impairment, specific learning difficulties and physical disabilities
Process information using calculations	Use could be made of practical helpers for learners with specific cognitive difficulties (eg dyscalculia)
Draw a valid conclusion, giving explanations and making generalisation/predictions	Use could be made of practical helpers for learners with specific cognitive difficulties or autism

As far as possible, reasonable adjustments should be made for the Assignment, where necessary. This includes the use of 'practical helpers', readers, scribes, adapted equipment or assistive technologies.

It is recognised that centres have their own duties under equality and other legislation and policy initiatives. The guidance given in these *Course Support Notes* is designed to sit alongside these duties but is specific to the delivery and assessment of the Course.

It is important that centres are aware of and understand SQA's assessment arrangements for disabled learners, and those with additional support needs, when making requests for adjustments to published assessment arrangements. Centres will find more guidance on this in the series of publications on Assessment Arrangements on SQA's website: **www.sqa.org.uk/sqa//14977.html**.

Appendix 1: Reference documents

The following reference documents will provide useful information and background.

- Assessment Arrangements (for disabled candidates and/or those with additional support needs) — various publications are available on SQA's website at: www.sqa.org.uk/sqa//14977.html.
- *Building the Curriculum 4: Skills for learning, skills for life and skills for work*
- *Building the Curriculum 5: A framework for assessment*
- Course Specifications
- Design Principles for National Courses
- *Guide to Assessment* (June 2008)
- Overview of Qualification Reports
- Principles and practice papers for curriculum areas
- *SCQF Handbook: User Guide* (published 2009) and SCQF level descriptors (to be reviewed during 2011 to 2012): www.sqa.org.uk/sqa/4595.html
- *SQA Skills Framework: Skills for Learning, Skills for Life and Skills for Work*
- *Skills for Learning, Skills for Life and Skills for Work: Using the Curriculum Tool*

Administrative information

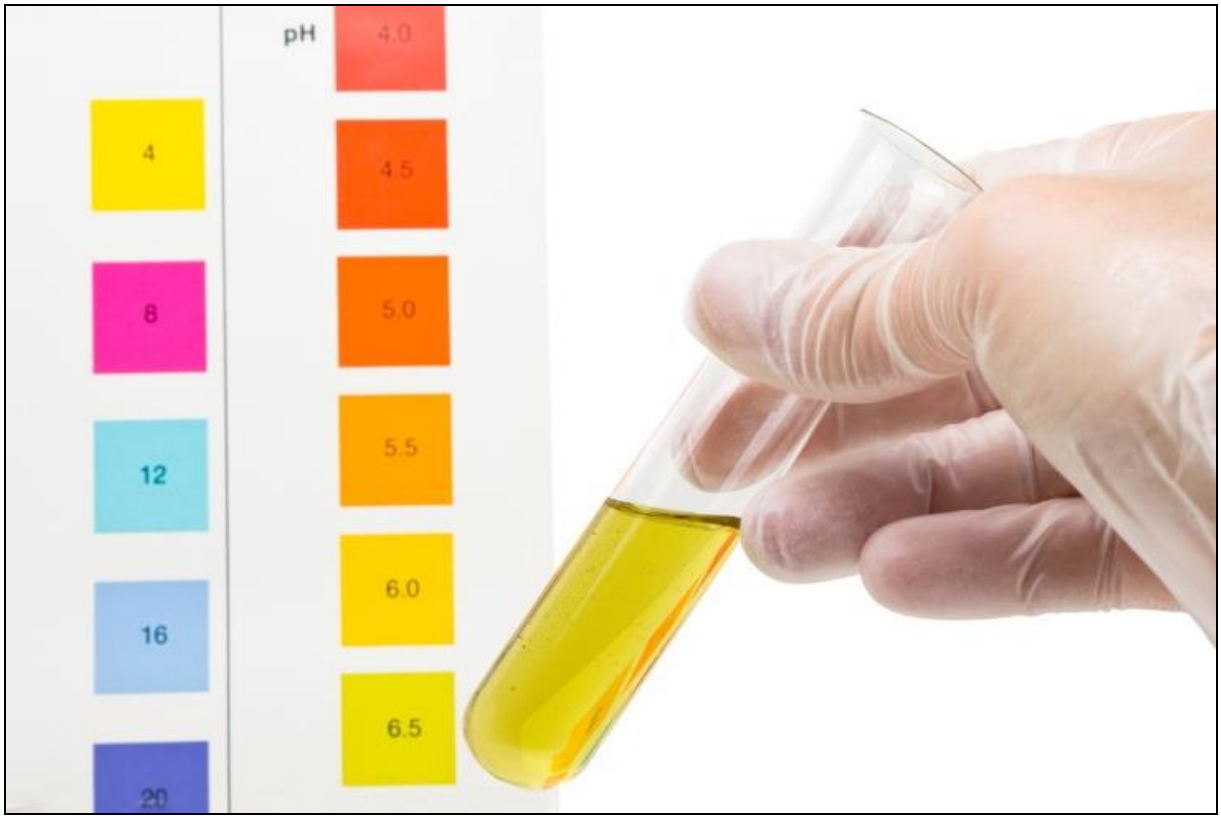
Published: May 2015 (version 1.2)

History of changes to Course Support Notes

Course details	Version	Description of change	Authorised by	Date
	1.1	Exemplar materials added.	Qualifications Development Manager	June 2013
	1.2	Minor typographical amendment in 'Hierarchies' section.	Qualifications Manager	May 2015

Unit Support Notes

Unit Support Notes — Chemical Changes and Structure (National 3)



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

Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing the Chemistry: Chemical Changes and Structure (National 3) Unit. They are intended for teachers and lecturers who are delivering this Unit. They should be read in conjunction with:

- the *Unit Specification*
- the *Course Specification*
- the *Course Support Notes*
- appropriate assessment support materials

General guidance on the Unit

Aims

The general aim of this Unit is to develop skills of scientific inquiry, investigation, and knowledge and understanding of chemical changes and structure. Learners will apply these skills when considering the applications of chemical changes and structure on our lives, as well as the implications on society/the environment. This can be done by using a variety of approaches, including investigation and problem solving.

The Unit covers the key areas of:

- **rates of reaction**
- **chemical structure**
- **acids and bases**

Learners will research issues, apply scientific skills and communicate information related to their findings, which will develop skills of scientific literacy.

Progression into this Unit

Entry to this Unit is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by the following or equivalent qualifications and/or experience:

- National 2 Science in the Environment Course or relevant component Units

Skills, knowledge and understanding covered in this Unit

Information about skills, knowledge and understanding is given in the National 3 Chemistry *Course Support Notes*.

If this Unit is being delivered on a free-standing basis, teachers and lecturers are free to select the skills, knowledge and understanding and contexts in ways which are most appropriate for delivery in their centres.

Progression from this Unit

This Unit may provide progression to:

- other qualifications in Chemistry, or related areas
- further study, employment and/or training

Approaches to learning and teaching

Approaches to learning and teaching and suggested learning activities are covered in the *Course Support Notes*.

Safety is integral to all practical work and learners should be encouraged to see risk assessment as a natural part of the planning process for any practical activity. Outcome 1 provides an opportunity for learners to identify risks and plan the safety steps required.

Developing skills for learning, skills for life and skills for work

Information about developing skills for learning, skills for life and skills for work in this Unit, is given in the relevant *Course Support Notes*.

Approaches to assessment and gathering evidence

The purpose of this section is to give advice on approaches to assessment for the Unit. There will be other documents produced for centres to provide exemplification of assessments and guidance on how to write them.

Approaches to the assessment of a Unit when it forms part of a Course may differ from approaches to assessing the same Unit when it is not being delivered as part of a Course. If an integrated approach to Course delivery is chosen, then there may be opportunities for combining assessment across Units.

Assessments must be valid, reliable and fit for purpose for the subject and level, and should fit in with learning and teaching approaches.

Unit assessment should support learning and teaching and were possible enable personalisation and choice for learners in assessment methods and processes.

Teachers and lecturers should select the assessment methods they believe are most appropriate, taking into account the needs of their learners and the requirements of the Unit.

There is no mandatory order for delivery of the Outcomes. These should be delivered during the course of the Unit and are an integral part of learning and teaching.

The table below gives guidance and advice on possible approaches to assessment and gathering evidence.

Strategies for gathering evidence

There may be opportunities, both planned and naturally occurring, in the day-to-day learning and teaching of the Unit to observe learners providing evidence which satisfies completely or partially an Outcome or Outcomes. Additional evidence may be required to supplement this evidence.

Approaches to assessment might cover the whole Unit or be combined across Outcomes. A holistic approach can enrich the assessment process for the learner by bringing together different Outcomes and/or Assessment Standards. If a holistic approach is used then it is necessary to be able to track individual Assessment Standard evidence.

Strategies for gathering evidence and ensuring that the learners' work is their own, could include:

- personal interviews during which the teacher or lecturer can ask additional questions about completed work
- oral presentations on their work
- written reports
- checklists to record authenticity
- supplementary sources of evidence, such as witness testimony, film or audio clips

Evidence can be gathered from classwork, experiment, investigations and/or research carried out in this unit. It can be obtained using one or more of the strategies outlined above or by alternative methods which could include a test of knowledge, understanding and skills.

Equality and inclusion

The *Course Support Notes* provide full information on equality and inclusion for this Unit.

It is recognised that centres have their own duties under equality and other legislation and policy initiatives. The guidance given in these *Unit Support Notes* is designed to sit alongside these duties but is specific to the delivery and assessment of the Unit.

Alternative approaches to Unit assessment to take account of the specific needs of learners can be used. However, the centre must be satisfied that the integrity of the assessment is maintained and that the alternative approach to assessment will generate the necessary evidence of achievement.

Appendix 1: Reference documents

The following reference documents will provide useful information and background.

- Assessment Arrangements (for disabled candidates and/or those with additional support needs) — various publications on SQA's website: http://www.sqa.org.uk/sqa/14976.html
- *Building the Curriculum 4: Skills for learning, skills for life and skills for work*
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- Course Specifications
- Design Principles for National Courses
- *Guide to Assessment* (June 2008)
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- *Coursework Authenticity — a Guide for Teachers and Lecturers*
- *SCQF Handbook: User Guide (published 2009)* and SCQF level descriptors (to be reviewed during 2011 to 2012): www.sqa.org.uk/sqa/4595.html
- *SQA Skills Framework: Skills for Learning, Skills for Life and Skills for Work*
- *Skills for Learning, Skills for Life and Skills for Work: Using the Curriculum Tool*
- SQA Guidelines on e-assessment for Schools
- SQA Guidelines on Online Assessment for Further Education
- SQA e-assessment web page: www.sqa.org.uk/sqa/5606.html

Administrative information

Published: June 2013 (version 1.1)

Superclass: RD

History of changes to Unit Support Notes

Unit details	Version	Description of change	Authorised by	Date
	1.1	Exemplar materials added.	Qualifications Development Manager	June 2013

Unit Support Notes

Unit Support Notes — Nature's Chemistry (National 3)

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

Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing the Chemistry: Nature's Chemistry (National 3) Unit. They are intended for teachers and lecturers who are delivering this Unit. They should be read in conjunction with:

- the *Unit Specification*
- the *Course Specification*
- the *Course Support Notes*
- appropriate assessment support materials

General guidance on the Unit

Aims

The general aim of this Unit is to develop skills of scientific inquiry, investigation, and knowledge and understanding of nature's chemistry. Learners will apply these skills when considering the applications of nature's chemistry on our lives, as well as the implications on society/the environment.

This can be done by using a variety of approaches, including investigation and problem solving.

The Unit covers the key areas of:

- **fuels and energy**
- **everyday consumer products**
- **plants to products**

Learners will research issues, apply scientific skills and communicate information related to their findings, which will develop skills of scientific literacy.

Progression into this Unit

Entry to this Course is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by the following or equivalent qualifications and/or experience:

- National 2 Science in the Environment Course or relevant component Units

Skills, knowledge and understanding covered in this Unit

Information about skills, knowledge and understanding is given in the National 3 Chemistry *Course Support Notes.*

If this Unit is being delivered on a free-standing basis, teachers and lecturers are free to select the skills, knowledge, understanding and contexts that are most appropriate for delivery in their centres.

Progression from this Unit

This Unit may provide progression to:

- other qualifications in chemistry, or related areas
- further study, employment and/or training

Approaches to learning and teaching

Approaches to learning and teaching and suggested learning activities are covered in the *Course Support Notes*.

Safety is integral to all practical work and learners should be encouraged to see risk assessment as a natural part of the planning process for any practical activity. Outcome 1 provides an opportunity for learners to identify risks and plan the safety steps required.

Developing skills for learning, skills for life and skills for work

Information about developing skills for learning, skills for life and skills for work in this Unit, is given in the relevant *Course Support Notes*.

Approaches to assessment and gathering evidence

The purpose of this section is to give advice on approaches to assessment for the Unit. There will be other documents produced for centres to provide exemplification of assessments and guidance on how to write them.

Approaches to the assessment of a Unit when it forms part of a Course may differ from approaches to assessing the same Unit when it is not being delivered as part of a Course. If an integrated approach to Course delivery is chosen, then there may be opportunities for combining assessment across Units

Assessments must be valid, reliable and fit for purpose for the subject and level, and should fit in with learning and teaching approaches.

Unit assessment should support learning and teaching and were possible enable personalisation and choice for learners in assessment methods and processes. Teachers and lecturers should select the assessment methods they believe are most appropriate, taking into account the needs of their learners and the requirements of the Unit.

There is no mandatory order for delivery of the Outcomes. These should be fulfilled during the course of the Unit and are an integral part of learning and teaching.

The table below gives guidance and advice on possible approaches to assessment and gathering evidence.

Strategies for gathering evidence

There may be opportunities, both planned and naturally occurring, in the day-to-day learning and teaching of the Unit to observe learners providing evidence which satisfies completely or partially an Outcome or Outcomes. Additional evidence may be required to supplement this evidence.

Approaches to assessment might cover the whole Unit or be combined across Outcomes. A holistic approach can enrich the assessment process for the learner by bringing together different Outcomes and/or Assessment Standards. If a holistic approach is used then it is necessary to be able to track individual Assessment Standard evidence.

Strategies for gathering evidence and ensuring that the learners' work is their own, could include:

- personal interviews during which the teacher or lecturer can ask additional questions about completed work
- oral presentations on their work
- written reports
- checklists to record authenticity
- supplementary sources of evidence, such as witness testimony, film or audio clips

Evidence can be gathered from classwork, experiment, investigations and/or research carried out in this unit. It can be obtained using one or more of the strategies outlined above or by alternative methods which could include a test of knowledge, understanding and skills.

Equality and inclusion

The *Course Support Notes* provide full information on Equality and Inclusion for this Unit.

It is recognised that centres have their own duties under equality and other legislation and policy initiatives. The guidance given in this document is designed to sit alongside these duties but is specific to the delivery and assessment of the Unit.

Alternative approaches to Unit assessment to take account of the specific needs of learners can be used. However, the centre must be satisfied that the integrity of the assessment is maintained and that the alternative approach to assessment will generate the necessary evidence of achievement.

Appendix 1: Reference documents

The following reference documents will provide useful information and background.

- Assessment Arrangements (for disabled candidates and/or those with additional support needs) — various publications on SQA's website: http://www.sqa.org.uk/sqa/14976.html
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- Course Specifications
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- *Guide to Assessment* (June 2008)
- Overview of Qualification Reports
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- *Coursework Authenticity — a Guide for Teachers and Lecturers*
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Administrative information

Published: June 2013 (version 1.1)

Superclass: RD

History of changes to Unit Support Notes

Unit details	Version	Description of change	Authorised by	Date
	1.1	Exemplar materials added.	Qualifications Development Manager	June 2013

Unit Support Notes

Unit Support Notes —Chemistry in Society (National 3)

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

Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing the Chemistry: Chemistry in Society (National 3) Unit. They are intended for teachers and lecturers who are delivering this Unit. They should be read in conjunction with:

- the *Unit Specification*
- the *Course Specification*
- the *Course Support Notes*
- appropriate assessment support materials

General guidance on the Unit

Aims

The general aim of this Unit is to develop skills of scientific inquiry, investigation, and knowledge and understanding of chemistry in society. Learners will apply these skills when considering the applications of chemistry in society on our lives, as well as the implications on society/the environment. This can be done by using a variety of approaches, including investigation and problem solving.

The Unit covers the key areas of:

- **the properties of materials**
- **chemical analysis**

Learners will research issues, apply scientific skills and communicate information related to their findings, which will develop skills of scientific literacy.

Progression into this Unit

Entry to this Course is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by the following or equivalent qualifications and/or experience:

- National 2 Science in the Environment Course or relevant component Units

Skills, knowledge and understanding covered in this Unit

Information about skills, knowledge and understanding is given in the National 3 Chemistry *Course Support Notes*.

If this Unit is being delivered on a free-standing basis, teachers and lecturers should cover the mandatory skills and key areas in ways which are most appropriate for delivery in their centres.

Progression from this Unit

This Unit may provide progression to:

- other qualifications in chemistry, or related areas
- further study, employment and/or training

Approaches to learning and teaching

Approaches to learning and teaching and suggested learning activities are covered in the *Course Support Notes.*

The following gives ideas for themes for teaching which could link the key areas in this Unit and other Units:

The car

- What will the car be made of?
- How will it be powered?

Mission to Mars

Many of Earth's resources are being depleted and scientists need to find new ways to produce materials. Could a mission to Mars help?

Safety is integral to all practical work and learners should be encouraged to see risk assessment as a natural part of the planning process for any practical activity. Outcome 1 provides an opportunity for learners to identify risks and plan the safety steps required.

Developing skills for learning, skills for life and skills for work

Information about developing skills for learning, skills for life and skills for work in this Unit, is given in the relevant *Course Support Notes*.

Approaches to assessment and gathering evidence

The purpose of this section is to give advice on approaches to assessment for the Unit. There will be other documents produced for centres to provide exemplification of assessments and guidance on how to write them.

Approaches to the assessment of a Unit when it forms part of a Course may differ from approaches to assessing the same Unit when it is not being delivered as part of a Course. If an integrated approach to Course delivery is chosen, then there may be opportunities for combining assessment across Units.

Assessments must be valid, reliable and fit for purpose for the subject and level, and should fit in with learning and teaching approaches.

Unit assessment should support learning and teaching and were possible enable personalisation and choice for learners in assessment methods and processes. Teachers and lecturers should select the assessment methods they believe are

most appropriate, taking into account the needs of their learners and the requirements of the Unit.

There is no mandatory order for delivery of the Outcomes. These should be delivered during the course of the Unit and are an integral part of learning and teaching.

The table below gives guidance and advice on possible approaches to assessment and gathering evidence.

Strategies for gathering evidence
There may be opportunities, both planned and naturally occurring, in the day-to-day learning and teaching of the Unit to observe learners providing evidence which satisfies completely or partially an Outcome or Outcomes. Additional evidence may be required to supplement this evidence. Approaches to assessment might cover the whole Unit or be combined across Outcomes. A holistic approach can enrich the assessment process for the learner by bringing together different Outcomes and/or Assessment Standards. If a holistic approach is used then it is necessary to be able to track individual Assessment Standard evidence. Strategies for gathering evidence and ensuring that the learners' work is their own, could include: ♦ personal interviews during which the teacher or lecturer can ask additional questions about completed work ♦ oral presentations on their work ♦ written reports ♦ checklists to record authenticity ♦ supplementary sources of evidence, such as witness testimony, film or audio clips Evidence can be gathered from classwork, experiment, investigations and/or research carried out in this unit. It can be obtained using one or more of the strategies outlined above or by alternative methods which could include a test of knowledge, understanding and skills.

Equality and inclusion

The *Course Support Notes* provide full information on Equality and Inclusion for this Unit.

It is recognised that centres have their own duties under equality and other legislation and policy initiatives. The guidance given in this document is designed to sit alongside these duties but is specific to the delivery and assessment of the Unit.

Alternative approaches to Unit assessment to take account of the specific needs of learners can be used. However, the centre must be satisfied that the integrity of the assessment is maintained and that the alternative approach to assessment will generate the necessary evidence of achievement.

Appendix 1: Reference documents

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- *Coursework Authenticity — a Guide for Teachers and Lecturers*
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Administrative information

Published: June 2013 (version 1.1)

Superclass: RD

History of changes to Unit Support Notes

Unit details	Version	Description of change	Authorised by	Date
	1.1	Exemplar materials added.	Qualifications Development Manager	June 2013