Royal Society of Chemistry resources aligned to Scottish Curriculum for Excellence: Early to Second level chemistry

The Royal Society of Chemistry recognises the value of primary science in developing a person's chemical understanding. Through the teaching of fundamental topics, such as changing of state and properties of materials, you are laying the foundations of chemistry.

To support Scottish teachers of early to second level chemistry, we have analysed the Curriculum for Excellence and Science: Concept development in the sciences , and identified the experiences and outcomes that are relevant to chemistry.

The experiences and outcomes identified have primarily come from the science curriculum; however there are some chemistry relevant statements that have been selected from the technology curriculum.

We have curated collections for each statement, to support you in identifying the most appropriate resources from Learn Chemistry and using them with your class.

To access a collection click the corresponding statement below.

Planet Earth

Topic	Level	Experiences and outcomes	Information from Sciences: Concept development in the sciences
Biodiversity and interdependence Learners explore the rich and changing diversity of living things and develop their understanding of how organisms are interrelated at local and global levels. By exploring interactions and energy flow between plants and animals (including humans) learners develop their understanding of how species depend on one another and on the environment for survival. Learners investigate the factors affecting plant growth and develop their understanding of the positive and negative impact of the human population on the environment.	Early		
	First		
	Second	**SCN 2-03a**	**Line of development**

		I have collaborated in the design of an investigation into the effects of fertilisers on the growth of plants. I can express an informed view of the risks and benefits of their use.	**03** At second level (SCN 2-03a), learners can explore the role of fertilisers through practical activities involving, for example, house plant nutrient fertilisers. the effect of factors such as dilution of the fertiliser or use of different fertilisers can be investigated.
Energy sources and sustainability Learners explore types, sources and uses of energy and develop their understanding of how energy is transferred and conserved. They consider the relevance of these concepts to everyday life. They explore the nature and sustainability of energy sources and discuss benefits and assess possible risks to form an informed view of responsible energy use	Early		
	First		
	Second	**SCN 2-04b** Through exploring non-renewable energy sources, I can describe how they are used in Scotland today and express an informed view on the implications for their future use.	
		TCH 2-02b I can investigate the use and development of renewable and sustainable energy to gain an awareness of their growing importance in Scotland or beyond.	
Processes of the planet Learners explore the changing states of matter and the physical and chemical processes which	Early	**SCN 0-05a** By investigating how water can change from one	**Line of development 05** The concept of the changing states of

influence Earth's atmosphere and oceans. They learn about climate change as a natural process in time as well as the result of human activity. Through connections with collaborative studies of landscape, weather and climate in social studies they build up an integrated picture of the dynamic nature of Earth.		form to another, I can relate my findings to everyday experiences.	water can be developed progressively throughout the early and first levels (SCN 0-05a and 1-05a), including the use of terms such as melting, freezing, boiling, evaporation and condensation.
	First	**SCN 1-05a** By investigating how water can change from one form to another, I can relate my findings to everyday experiences.	
	Second	**SCN 2-05a** I can apply my knowledge of how water changes state to help me understand the processes involved in the water cycle in nature over time.	**Line of development 05** At second level (SCN 2-05a), learners explore the water cycle in nature by applying their knowledge and understanding of changing states of water. They are introduced to the concept of matter existing in three major states (solid, liquid and gas) and should be able to describe some observable physical properties of each.

Forces, electricity and waves

Topic	Level	Experiences and outcomes	Information from Sciences: Concept development in the sciences
Electricity The learner's knowledge about electricity begins with knowing how to use it safely and this aspect is reinforced throughout their learning. They develop their understanding of electricity as a means of transferring energy by investigating circuits and building chemical cells.	Early		

Learners develop their understanding of series and parallel circuits and of electrical and electronic components and apply their knowledge to the process of designing, constructing, testing and modifying.			
	First		
	Second	**SCN 2-10a** To begin to understand how batteries work, I can help to build simple chemical cells using readily-available materials which can be used to make an appliance work.	**Line of development 10** At second level (SCN 2-10a), learners develop the idea that some chemical reactions can produce an electric current (for example by using two different strips of metal and lemons/limes/potatoes), leading to an awareness that the electricity generated can be used to power an appliance such as a light bulb or potato clock.

Materials

Topic	Level	Experiences and outcomes	Information from Sciences: Concept development in the sciences
Properties and uses of substances By exploring the properties of different substances and how they can be changed, learners gradually develop their understanding of the connection between structure and properties. They explore the development of new substances which have useful properties, and begin to relate physical and chemical properties to models of atomic structure. Learners begin to use symbols and chemical formulae as a way of communicating information about elements and compounds.	Early	**SCN 0-15a** Through creative play, I explore different materials and can share my reasoning for selecting materials for different purposes.	**Line of development 15** At early level (SCN 0-15a), learners can choose materials for different uses based on their physical properties (e.g. strength, hardness, resistance to water). This is further developed in SCN 1-15a, where learners explore a more extensive range of materials and their physical properties (e.g. colour, hardness, texture, smell, shape,

			weight/mass). The basic properties of metals can be explored and related to their uses e.g. conduction of heat and electricity, hardness, shiny appearance, can be moulded. The sources of some of the Earth's resources can be explored e.g. wood, soil, water, minerals, fuels, metals.
	First	**SCN 1-15a** Through exploring properties and sources of materials, I can choose appropriate materials to solve practical challenges.	
		SCN 1-16a I can make and test predictions about solids dissolving in water and can relate my findings to the world around me.	
		SCN 2-15a By contributing to investigations into familiar changes in substances to produce other substances, I can describe how their characteristics have changed.	**Line of development 15** At second level (SCN 2-15a), learners explore familiar changes in substances to produce other substances with different characteristics e.g. decaying of animal or plant matter, burning, cooking, rusting.
	Second	**SCN 2-16a** I have participated in practical activities to separate simple mixtures of substances and can relate my findings to my everyday experience.	**Line of development 16a** At second level (SCN 2-16a), learners explore mixtures of substances and methods used to separate them into their constituent parts on the basis of their observable properties e.g. particle size,

			shape, magnetic attraction.
		SCN 2-16b By investigating common conditions that increase the amount of substance that will dissolve or the speed of dissolving, I can relate my findings to the world around me.	**Line of development 16b** At second level (SCN 2-16b), learners participate in practical investigations involving dissolving and gain an appreciation of the importance of changing one variable at a time, e.g. temperature of water, physically changing the particle size, volume of water, stirring, to make the comparison fair.
Earth's materials Learners develop their knowledge and understanding of substances that make up the Earth's surface. Properties, uses and methods of extraction of such materials are explored. Opportunities exist to discuss the importance of carbon compounds derived from crude oil to our lives.	Early		
	First	**TCH 1-02a** Throughout all my learning, I take appropriate action to ensure conservation of materials and resources, considering the impact of my actions on the environment.	
	Second	**SCN 2-17a** Having explored the substances that make up Earth's surface, I can compare some of their characteristics and uses.	**Line of development 17** At second level and third level (SCN 2-17a and SCN 3-17a), learners progressively develop their understanding of the formation, characteristics and uses of rocks, minerals, sand and

			soil.
		TCH 2-02a Having analysed how lifestyle can impact on the environment and Earth's resources, I can make suggestions about how to live in a more sustainable way.	***Please note** – neither the Curriculum for Excellence or Science: Concept development in the sciences identify TCH 2-02a as relevant to the science curriculum. However we think that there is an overlap of content here.
Chemical changes Learners gradually develop an understanding of chemical changes. They consider processes which take place in the environment and in the laboratory, and develop their understanding of the environmental impact of some changes. They develop their understanding of energy changes in chemical reactions and some of the factors affecting the rates of reactions. Learners develop the use of chemical names, formulae and equations as a way of conveying information about chemical changes.	Early		
	First		
	Second	**SCN 2-18a** I have investigated different water samples from the environment and explored methods that can be used to clean and conserve water and I am aware of the properties and uses of water.	**Line of development 18** At second level (SCN 2-18a), learners explore common uses of water, for example as a solvent, coolant, heat source. They can participate in practical activities to clean different water samples, using a range of methods such as filtering, evaporating, use of filter beds.
		SCN 2-19a I have collaborated in activities which safely demonstrate simple chemical reactions using	**Line of development 19a** At second level (SCN 2-19a), learners safely carry out practical activities using readily-

		everyday chemicals. I can show an appreciation of a chemical reaction as being a change in which different materials are made.	available chemicals e.g. household chemicals; they investigate chemical reactions leading to an understanding that a new substance is always made when a chemical reaction takes place.

Topical science

Topic	Level	Experiences and outcomes	Information from Sciences: Concept development in the sciences
Topical science By considering current issues of science, learners increasingly develop their understanding of scientific concepts and their capacity to form informed social, moral and ethical views. They reflect upon and critically evaluate media portrayal of scientific findings.	Early	**SCN 0-20a** I can talk about science stories to develop my understanding of science and the world around me.	***Please note** – we do not currently have a resource collection that is relevant to SCN 0-20a.
	First	**SCN 1-20a** I have contributed to discussions of current scientific news items to help develop my awareness of science.	
	Second	**SCN 2-20a** Through research and discussion I have an appreciation of the contribution that individuals are making to scientific discovery and invention and the impact this has made on society.	
		SCN 2-20b I can report and comment on current scientific news items to develop my knowledge and	

		understanding of topical science.	