



Year 10 Chemistry Curriculum Map

Overview

Year 10 Chemists build upon their knowledge of the Periodic Table and Atomic Structure to learn how theories of structure and bonding can explain the physical and chemical properties of materials. Analysis of structures shows that atoms can be arranged in a variety of ways, some of which are molecular while others are giant structures. Theories of bonding explain how atoms are held together in these structures, this knowledge of structure and bonding can be used to engineer new materials with desirable properties. The properties of these materials may offer new applications in a range of different technologies.

Quantitative analysis is used to determine the formulae of compounds and the equations for reactions. Given this information, analysts can then use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions. Chemical reactions can be classified in various ways. Identifying different types of chemical reaction allows chemists to make sense of how different chemicals react together, to establish patterns and to make predictions about the behaviour of other chemicals. Chemical equations provide a means of representing chemical reactions and are a key way for chemists to communicate chemical ideas.

Understanding of chemical changes began when people began experimenting with chemical reactions in a systematic way and organizing their results logically. Knowing about these different chemical changes meant that scientists could begin to predict exactly what new substances would be formed and use this knowledge to develop a wide range of different materials and processes. It also helped biochemists to understand the complex reactions that take place in living organisms. The extraction of important resources from the earth makes use of the way that some elements and compounds react with each other and how easily they can be 'pulled apart'

Energy changes are an important part of chemical reactions. The interaction of particles often involves transfers of energy due to the breaking and formation of bonds. Reactions in which energy is released to the surroundings are exothermic reactions, while those that take in thermal energy are endothermic. These interactions between particles can produce heating or cooling effects that are used in a range of everyday applications. Some interactions between ions in an electrolyte result in the production of electricity. Cells and batteries use these chemical reactions to provide electricity. Electricity can also be used to decompose ionic substances and is a useful means of producing elements that are too expensive to extract any other way.

Chemical reactions can occur at vastly different rates. Whilst the reactivity of chemicals is a significant factor in how fast chemical reactions proceed, there are many variables that can be manipulated in order to speed them up or slow them down. Chemical reactions may also be reversible and therefore the effect of different variables needs to be established in order to identify how to maximise the yield of desired product. Understanding energy changes that accompany chemical reactions is important for this process. In industry, chemists and chemical engineers determine the effect of different variables on reaction rate and yield of product. Whilst there may be compromises to be made, they carry out optimisation processes to ensure that enough product is produced within a sufficient time, and in an energy-efficient way.

Year 10	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic	C3 Structure and Bonding	C4 Chemical Calculations	C5 Chemical Changes	C6 Electrolysis	C7 Energy Changes	C8 Rates and Equilibrium
Knowledge	Chemical bonds, ionic, covalent and metallic	Chemical measurements, conservation of mass and the quantitative	Reactivity of metals Reactions of acids	Electrolysis	Exothermic and endothermic reactions	Rate of reaction Reversible reactions and

	<p>How bonding and structure are related to the properties of substances</p> <p>Structure and bonding of carbon</p> <p>Bulk and surface properties of matter including nanoparticles (chemistry only)</p>	<p>interpretation of chemical equations</p> <p>Use of amount of substance in relation to masses of pure substances</p> <p>Yield and atom economy of chemical reactions (chemistry only)</p> <p>Using concentrations of solutions in mol/dm³ (chemistry only) (HT only)</p> <p>Use of amount of substance in relation to volumes of gases (chemistry only) (HT only)</p>			Chemical cells and fuel cells (chemistry only)	dynamic equilibrium
Skills	<p>Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects</p> <p>Recognise substances as small molecules, polymers or giant structures from diagrams showing their bonding.</p>	<p>Make and record observations and measurements using a range of apparatus and methods</p> <p>Use of appropriate apparatus to make and record a range of measurements accurately.</p> <p>Use of appropriate apparatus and techniques for conducting and monitoring chemical reactions.</p> <p>Recognise and use expressions in decimal form.</p> <p>Recognise and use expressions in standard form.</p>	<p>Safe use of appropriate heating devices and techniques including use of a Bunsen burner and a water bath or electric heater.</p> <p>Use of appropriate apparatus and techniques for conducting chemical reactions, including appropriate reagents.</p> <p>Safe use of a range of equipment to purify and/or separate chemical mixtures including evaporation, filtration, crystallisation.</p> <p>Safe use and careful handling of liquids and solids, including careful</p>	<p>Use of appropriate apparatus and techniques for conducting and monitoring chemical reactions.</p> <p>Use of appropriate apparatus and techniques to draw, set up and use electrochemical cells for separation and production of elements and compounds.</p> <p>Use of appropriate qualitative reagents and techniques to analyse and identify unknown samples or products including gas tests for hydrogen, oxygen and chlorine.</p>	<p>Use of appropriate apparatus to make and record a range of measurements accurately, including mass, temperature, and volume of liquids.</p> <p>Use of appropriate apparatus and techniques for conducting and monitoring chemical reactions.</p> <p>Making and recording of appropriate observations during chemical reactions including changes in temperature.</p> <p>Safe use and careful handling of gases, liquids and solids, including</p>	<p>Use of appropriate apparatus to make and record a range of measurements accurately, including mass, time, temperature, and volume of liquids and gases.</p> <p>Use of appropriate apparatus and techniques for conducting and monitoring chemical reactions.</p> <p>Making and recording of appropriate observations during chemical reactions including the measurement of rates of reaction by a variety of</p>

		<p>Use an appropriate number of significant figures.</p> <p>Change the subject of an equation.</p>	<p>mixing of reagents under controlled conditions.</p> <p>Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment.</p> <p>Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations</p>		<p>careful mixing of reagents under controlled conditions, using appropriate apparatus to explore chemical changes</p>	<p>methods such as production of gas and colour change.</p> <p>Safe use and careful handling of gases, liquids and solids, including careful mixing of reagents under controlled conditions, using appropriate apparatus to explore chemical changes.</p>
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