

	Year 12 Chemistry					
	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
BIG Q Content <i>(max 5)</i> Please log into Seneca to support your child to understand this learning	<i>How do the subatomic building blocks of matter dictate the quantity, interactions, and physical properties of the substances around us?</i> Describe the structure of the atom, in particular the arrangement of electrons around the nucleus. Explain how the mass of atoms and molecules can be measured using mass spectrometry. Explain the formation of chemical bonds. Explain the physical and chemical properties of compounds in terms of bonding and structure. Calculate amounts, concentrations and gas volumes in reactions.	<i>How does a knowledge of bonding and polarity help chemists explain differences in energy changes in reactions and explain whilst alkanes are unreactive whilst halogenated alkanes are highly reactive?</i> Identify, name, draw and explain the existence of structural and stereoisomers. Describe the use of alkanes as fuels and explain the associated environmental consequences. Explain the formation of radicals and describe free radical substitution reactions. Explain the reactions of halogenoalkanes using reaction mechanisms. Calculate enthalpy changes from calorimetry experiments and application of Hess's Law.	<i>How does atomic structure and electron configuration govern the chemical behaviour and reactivity of elements across the periodic table?</i> Describe and explain the trends in physical properties of the Period 3 elements. Assign oxidation states to elements in a compound or ion. Construct half equations for oxidation and reduction processes and combine these to form overall redox equations. Explain the reactions of alkenes. Explain the properties of addition polymers in terms of bonding and structure.	<i>How does our understanding of the trends in the properties of the elements and the compounds of the elements in Group 2 and Group 7 of the periodic table, allow us to link them to their uses, for example in medicine and agriculture?</i> Explain trends in physical properties and chemical reactions of the elements in Group 2. Link the properties of the sulfates and hydroxides of elements in group 2 to their uses. Explain trends in the physical properties of the halogens and explain the trend in the ability of the halogens to behave as oxidising agents and halide ions to behave as reducing agents. Describe the uses of chlorine and chlorate(II). Describe the methods of production of and the reactions of alcohols.	<i>How do chemists control the extent and speed of a chemical reaction, and how do we prove what has been made?</i> Using ideas about collision theory and Maxwell Boltzmann distributions, explain the effect of changes in temperature, concentration and pressure and the addition of catalysts on the rate of reaction. Predict the effect of changes in temperature, pressure and concentration on the position of equilibrium Perform calculations involving the equilibrium constant K_c . Describe test-tube reactions to identify different functional groups. Analyse data from mass spectrometry and IR spectroscopy to determine the molecular formula of compounds and suggest possible structures.	<i>How do chemists separate and identify the invisible components of a complex chemical mixture and how does the bonding and structure of Period 3 oxides dictate their physical properties and chemical behaviour?</i> Explain how chromatography can be used to separate and identify the components in a mixture. Perform TLC to determine the components of a commercial tablet. Describe the reactions of the period 3 elements with water and oxygen. Describe and explain the trends in the melting points of the oxides of period 3 elements. Describe the reactions of the oxides of the period 3 elements and explain the pH of the solutions formed.
Vocabulary <i>(max 10)</i> Please use your child's knowledge notes to help them learn these definitions	Dipole Electron configuration Electronegativity Intermolecular forces Isotope Ionisation energy Time of Flight Spectrometry Relative atomic mass Relative molecular mass	Calorimetry Enthalpy Change Electrophile Elimination Free radical Hess's Law Isomer Nucleophile Structural isomerism Stereoisomerism	Addition polymer Alkene Atomic radius Carbocation Oxidation state Oxidising agent Periodicity Plasticiser Redox reaction Reducing agent	Barium Meal Biofuel Carbon-neutral fuel Disproportionation Fermentation Hydration Oxidation (of alcohols) Oxidising ability Reducing ability Wet scrubbing	Activation energy Aldehyde Catalyst Closed system Collision theory Dynamic equilibrium Equilibrium constant (K_c) Fingerprint region Le Chatelier's principle	Amphoteric Column chromatography Dissociate Gas chromatography Mobile phase Oxides Retention time R_f value Stationary phase

	VSEPR theory				Maxwell Boltzmann distribution	Thin Layer chromatography
Catholic Link	Life and Dignity of the Human Person: Every human has inherent value, just as every atom has a unique identity	Call to Family, Community, and Participation: Lone atoms (except noble gases) are unstable on their own. They "participate" in bonding to achieve stability.	Call to Family, Community, and Participation: Redox reactions require both an oxidizing agent and a reducing agent working together. One cannot occur without the other.	The Dignity of Work and the Rights of Workers: Halogens are industrial workhorses. Chlorine purifies drinking water, and Iodine sterilises wounds. Their chemical "work" directly serves and protects human life, mirroring productive, dignified human labour.	Rights and Responsibilities: Controlling the rate of industrial chemical reactions prevents runaway reactions and explosive hazards.	Life and Dignity of the Human Person: Chromatography separates mixtures into their individual components demonstrating how complex, blended realities can be broken down into brilliant, distinct, and purposeful truths
Careers Link	Medicinal Chemist, Analytical Chemist	Medicinal Chemist, Chemical Engineer	Medicinal Chemist, Chemical Engineer	Chemical Engineer, Analytical Chemist.	Analytical Chemist.	Analytical Chemist. Forensic Chemist

Ways to enrich the Y12 Chemistry curriculum at home:

- The RSC provide on screen experiments for you to have a go at. Complete an on screen titration experiment here: <https://virtual.edu.rsc.org/titration/experiment/2>
- Explore molecule shapes using the online simulations: <https://phet.colorado.edu/en/simulations/molecule-shapes-basics> and <https://phet.colorado.edu/en/simulations/molecule-shapes>
- Download ChemsSketch Freeware and use it to draw chemical structures and calculate molecular properties <http://www.acdlabs.com/resources/freeware/chemsketch/>
- Try these interactive online mechanisms: <https://vrchemistry.chem.ox.ac.uk/iom/>