

## KS5 – Year 12 – Chemistry

Term	Topic Titles	Brief Overview
<b>1</b>	Chemistry Fundamentals & Maths Skills	Students will be recapping fundamental knowledge and maths skills from GCSE, building on the pre-learning work completed over the summer.
	Amount of Substance	Students will be building on the work from GCSE on moles calculations, to now include more complex calculations and integrating calculations fully into quantitative practical work.
	Atomic Structure	Students will study how chemical properties of elements depend on atomic structure and learn the principles of modern mass spectrometry. Students will also learn about how evidence from Ionisation Energies creates a more detailed understanding of electron configuration.
	Energetics	Students will study the key concepts of calorimetry, Hess' Law and bond enthalpies to determine enthalpy changes.
	Bonding	Students will learn about the theories of metallic, covalent and ionic bonding & how they determine structures of substances. Students will also study phase changes of substances and how different types of intermolecular forces and shapes of molecules will determine physical and chemical properties of compounds.
	Kinetics	Students will learn how to determine how a change in conditions affects the speed of a chemical reaction and how to manipulate the variables to alter the rate of reactions.
	Periodicity	Students study the Periodic Table which provides chemists with a structured organisation of the known chemical elements from which they can make sense of their physical and chemical properties.
<b>2</b>	Equilibria	Students will learn how to predict the effects of changes in temperature, pressure and concentration on the yield of a reversible reaction. Students will also calculate how an equilibrium yield will be influenced by the concentration of reactants and products.
	Redox	Students will expand on their GCSE knowledge of redox reactions looking at electron transfer from a reducing agent to an oxidising agent. Students will examine changes in the oxidation state of an element in a compound or ion to identify the element that has been oxidised or reduced in a given reaction. Students will also learn how to construct half equations and complete redox equations.
	Group 7	Students will learn about the trends in the physical properties and uses of Group 7. Students will also learn how to explain the trends in ability of the halogens to behave as oxidising agents and the halide ions to behave as reducing agents.
	Group 2	Students study the properties of Group 2 elements and study the trends in solubilities of the hydroxides and the sulfates of these elements are linked to their use and applications in medicine.
	Introduction to Organic Chemistry	Students will learn how to draw structural, displayed and skeletal formulas for given organic compounds and how to apply IUPAC rules for nomenclature to name organic compounds. Students will also practise outlining mechanisms

		by drawing the structures of the species involved and curly arrows to represent the movement of electron pairs. Students will learn how to draw different forms of isomers.
	Alkanes	Students will recap their GCSE knowledge of alkane properties, combustion reactions and uses before studying the cracking processes and economical reasons for cracking. Students will also learn about chlorination of alkanes using the free-radical substitution mechanism.
	Halogenoalkanes	Students will learn how to draw and explain the different mechanisms that halogenoalkanes take part in and students will learn how to use equations to explain how chlorine atoms catalyse decomposition of ozone.
	Alkenes	Students will review properties of alkenes from GCSE and learn about the addition mechanisms around the double bond in alkenes including polymerisation for commercial uses.
<b>3</b>	Alcohols	Students will study the different production processes for making ethanol as a biofuel as well as learning about oxidation of alcohols and elimination reactions.
	Organic Analysis	Students will study analytical techniques used by chemists, including test-tube reactions and spectroscopic techniques to identify organic compound structures.
	Equilibrium constant $K_p$ for homogeneous systems	Students will continue to further study equilibria considering how the expression for the equilibrium constant $K_p$ enables them to calculate how an equilibrium yield will be influenced by the partial pressures of reactants and products. Students will also look at the consequences for many industrial processes.
	Properties of period 3 elements and their oxides	Students will expand on their knowledge from the Periodicity topic and examine further trends in properties for Period 3 and their oxides and their reactions with water, acids and bases.