Chemistry Separate Science Curriculum Long Term Planning

Biology		Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Year 10	Big Idea	**Structure and Bonding:** How are atoms held together and what structures do they form?	**Structure and Bonding Continued.**	**Chemical Changes:** How can we use chemical reactions to our advantage?	**Quantitative Chemistry:** How can we calculate the mass of reactants or products in a chemical reaction?	**Energy Changes:** What is the relationship between chemical reactions and energy?	**Chemical Analysis Review:** How can substances be analysed using chemical techniques?
	Key knowledge and skills	**Structure and Bonding:** • Understanding the features and differences between ionic, covalent and metallic bonding • Understanding the different types of structures formed as a result of the different types of chemical bond • Describing and explaining the characteristics of ionic, covalent and metallic structures • Understanding how covalent bonding can result in giant structures such as polymers, diamond, graphite and silicone dioxide. • Describing and explaining the		**Chemical Changes:** • Understanding how we can use the reactivity series of metals to explain displacement reactions • Understanding how metals react with different acids and how we can we use this knowledge to make different salts? • Describing how we can use the pH scale to identify acids and alkalis • (HT Only) – Explaining the difference between weak and strong acids in terms of the hydrogen ion concentration • Explaining how we can extract metals the electrolysis of	**Quantitative Chemistry:** • Understanding the law of conservation of mass and how this links to balanced chemical equations • Calculating relative formula mass and concentrations of solutions • Understanding what a 'Mole' is and how it can be calculated. • Calculating percentage yield of a product formed in a chemical reaction. • Understanding what atom economy is and how to calculate it. • Understanding equal amounts of moles of gases occupy the same volume under the same temperature and pressure.	**Energy Changes:** • Understanding the difference between exothermic and endothermic reactions • Interpreting Energy Profile Diagrams • Applying knowledge of exothermic and endothermic reactions to everyday uses • Describing how we make a single cell and investigating the factors that affect the voltage produced. • Stating the use of fuel cells and evaluating their advantages and disadvantages.	**Chemical Analysis Review:** • Understanding the difference between pure substances, impure substances and formulations. • Understanding how substances can be separated using chromatography, particularly paper chromatography • Understanding how to test for common gases such a hydrogen, oxygen, carbon dioxide and chlorine. • Understanding how to use flame tests to identify metal, and non-metal ions. • Understanding the process of flame emission spectroscopy.

		properties of giant covalent structures. • Understanding the properties and uses of fullerenes and alloys. • Understanding what nanoparticles are and describing their uses.		molten and aqueous solutions. • Understanding how to determine reacting volumes of acid and alkali by titration.			
	End Point	Pupils will explain bonding and structure, distinguishing ionic, covalent and metallic substances and their properties, and describe carbon structures. They will explain the particle model, including state changes, density and internal energy, and calculate specific heat capacity and latent heat for different substances.		Students will learn how the reactivity series explains displacement reactions, how metals react with acids to form different salts, how to use the pH scale to identify acids and alkalis, the difference between strong and weak acids (HT), and how metals are extracted using electrolysis of molten and aqueous solutions.	Students will apply quantitative chemistry, including conservation of mass, relative formula mass and moles, percentage yield, and atom economy calculations.	Pupils will distinguish exothermic and endothermic reactions, interpret energy profile diagrams, and apply these concepts to real-world contexts.	Pupils will be able to analyse substances using chromatography and gas tests.
Year 11	Big Idea	**Rates of Reaction:** What affects the rate of a chemical reaction?	**Chemistry of the Atmosphere:** How has Earth's atmosphere changed over time?	**Using Resources:** How can we live sustainably to ensure that future generations have access to the resources they need?	**Revision**	**Revision**	

	Key Knowledge and skills	**Rates of Reaction:** • Understanding how collision theory can be used to explain why chemical reactions take place at different rates • Explaining how changing the temperature, concentration, pressure and/or surface area of reactants can affect the rate of a chemical reaction. • Describing and explaining how catalysts affect the rate of a chemical reaction • Understanding what is meant by the term 'reversible reaction' • Understand the term 'dynamic equilibrium' and use Le Chatelier's principle to predict what will happen to the yield of a reaction when the concentration, pressure or temperature is changed.	**Chemistry of the Atmosphere** • Describing the composition of the current atmosphere • Comparing Earth's early atmosphere to the current atmosphere and explaining the changes that have occurred. • Understanding the greenhouse effect and how it can lead to climate change • Describing and explaining the impact of climate change • Understanding what is meant by a 'carbon footprint' • Describing the different atmospheric pollutants released from burning fuels and understanding the impact they have on the environment	**Using Resources** • Stating the resources that Planet Earth provides and explaining what these resources are used for. • Understanding what is meant by the term 'sustainable development' and how we can reduce the use of resources • Carrying out Life Cycle Assessments (LCAs) on plastic and paper products to assess their impact on the environment • Explaining how potable water is produced and how waste water is treated • Understanding how metals corrode and how we can prevent it • Describing the properties of ceramics, polymers and composites and this links to use • Understanding the Haber process and the explaining how			

				conditions can affect yield. • Understanding how NPK fertilisers are produced and why they are used.			
	End Point	Pupils will explain factors affecting reaction rates using collision theory.	Pupils will be able to compare the early and modern atmospheres, as well as being able to explain the main risks of pollutant gases.	Pupils will apply principles of sustainability, including resource use, life cycle assessments, water treatment, composites, and fertilisers.			