Progression Model – Year 11 Chemistry (Higher Tier)

Module Title: Rates of reaction and organic chemistry	**Module Title:** Chemical analysis, the Earth's atmosphere and its resources	**Module Title:** Exam preparation
Learning Intent for this module: In this module students are introduced to how the rate of reaction is determined by the frequency of collisions and energy of the reactant particles. They will then learn about reversible reactions and the concept of equilibrium, including le Chatelier's principles. This module will also present an opportunity for students to deepen their knowledge and understanding of separating mixtures and combustion reactions by when they learn about crude oil and its separation into useful products – cracking where necessary. Products of combustion are considered, both complete and incomplete, and their problems discussed. • Calculating rate of reaction • Using graphs to calculate rate • Collision theory • Reversible reactions • Equilibrium • Le Chatelier's principle • Required practical (rates of reaction) • Hydrocarbons • Crude oil • Fractional distillation • Properties of hydrocarbons • Combustion • Cracking	**Learning Intent for this module:** Students will revisit and build on the concept of purity and mixtures in chemistry, including the use of formulations. They will also look at the use of chromatography to separate mixtures and learn how gases can be identified in the laboratory. In year 10, students looked at idea of acidic substances and chemical reactions. This module offers a chance to review these ideas in the context of the Earth's atmosphere. Pupils will develop their KS3 understanding of the impact of climate change and the human effect on it. They will learn about the gases in the atmosphere and link these to climate change. Students will move on to explore Earth's resources and the concept of finite and renewable resources. They will investigate the production of potable water and look at alternative methods of extracting metal from the Earth. • Purity and formulation • Chromatography • Identifying gases • History of the atmosphere • Greenhouse gases • Climate change • Global warming • Potable water • Finite resources • Life cycle assessments • Metal extraction	**Learning Intent for this Module:** Students are provided the opportunity to revisit and review key ideas and provide revision, consolidation and examination practise prior to examination. Revision of paper 1 and 2 topics • Atomic structure • Bonding • Quantitative chemistry • Chemical changes • Energy changes • Rate and extent • Organic chemistry • Chemical analysis • Chemistry of the atmosphere • Using resources

Key Content to be learned: Students will learn about rates of reaction and the ways rate can be calculated. They will learn about the theory of collision theory and how it underpins chemical reactions before moving on to the concept of reversible reactions and dynamic equilibrium. They will use Le Chatelier's principle to predict the position of equilibrium when reaction conditions are changed. Students will learn about crude oil and how it can be separated into its key constituents, hydrocarbons, by use of fractional distillation. Students will learn how each fraction contains useful products that have various uses and how small hydrocarbons can be used as fuels when burned in oxygen. Finally, they will look at how hydrocarbons can be broken down into more useful products by means of cracking.	**Key content to be learned:** In this module, students will then learn about the concept of purity in chemistry. Students will learn how useful mixtures are known as formulations. Students will revisit and deepen their understanding of chromatography and testing for gases. Students will go onto learn about the history of the Earth's atmosphere and how it has changed over 4 billion years. Key links are made to biology as students study the effect of photosynthesis and respiration on the Earth's atmosphere. Students will move on to learning about greenhouse gases, climate change and the phenomenon of global warming. They will study the effect of human activities and how scientist evaluate data. Students will then move on to looking at Earth's resources including finite and renewable resources and the production of potable water. They will look at alternative ways to extract metals from the earth and finally, life cycle assessments.	**Key Content to be learned:** Students will retrieve and practice application of their chemistry knowledge by completing exam preparation and revision.
Prior knowledge: • What catalysts do • The concept of a pure substance and a mixture • Types of chemical bonding: ionic, covalent, and metallic • Bulk properties of materials related to bonding and intermolecular forces • Separation techniques for mixtures of substances	**Prior knowledge:** • The concept of a pure substance and a mixture • Separation techniques for mixtures of substances • The composition of the Earth • The structure of the Earth • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks • Earth as a source of limited resources and the efficacy of recycling • The carbon cycles • The composition of the atmosphere	**Prior knowledge:** • Atomic structure and the periodic table • Bonding and properties of matter • Quantitative chemistry • Chemical changes • Energy changes • Rate and extent of chemical change • Organic chemistry • Chemical analysis • Earth's atmosphere • Using resources

	• The production of carbon dioxide by human activity and the impact on climate. • Reactions of acids with metals and alkalis	
Key tasks for this module: • Mock exam • Organic chemistry	Key tasks for this module: • Earth's atmosphere and using resources • Mock exam	Key tasks for this module: • Past Papers • GCSE Exams