

Key Stage 4 CHEMISTRY: Year 9

Overall Curriculum Goals – to develop an understanding of atoms as the building blocks of matter, and how properties of materials can be used to classify them					
Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
				C1: Atomic Structure and the Periodic Table <ul style="list-style-type: none"> Explain that atoms are the smallest part of any element, they are represented by symbols on the periodic table, and they are rearranged in chemical reactions. Explain that compounds are formed from more than one element in fixed proportions Name compounds when given their formula Explain that mixtures consist of more than one substance which can be easily separated without a chemical reaction Describe methods of separating mixtures Describe the progression of science which led to the current understanding of the atom's structure Use the nuclear model to describe atoms Calculate numbers of protons, neutrons and electrons in atoms Describe electron configurations of atoms Describe patterns within the periodic table Explain how reactive Group 7 elements can displace other Group 7 elements from their compounds Describe the properties of transition metals Explain why pure metals are not often used for building materials Describe the reactions of Group 1 metals with water and oxygen Explain how we can infer reactivity of a metal by observing its reactions Describe displacement reactions of metals Explain how displacement reactions can be used to extract iron from the Earth's crust 	
Key Vocabulary/Concepts/Ideas		Key Vocabulary/Concepts/Ideas		Key Vocabulary/Concepts/Ideas	
				<ul style="list-style-type: none"> Elements, compounds and mixtures Atomic structure and electron configuration Evolving models of the atom Periodic Table Metals 	
CIAG		CIAG		CIAG	
				Science teacher / communicator Radiation scientist	

Key Stage 4 CHEMISTRY: Year 10

Overall Curriculum Goals – To explore the behaviour of substances on a microscopic scale, including how the molecular structure of materials influences their properties					
Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
<p>C2 Structure and Bonding</p> <ul style="list-style-type: none"> Describe the differences in particle arrangement in solids, liquids and gases Explain how states of matter can change Use state symbols to represent states of matter Explain how isotopes differ from each other Explain how properties of an element depends on the arrangement of their electrons Explain how atoms can bond to each other, using ionic, covalent or metallic bonds, highlighting the difference between those bonds Calculate the charge on the ions of metal and non-metals by looking at Groups 1,2, 6 and 7 of the periodic table Link the properties of compounds, such as melting point or conduction of electricity) to their structure and bonds Link properties of compounds to their uses in the wider world Explain how intermolecular forces can hold molecules together, and how breaking these forces leads to a change of state. Describe the difference between giant covalent structures of diamond, graphite and graphene Describe how graphene and fullerenes may be used in the world of the future <p>(Triple only)</p> <ul style="list-style-type: none"> Explain what is meant by “nanotechnology” 		<p>C3 Organic Chemistry</p> <ul style="list-style-type: none"> Explain how crude oil is formed and what it contains Explain how the compounds in crude oil are separated from one another Describe the structure and uses of hydrocarbons Describe the structure of simple alkanes Describe how less useful long-chain alkanes are cracked into more useful short-chain alkanes and alkenes <p>(Triple only)</p> <ul style="list-style-type: none"> Describe the structure and reactions of alkenes, alcohols, carboxylic acids and polymers Describe how to produce alcohols and polymers Explain differences between addition and condensation polymers Describe naturally occurring polymers such as starch and DNA 	<p>C4 Chemistry of the Atmosphere</p> <ul style="list-style-type: none"> Describe the composition of the Earth’s atmosphere Describe how the composition of Earth’s atmosphere has changed over history Explain how oxygen levels have increased and carbon dioxide levels decreased until recent years Explain how the greenhouse effect works in terms of the interaction of radiation with matter Describe human activities which have increased the amount of greenhouse gases in the atmosphere Describe potential effects of climate change Describe actions to reduce emissions of greenhouse gases Describe how pollutants can be produced when burning fuels 	<p>C5 Quantitative Chemistry</p> <ul style="list-style-type: none"> Describe the law of conservation of mass Explain what is meant by the term “relative formula mass” Explain what is meant by a measurement’s “uncertainty” Describe what is meant by a “mole” of a substance, and calculate its mass Explain what is meant by the concentration of a solution Calculate the concentration of a solution Calculate the masses of reagents and products in a reaction Describe what is meant by a limiting reagent <p>(Triple only)</p> <ul style="list-style-type: none"> Calculate the percentage yield and atom economy of a reaction Link atom economy and percentage yield to sustainability Calculate the volume occupied by gases 	<p>C6 Energy Changes</p> <p>C7 Rates of Reaction</p> <ul style="list-style-type: none"> Describe the differences between, and uses of, endothermic and exothermic reactions Use reaction profiles to explain endothermic and exothermic reactions Use bond energies to calculate the overall energy change of a reaction Explain what is meant by the term “rate of reaction” Describe methods to measure the rate of a reaction Draw and interpret graphs regarding rates of reaction Use the collision theory to describe factors which affect the rate of reactions Explain why a catalyst increases the rate of reaction <p>(Triple only)</p> <ul style="list-style-type: none"> Describe how cells and batteries work Evaluate the use of fuel cells compared to storage cells Construct half-equations for reactions at electrodes
Key Vocabulary/Concepts/Ideas		Key Vocabulary/Concepts/Ideas		Key Vocabulary/Concepts/Ideas	
<ul style="list-style-type: none"> Chemical Reactions Atomic structure Ionic bonding & structures Covalent bonding & structures Metallic bonding 		<ul style="list-style-type: none"> Alkanes & Alkenes Combustion & Fractionating Alcohols & Carboxylic acids (Triple only) Polymers 		<ul style="list-style-type: none"> Earth’s atmosphere Greenhouse effect Pollutants 	
CIAG		CIAG		CIAG	
Biochemist Materials scientist Science communicator Chemical engineer Metallurgist Nanotechnologist		Synthetic chemist (pharmaceuticals, cosmetics, etc) Food scientist Perfumer Climate scientist Environmental scientist		Chemical plant technician School technician Chemical engineer Analytical chemist	

Key Stage 4 CHEMISTRY: Year 11

Overall Curriculum Goals – To explore the behaviour of substances on a macroscopic scale, including production, testing and wider environmental impact					
Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
<p>C8 Reactions of acids C9 Electrolysis</p> <ul style="list-style-type: none"> Describe what makes solutions acidic or alkaline, and their resulting pH Determine the products of neutralisation reactions Describe how to make pure, dry samples of salts Describe how to use an indicator to measure pH Describe the difference between weak and strong acids Explain that electrolysis is the splitting of compounds using electricity Predict the products of electrolysis of molten and dissolved compounds Explain how electrolysis can be used to extract aluminium and other metals Represent reactions using half-equations <p>(Triple only)</p> <ul style="list-style-type: none"> Use titrations to calculate the concentration of an acid or alkali 	<p>C10 Reversible Reactions C11 Chemical Analysis</p> <ul style="list-style-type: none"> Explain why some reactions do not produce as much product as expected Describe examples of reversible reactions Link energy changes to reversible reactions Describe what is meant by “equilibrium” Explain how changing conditions of temperature, pressure and concentration can affect equilibria Describe what is meant by the terms “purity” and “formulation” Explain how paper chromatography works Interpret chromatograms Describe the tests for common gases <p>(Triple only)</p> <ul style="list-style-type: none"> Describe the tests for common metals, non-metal and molecular ions Explain why instrumental methods are used Interpret flame emission spectrographs 	<p>C12 Resources & Potable Water</p> <ul style="list-style-type: none"> Describe examples of natural products used by humankind, and synthetic alternatives Distinguish between finite and renewable resources Describe how water is treated to make it potable Describe the differences in treatment of ground water and salty water Explain how sewage water is treated Describe alternative methods of extracting metals from the Earth Use a life cycle assessment to assess the environmental impact of a product Evaluate ways of reducing the use of Earth’s resources <p>(Triple only)</p> <ul style="list-style-type: none"> Describe how to prevent corrosion of metals Describe properties of ceramics, polymers and composites Describe conditions used in the Haber process Describe the production and use of fertilisers 	<p>Revision, consolidation, terminal assessment</p>		
Key Vocabulary/Concepts/Ideas		Key Vocabulary/Concepts/Ideas		Key Vocabulary/Concepts/Ideas	
<ul style="list-style-type: none"> pH and neutralisation Titration (Triple only) Strong and weak acids Electrolysis 	<ul style="list-style-type: none"> Examples and uses of reversible reactions Dynamic equilibrium Chromatography & Rf values Gas tests 	<ul style="list-style-type: none"> Sustainable development Potable water Reduce, Reuse, Recycle 			
CIAG		CIAG		CIAG	
Analytical chemist Inorganic chemist Electrologist Jeweller Forensic scientist		Water treatment scientist Farmer Environmental scientist			