



Year 10

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Atomic Structure and the Periodic Table	Bonding, structure, and properties of matter	Quantitative chemistry	Chemical Changes	Electrolysis	Energy Changes
	<p>Atomic Structure and the Periodic Table Substantive knowledge headlines:</p> <ul style="list-style-type: none"> a simple model of the atom consisting of the nucleus and electrons, relative atomic mass, electronic charge, and isotopes the number of particles in a given mass of a substance the modern Periodic Table, showing elements arranged in order of atomic number position of elements in the Periodic Table in relation to their atomic structure and arrangement of outer electrons properties and trends in properties of elements in the same group characteristic properties of metals and non-metals chemical reactivity of elements in relation to their position in the Periodic Table <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> safe use of a range of equipment to separate chemical mixtures why and how scientific methods and theories develop over time use SI units and the prefix nano explain how testing a prediction can support or refute a new scientific idea. <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> KS3 Elements and compounds; Particle model of matter. <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> GCSE Chemistry – constant references to these fundamental ideas in Bonding/structure model. A-Level Chemistry – Atomic structure and periodicity is built on in Y12 <p>Math skills:</p> <ul style="list-style-type: none"> recognise expressions in standard form visualise and represent 2D and 3D forms including two-dimensional representations of 3D objects. 	<p>Bonding, structure, and properties of matter Substantive knowledge headlines:</p> <ul style="list-style-type: none"> changes of state of matter in terms of particle kinetics, energy transfers and the relative strength of chemical bonds and intermolecular forces types of chemical bonding: ionic, covalent, and metallic bulk properties of materials related to bonding and intermolecular forces bonding of carbon leading to the vast array of natural and synthetic organic compounds that occur due to the ability of carbon to form families of similar compounds, chains, and rings structures, bonding and properties of diamond, graphite, fullerenes, and graphene. <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> recognise substances as small molecules, polymers or giant structures from diagrams showing their bonding recognise substances as metallic giant structures from diagrams showing their bonding <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> KS3 Particle model of matter <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> GCSE Chemistry – running theme fundamental A-Level Chemistry – Y12 intermolecular forces <p>Math skills:</p> <ul style="list-style-type: none"> visualise and represent 2D and 3D forms including two-dimensional representations of 3D objects work out the empirical formula of an ionic compound from a given model or diagram that shows the ions in the structure make order of magnitude calculations (Triple Science only) calculate areas of triangles and rectangles, surface areas and volumes of cubes (Triple Science only). recognise and use expressions in standard form use ratios, fractions, and percentages make estimates of the results of simple calculations. 	<p>Quantitative chemistry Substantive knowledge headlines:</p> <ul style="list-style-type: none"> conservation of mass and balanced chemical equations, ionic equations, and state symbols determination of empirical formulae from the ratio of atoms of different kinds use of amount of substance in relation to masses of pure substances. <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> recognise the importance of scientific quantities and understand how they are determined whenever a measurement is made, there is always some uncertainty about the result obtained <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> KS3 conservation of mass in in Y8/9 <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> GCSE Chemistry – fundamental idea can be examined anywhere in GCSE A-Level Chemistry – built upon in Y12 and 13 <p>Math skills:</p> <ul style="list-style-type: none"> recognise and use expressions in decimal form use an appropriate number of significant figures understand and use the symbols: =, <, <<, >>, >, α, ~ change the subject of an equation use the relative formula mass of a substance to calculate the number of moles in a given mass of that substance and vice versa substitute numerical values into algebraic equations using appropriate units for physical quantities interconvert units use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano). 	<p>Chemical Changes Substantive knowledge headlines:</p> <ul style="list-style-type: none"> reduction and oxidation in terms of loss or gain of oxygen the chemistry of acids; reactions with some metals and carbonates pH as a measure of hydrogen ion concentration and its numerical scale <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> KS3 Acid reactions; Metal reactions <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> GCSE Chemistry – essential knowledge for Paper 1 and for study in y11. A-Level Chemistry – assumed knowledge for A level. <p>Math skills:</p> <ul style="list-style-type: none"> make order of magnitude calculations. 	<p>Electrolysis Substantive knowledge headlines:</p> <ul style="list-style-type: none"> electrolysis of molten ionic liquids and aqueous ionic solutions <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations make and record observations and measurements using a range of apparatus and methods. <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> KS3 link to endothermic reactions in Y8 <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> GCSE Chemistry – link back to structure and bonding and forward to energy changes A-Level Chemistry – electrochemistry in Y13 <p>Math skills:</p> <ul style="list-style-type: none"> recognise and use expressions in decimal form use ratios, fractions, and percentages use an appropriate number of significant figures. 	<p>Energy Changes Substantive knowledge headlines:</p> <ul style="list-style-type: none"> measurement of energy changes in chemical reactions (qualitative) bond breaking, bond making, activation energy and reaction profiles (qualitative) <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> use scientific theories and explanations to develop hypotheses. plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. make and record observations and measurements using a range of apparatus and methods. evaluate methods and suggest possible improvements and further investigations. <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> KS3 Chemical reactions <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> GCSE Chemistry – rates and equilibrium in Y11 A-Level Chemistry – Periodic table and energy in Y12 and Y13 <p>Math skills:</p> <ul style="list-style-type: none"> recognise and use expressions in decimal form use an appropriate number of significant figures find arithmetic means translate information between graphical and numeric form plot two variables from experimental or other data.
Assessments	Progress Point 1 Assessment	Progress Point 2 Assessment	Trial Exam (used for Progress Point 3)		Progress Point 4 Assessment	



	Autumn1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2	
<h1>Year 11</h1>	<p>The rate and extent of chemical change</p> <p><u>The rate and extent of chemical change</u></p> <p>Substantive knowledge headlines:</p> <ul style="list-style-type: none"> factors that influence the rate of reaction: varying temperature or concentration, changing the surface area of a solid reactant or by adding a catalyst factors affecting reversible reactions. <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> predict and explain using collision theory the effects of changing conditions of concentration, pressure, and temperature on the rate of a reaction Apply Le Chatelier's principle to reversible reactions <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> KS3 Y9 Chemical reaction/ rates of reaction topic <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> GCSE Chemistry – this concept could be examined wrt to unknown reactions in Paper 2 chemistry. A-Level Chemistry – Collision theory is assumed knowledge at Y12 and build upon with Boltzmann distribution to explain in more detail. <p>Math skills:</p> <ul style="list-style-type: none"> calculate the mean rate of a reaction from given information about the quantity of a reactant used or the quantity of a product formed, and the time taken draw, and interpret, graphs showing the quantity of product formed or quantity of reactant used up against time draw tangents to the curves on these graphs and calculate the gradient of a tangent to the curve as a measure of rate of reaction at a specific time. 	<p>Organic chemistry</p> <p>Substantive knowledge headlines:</p> <ul style="list-style-type: none"> bonding of carbon leading to the vast array of natural and synthetic organic compounds that occur due to the ability of carbon to form families of similar compounds, chains, and rings fractional distillation of crude oil and cracking to make more useful materials carbon compounds, both as fuels and feedstock, and the competing demands for limited resources <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> recognise substances that are alkenes from their names or from given formulae use models to represent addition polymerisation use models to represent condensation polymerisation <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> KS3 combustion of compounds in Y8 <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> GCSE Chemistry - Y10 covalent bonding A-Level Chemistry – This knowledge becomes the foundation of Y12 and 13 organic chemistry <p>Math skills:</p> <ul style="list-style-type: none"> visualise and represent 2D and 3D forms including two-dimensional representations of 3D objects 	<p>Chemical Analysis</p> <p>Substantive knowledge headlines:</p> <ul style="list-style-type: none"> identification of common gases distinguishing between pure and impure substances separation techniques for mixtures of substances: filtration, crystallisation, chromatography, simple and fractional distillation <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> use melting point and boiling point data to distinguish pure from impure substances identify formulations given appropriate information explain how paper chromatography separates mixtures suggest how chromatographic methods can be used for distinguishing pure substances from impure substances interpret chromatograms and determine R_f values from chromatograms use chemical tests to identify the ions in unknown single ionic compounds (Triple Science only) interpret an instrumental result given appropriate data in chart or tabular form, when accompanied by a reference set in the same form, limited to flame emission spectroscopy (Triple Science only). <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> KS3 Analysis in Y9 <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> GCSE Chemistry – separating mixtures and analysis of mixtures. A-Level Chemistry – Y12 analysis Y13 Analysis <p>Math skills:</p> <ul style="list-style-type: none"> recognise and use expressions in decimal form use ratios, fractions, and percentages make estimates of the results of simple calculations provide answers to an appropriate number of significant figures. 	<p>Atmosphere and resources</p> <p><u>Atmosphere and resources</u></p> <p>Substantive knowledge headlines:</p> <ul style="list-style-type: none"> evidence for composition and evolution of the Earth's atmosphere since its formation evidence, and uncertainties in evidence, for additional anthropogenic causes of climate change potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth's climate common atmospheric pollutants: sulphur dioxide, oxides of nitrogen, particulates, and their sources the Earth's water resources and obtaining potable water life cycle assessment and recycling to assess environmental impacts associated with all the stages of a product's life the viability of recycling of certain materials. <p>Disciplinary knowledge headlines:</p> <ul style="list-style-type: none"> recognise the importance of peer review of results and of communicating results to a wide range of audiences extract and interpret information about resources from charts, graphs, and tables carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations make and record observations and measurements using a range of apparatus and methods recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative evaluate methods and suggest possible improvements and further investigations. <p>Link to knowledge from previous units:</p> <ul style="list-style-type: none"> KS3 reactivity of metals <p>Link to knowledge in future units:</p> <ul style="list-style-type: none"> GCSE Chemistry – last unit links to chemical changes in Y10 A-Level Chemistry – Y12 organic chemistry Y13 <p>Math skills:</p> <ul style="list-style-type: none"> recognise and use expressions in decimal form use ratios, fractions, and percentages translate information between graphical and numeric form 	<p>Revision and examinations</p>		
	Assessments	Progress Point 1 Assessment	Trial Exam 1 (used for Progress Point 2)	Trial Exam 2 (used for Progress Point 3)			