



Curriculum Map

Subject: Chemistry

Year group: 10 & 11

Timings are broad as classes vary depending on how many teachers the class has.

The colours denote: **Higher tier only content**

Separate science only content

Time period	Topic 3 Year 10 (Autumn Term)	Topic 4 Year 10 (Autumn Term)	Topic 5 Year 10 (Autumn-spring term)	Topic 6 Year 10 (Spring term)	Topic 7 Year 10 (Spring - summer Term)	Topic 8 Year 10 (Summer Term)	Topic 9 Year 11 (Autumn-Spring Term)	Topic 10 Year 11 (Autumn-spring Term)	Topic 11 Year 11 (Spring Term)
Content <i>Declarative Knowledge</i> – <i>'Know What'</i>	<u>Chemistry 1 - Atomic Structure part 2</u> -The periodic table; Group 1, 7 and 0 -Mixtures compared to compounds -A chemical formula shows the relative proportions of each type of atom present in a substance, e.g. H ₂ O.	<u>Chemistry 2 - Bonding, Structure and Properties of Matter</u> -Ionic Bonding -Ionic Compounds and their properties -Covalent bonding -Properties of simple covalent molecules -Properties of giant covalent molecules -Structure and properties of isomers of carbon: Diamond, graphite, graphene and fullerenes -Metallic Bonding	<u>Chemistry 5 - Energy Changes</u> -Energy changes in reactions -Investigating energy changes -Energy profiles -Bond energies -Calculating energy changes -Cells and batteries -Fuel cells	<u>Chemistry 6 - The Rate and Extent of Chemical Change</u> -Calculating rates of reactions - Factors which affect the rates of chemical reactions - Collision theory and activation energy -Catalysts -Reversible reactions -Energy changes and reversible reactions -Equilibrium -The effect of changing conditions on	<u>Chemistry 10b - Using Resources</u> -Corrosion and its prevention -Alloys and useful materials -Ceramics, composites and polymers - The Haber process -Production and used of NPK fertilisers	<u>Chemistry 7 - Organic Chemistry</u> -Crude Oil, hydrocarbons and alkanes -Fractional distillation and petrochemicals -Properties of hydrocarbons -Cracking and alkenes -Structure and formulae of alkenes -Reactions of Alkenes -Structure and reactions of alcohols -Structure and reactions of carboxylic acids -Addition Polymerisation -Condensation Polymerisation -Amino Acids	<u>Chemistry 4 - Chemical Changes</u> -Formation of metal oxides -The reactivity series -Extraction of metals and reduction -Oxidation and reduction in terms of electrons -Reactions of acids with metals -Neutralisation of acids and salt production -Soluble salts -The pH scale and neutralisation -Titrations -Strong and weak acids - The process of electrolysis	<u>Chemistry 3 - Quantitative Chemistry</u> -Conservation of mass and balanced chemical equations -Relative formula mass -Mass changes when a reactant or product is a gas -Chemical measurements -Moles -Amounts of substances in equations -Using moles to balance equations -Limiting reactants -Concentration of solutions -Percentage yield	<u>Chemistry 8b - Analysis</u> -Flame tests to identify ions -Use of metal hydroxides to identify ions -Identification of carbonates -Identification of halides -Identification of sulfates -Instrumental methods -Flame emission spectroscopy



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		<ul style="list-style-type: none"> -Properties of Metals and Alloys -Polymers -Bulk and surface properties of matter including nanoparticles -Sizes of particles and their properties -Uses of nanoparticles 		<p>equilibrium: concentration, temperature and pressure</p>		<p>-DNA and other naturally occurring polymers</p>	<ul style="list-style-type: none"> -Electrolysis of molten ionic compounds -Using electrolysis to extract metals -Electrolysis of aqueous solutions -Representation of reactions at electrodes as half equations 	<ul style="list-style-type: none"> -Atom economy -Using concentrations of solutions in mol/dm³ -Use of amount of substance in relation to volumes of gases 	
<p>Skills</p> <p><i>Procedural Knowledge – ‘Know How’</i></p>	<p><u>Evaluation</u></p> <p>How to identify metals and non-metals in the periodic table</p> <ul style="list-style-type: none"> -Draw the electron configuration of the first 20 elements -Calculate relative abundance of isotopes 	<ul style="list-style-type: none"> -Know how to identify and differentiate between the bonding in substances. -Draw a dot-and-cross diagram for simple molecules -Work out the charge on the ions of metals and non-metals from the group number of the element, limited to the metals in Groups 1 and 2, and non-metals in Groups 6 and 7. 	<ul style="list-style-type: none"> -Calculate bond energies -Draw energy profiles for an endothermic and exothermic reaction -Use of appropriate apparatus to make and record a range of measurements accurately, including mass, time, temperature, and volume of liquids and gases. -Use of appropriate apparatus and techniques for conducting and monitoring chemical 	<ul style="list-style-type: none"> - Use of appropriate apparatus to make and record a range of measurement s accurately, including mass, time, temperature, and volume of liquids and gases. -Use of appropriate apparatus and techniques for conducting and monitoring chemical 	<ul style="list-style-type: none"> -Safe use of appropriate heating devices and techniques including use of a Bunsen burner and a water bath or electric heater. -Use of appropriate apparatus and techniques for the measurement of pH in different situations. -Safe use of a range of equipment to purify and/or separate chemical mixtures including evaporation, distillation. 	<ul style="list-style-type: none"> -Write balanced formula equations -Draw fully displayed structural formulae of the first four members of the alkenes and the products of their addition reactions with hydrogen, water, chlorine, bromine and iodine. -Recognise organic molecules from given formulae. 	<ul style="list-style-type: none"> -Safe use of appropriate heating devices and techniques including use of a Bunsen burner and a water bath or electric heater. -Use of appropriate apparatus and techniques for conducting chemical reactions, including appropriate reagents. -Safe use of a range of equipment to purify and/or 	<ul style="list-style-type: none"> -Balance formula equations - A variety of maths skills (detailed in numeracy) 	<ul style="list-style-type: none"> -Use of appropriate apparatus to make and record a range of measurements accurately. -Safe use of a range of equipment to purify and/or separate chemical mixtures including chromatography. -Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements



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		<ul style="list-style-type: none"> -Identify the types of bonding and/or molecule from their formulas -Recognise substances as small molecules, polymers or giant structures from diagrams showing their bonding. 	<ul style="list-style-type: none"> apparatus and techniques for conducting and monitoring chemical reactions. -Making and recording of appropriate observations during chemical reactions including changes in temperature. -Safe use and careful handling of gases, liquids and solids, including careful mixing of reagents under controlled conditions, using appropriate apparatus to explore chemical changes. -Use scientific theories and explanations to develop hypotheses. -Plan experiments or devise procedures to make observations, produce or 	<ul style="list-style-type: none"> reactions. -Safe use and careful handling of gases, liquids and solids, including careful mixing of reagents under controlled conditions. -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 	<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. -Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. -Make and record observations and measurements using a range of apparatus and methods. -Evaluate methods and suggest possible improvements and further investigations. 		<ul style="list-style-type: none"> separate chemical mixtures including evaporation, filtration, crystallisation. -Safe use and careful handling of liquids and solids, including careful mixing of reagents under controlled conditions. -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. -The determination of concentrations of strong acids and strong alkalis. 		<ul style="list-style-type: none"> and health and safety considerations. -Make and record observations and measurements using a range of apparatus and methods. -Safe use of a Bunsen burner -Use of appropriate qualitative reagents and techniques to analyse and identify unknown samples.
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			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. -Evaluate methods and suggest possible improvements and further investigations.	appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurement s and health and safety consideration s. -Evaluate methods and suggest possible improvement s and further investigations.			-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. -Make and record observations and measurements using a range of apparatus and methods.		
Key Questions	1.How does the periodic table explain the arrangement of chemical elements 2.What is an atom, and ion and an isotope? 3.What are the properties of group 1, 7 and 0? 4. What is a mixture?	-How is the bonding in metals and non-metals different? -How does the type of bonding affect properties? -Why do non-metals tend to be gases at room temperature? -Why is diamond so strong?	-What are endothermic and exothermic reactions? -How can we calculate energy changes in endothermic and exothermic reactions? -What are the uses of endothermic and exothermic reactions?	-How can the rate of a chemical reaction be measured? -What factors affect the rates of chemical reactions? -What is equilibrium? -What factors can affect equilibrium?	-How is waste water made into potable water? -How can we be more sustainable to preserve the world's resources? -Why is it important for industry to evaluate the environmental impact of their processes? -Why is it important that we reduce, reuse, recycle?	-How does crude oil form and what is it made of? -How do we split crude oil into its useful components? -How do we make more useful hydrocarbons from less useful ones? -How can we make alcohols, carboxylic acids and polymers	-How and why do different chemicals react and what will be their products? -How can metals be extracted based on their reactivity? -What determines an acid and what makes a base? -What makes an acid stronger than another irrespective of concentration.	-How can we use the mole to help us with calculations? -How can we write ionic formulae? -How can we balance equations correctly? -How can we find the efficiency of a chemical process? -How can we do a titration using the correct	-What is a formulation? - How does chromatography work? -How can gases be identified? - How can ions be identified? - How does flame emission spectroscopy work?



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	5.What is a compound?					from other hydrocarbons?	-How can salts be made? -How can pH be measured? -How can titrations help to find the concentration of a solution?	techniques and the associated calculations?	
Assessment	1.Required practical assessed questions 2.Mid unit test 3.End of topic test	-Assessed Exam Question -End of Unit Assessment	-Required Practical Assessed Exam Questions -End of unit test	-Required Practical Assessed Exam Questions -Assessed Exam Question -End of Topic Test	-Required Practical Assessed Exam Questions -Mid-unit assessment -End of unit test	-Assessed Exam Question -End of Unit Assessment	-Required Practical Assessed Exam Questions (Making salts & Neutralisation) -Mid unit test -End of unit test	-Assessed Exam Question -End of topic test	-Required Practical Assessed Exam Questions -End of unit test
Literacy/Numeracy/SMSC/Character	Literacy: plan experiments or devise procedures to make observations. Numeracy: Calculating relative abundance of an isotope, number of neutrons from relative atomic mass, charges and using it to write	Literacy -Appropriate use of tier three vocabulary. -Develop extended answers through practice of 6 mark questions. -Development of comprehension skills through research using a variety of sources. Numeracy -Calculating Surface Area to Volume Ratio for nanoparticle. -Use of standard form and decimals -Conversion of units	Literacy -Appropriate use of tier three vocabulary. -Develop extended answers through practice of 6 mark questions. -Development of comprehension skills through research using a variety of sources	Literacy -Appropriate use of tier three vocabulary. -Develop extended answers through practice of 6 mark questions. -Development of comprehension skills through research using a variety of sources	Literacy -Appropriate use of tier three vocabulary. -Develop extended answers through practice of 6 mark questions. -Development of comprehension skills through research using a variety of sources. Numeracy: -Translate information between graphical and numeric form. -Use decimals, ratios, fractions and percentages. SMSC -	Literacy -Appropriate use of tier three vocabulary. -Develop extended answers through practice of 6 mark questions. -Development of comprehension skills through research using a variety of sources. Numeracy -Use of general formulae to classify different functional groups. SMSC	Literacy -Appropriate use of tier three vocabulary. -Develop extended answers through practice of 6 mark questions. -Development of comprehension skills through research using a variety of sources. -Plan experiments or devise procedures to make observations Numeracy	Literacy -Appropriate use of tier three vocabulary. -Develop extended answers through practice of 6 mark questions. -Development of comprehension skills through research using a variety of sources. Numeracy -Use of decimals, fractions, ratios and percentages -Change the subject of an equation	Literacy -Appropriate use of tier three vocabulary. -Develop extended answers through practice of 6 mark questions. -Development of comprehension skills through research using a variety of sources. -Plan experiments or devise procedures to make observations Numeracy -Use of decimals, fractions, ratios and percentages -Use an appropriate



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	<p>compound formula</p> <p>SMSC; collaborativ e working on challenging aspects of the topic</p> <p>Character; Resilience - understanding isotopes and percentage abundance can be challenging.</p>	<p>SMSC</p> <p>-Discussion of the uses of nanoparticles and how it affects human biology and the environment</p>	<p>Numeracy</p> <p>-Use decimals, fractions, percentages and ratios.</p> <p>-Use an appropriate number of significant figures.</p> <p>-Find arithmetic means.</p> <p>-Translate information between graphical and numeric form.</p> <p>-Plot two variables from experimental or other data.</p>	<p>Numeracy</p> <p>-Use decimals, fractions, percentages and ratios.</p> <p>-Make estimates of the results of simple calculations.</p> <p>-Use an appropriate number of significant figures.</p> <p>-Find arithmetic means.</p> <p>-Translate information between graphical and numeric form.</p> <p>-Understand that $y = mx + c$ represents a linear relationship.</p> <p>-Plot two variables from experimental or other data.</p> <p>-Determine the slope and intercept of a linear graph.</p> <p>-Draw and use the slope of a tangent to a curve as a measure of rate of change.</p>	<p>-Discussion of use of fluorine in drinking water.</p> <p>-Discussion around should we reduce, reuse, recycle.</p> <p>- Evaluations of use of synthetic fertilisers.</p> <p>Character</p> <p>-Tolerance of others' views during discussions</p>	<p>-Discussion on the continued use of fossil fuels and how this affects the environment?</p> <p>-Discussion of uses of crude oil including plastics and their effect on the environment</p> <p>Character</p> <p>-Tolerance - of others views during discussions</p> <p>-Confidence - Building confidence in practical skills with the completion of a required practical.</p> <p>-Resilience & Initiative</p> <p>-Resolving difficulties in practical techniques</p>	<p>-Calculate the chemical quantities in titrations</p> <p>-Use decimals, ratios, fractions and percentages.</p> <p>-Use an appropriate number of significant figures. involving concentrations in mol/dm³ and in g/dm³</p> <p>-Make order of magnitude calculations.</p> <p>-Use an appropriate number of significant figures.</p> <p>SMSC</p> <p>-Evaluation of methods used to extract metals including environmental and socio-economic impacts</p> <p>Character</p> <p>-Tolerance - of others views during discussions</p> <p>-Confidence - Building confidence in practical skills with the</p>	<p>-Substitute numerical values into algebraic equations</p> <p>-Use an appropriate number of significant figures</p> <p>-Recognise and express figures in standard form</p>	<p>number of significant figures</p> <p>-Recognise and express figures in standard form</p> <p>Character</p> <p>-Confidence - Building confidence in practical skills with the completion of a required practical.</p> <p>-Resilience & Initiative</p> <p>-Resolving difficulties in practical techniques</p>
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				Character Confidence - Building confidence in practical skills with the completion of a required practical. -Resilience & Initiative -Resolving difficulties in practical techniques			completion of a required practical. -Resilience & Initiative -Resolving difficulties in practical techniques		
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