

| Topic                          | What will I learn?   | How will I learn it?   | Why is it important that I learn this?   | Why am I learning this now?  |
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| Year 9 – Term 1                |  |  |  |  |
| <b><u>Basic Chemistry</u></b>  | <p>You will develop a deeper knowledge and understanding of atoms, elements, compounds and mixtures.</p> <p>You will learn to represent chemical reactions using formulae and equations</p> <p>You will expand your knowledge of simple techniques to separate mixtures.</p> | <p>Through teacher input and demonstration.</p> <p>Through practical work and data analysis with an emphasis on chromatography.</p> <p>Through independent learning and research.</p> <p>Through the making and use of revision resources to conclude the topic.</p> | <p>The concepts studied at the start of year 9 are the basis for all further study in Chemistry.</p>   | <p>This topic builds on the work in Year 7 looking at pure substances and separating mixtures.</p> <p>This topic also prepares you for the practical work you will carry out throughout the GCSE Chemistry course.</p>   |
| <b><u>Atomic Structure</u></b> | <p>You will learn the basic structure of an atom and how the structure links to the periodic table.</p> <p>What an isotope is and how to calculate relative atomic mass.</p> <p>How scientific theories develop over time by studying different models of the atom.</p>      | <p>Through teacher input and demonstration.</p> <p>Through using models and diagrams to represent ideas about atoms.</p> <p>Through independent research and enquiry.</p> <p>Through the making and use of revision resources to conclude the topic.</p>             | <p>To gain an appreciation of how scientific ideas and explanations develop over time as new evidence emerges.</p> <p>Knowledge of atomic structure is essential to our understanding of the properties and behaviour of different elements.</p> | <p>This learning builds on earlier study of the particle model of matter and the introduction to atoms and elements in Year 7 and at the start of year 9.</p> <p>Knowledge of atomic structure is essential when you study topic C2 Structure and bonding and the process of electrolysis in unit C4 Chemical Changes.</p> |

Year 9 – Term 2

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| <p><b><u>Periodic Table</u></b></p> | <p>To explain the difference between metals and non-metals in terms of atomic structure</p> <p>How the periodic table has changed over time</p> <p>How to use the Periodic Table to explain chemical properties and patterns in reactivity through study of different groups of elements.</p> | <p>Through teacher input and demonstration.</p> <p>Through using models and diagrams to represent ideas about atoms.</p> <p>Through practical work testing the reactivity of different metals.</p> <p>Through independent learning and research.</p> <p>Through the making and use of revision resources to conclude the topic.</p> | <p>The Periodic Table links to atomic structure and provides chemists with a structured organisation of all the known elements providing information on their physical and chemical properties.</p> <p>Explains how testing a prediction can support or refute a new scientific idea.</p> | <p>Builds on prior knowledge of atoms and elements and links how reactions of elements are related to their electronic structure</p> <p>Knowledge of the elements in different groups of the periodic table is needed to help explain the chemical reactions and processes such as reactions of metals and electrolysis studied in the GCSE course</p> |
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Year 9 – Term 3

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| <p><b><u>Introduction to bonding</u></b></p> | <p>The basic information about the three different types of bonding and structures found in elements and compounds.</p> <p>An initial look at the properties that these different substances have and how their structure is related to their properties.</p> | <p>Through teacher input and demonstration.</p> <p>Through using models and diagrams to represent ideas.</p> <p>By comparing different structures and how they relate their properties.</p> | <p>To know how the properties of different elements and compounds are the related to their structure and why we use them for certain uses.</p> <p>To appreciate how scientists can use this knowledge to engineer new materials with desirable properties and for use in different technologies.</p> | <p>The bonding topic builds on the periodic table and the electronic structure that students have studied in Year 9.</p> <p>To prepare you for a deeper understanding of this topic when you study unit C2b in year 10 which relates bonding and structure to properties of materials.</p> <p>Cross-curricular links with Product Design</p> |
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| <u><b>Chemistry of the atmosphere</b></u> | <p>How the atmosphere has developed over time and why these changes have taken place.</p> <p>About greenhouse gases, how human activity impact these and how this leads to global climate change.</p> <p>What is meant by carbon footprint and how to reduce it.</p> <p>Other atmospheric pollutants and their effects.</p> | <p>Through group and class discussion and debate.</p> <p>Through independent learning and research.</p> <p>Through the application of knowledge to exam style questions.</p>   | <p>To appreciate that the Earth's atmosphere is dynamic and forever changing.</p> <p>To understand the importance of the of the Chemistry of the atmosphere and how this can tell us information about history but can also be used to help predict weather and climate change.</p> <p>To understand how you yourself can have an impact on the environment and atmosphere and how to reduce the impact of human activity.</p> | <p>This topic will build on the work done in Year 8 on the Earth's atmosphere, the greenhouse effect and global warming.</p> <p>This topic also links to the GCSE Organic Chemistry topic looking at the combustion of fossil fuels.</p> <p>Cross-curricular links with Biology and Geography.</p>  |
| Year 10 – Term 1                          |   |  |  |   |
| <u><b>Bonding and Structure</b></u>       | <p>The three different types of bonding and structures found in elements and compounds.</p> <p>The properties that these different substances have and how their structure is related to their properties.</p> <p><b>TRIPLE ONLY</b><br/>Students will learn about nanoparticles and their applications.</p>                | <p>By looking at models of different structures.</p> <p>By comparing different structures and how they relate their properties.</p> <p>By teacher demonstration and discussion.</p> <p>Through the application of knowledge to exam style questions.</p> | <p>To know how the properties of different elements and compounds are the related to their structure and why we use them for certain uses.</p> <p>To appreciate how scientists can use this knowledge to engineer new materials with desirable properties and for use in different technologies.</p>   | <p>The build on knowledge of the periodic table and electronic structure studied in Year 9 and explain where the ions used to work out chemical formulae have come from.</p> <p>To gain an understanding of ionic compounds and their properties before learning about electrolysis later in Year 10.</p> <p>To prepare for the study of organic Chemistry and polymers in Year 11.</p> <p>As a basis for further study of bonding and structure at A level</p> |

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| <u><b>Reactions of metals and acids</b></u> | <p>Reactions of metals with oxygen, water and acids.</p> <p>How the reactivity series can be determined and the impact this has on methods of extraction.</p> <p>How to prepare a pure sample of a soluble salt.</p> <p>Equations and observations involving acids and bases.</p> <p>Properties of acids and the pH scale as a measure of acidity</p> | <p>Through planning, risk assessing and conducting practical procedures.</p> <p>Through learning rules for chemical procedures and using these to determine observations and results for given chemicals.</p> <p>Through the application of knowledge to exam style questions involving unfamiliar contexts</p> | <p>To develop practical skills and writing/following a method for a multi-stage practical procedure.</p> <p>To provides you with an understanding of how chemical reactions have been used since the Bronze Age and Iron Age to make useful substances from everyday resources.</p> <p>To know how everyday items can impact the environment and economy.</p> <p>To develop skills in safely carrying out procedures including conducting risk assessments.</p> | <p>To build on KS3 knowledge of acids, alkalis, indicators and the pH scale</p> <p>To gain understanding of chemical processes for high grade ores before learning alternate techniques for low grade ores in year 11.</p>  |
| Year 10 – Term 2                            |   |   |   |   |
| <u><b>Quantitative Chemistry</b></u>        | <p>The physical law of conservation of mass and how this would apply to practical observations</p> <p>The concept of moles and calculations involving moles and molar ratios.</p> <p>Calculations involving concentrations and practice how to convert units/rearrange equations</p>  | <p>Through practical observations and data analysis.</p> <p>Through practicing calculations and stretch and challenge applied questions.</p> <p>Through the application of knowledge to exam style questions involving unfamiliar contexts</p>  | <p>To develop practical skills and the use of evidence to back up predictions/conclusions.</p> <p>To gain an understanding of physical laws and basic laws of chemistry</p> <p>To make the link between observations and explanations.</p> <p>To gain the skills that will be applicable to many areas of the course (and other sciences)</p>   | <p>To consolidate chemistry understanding from year 9</p> <p>To have a greater understanding of what the chemical equations met later in the course tell us. .</p> <p>To provide knowledge and skills that will help understanding of the rates topic covered in year 11.</p> |

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|                              | <p><b>TRIPLE ONLY</b></p> <p>The concepts of efficiency, percentage yield and atom economy</p> <p>Titration calculations.</p>  |   |   |   |
| <b><i>Electrolysis</i></b>   | <p>How the process of electrolysis can be used to extract metals.</p> <p>How to represent the reactions involved in electrolysis using half equations.</p> <p>How the important metal aluminium is extracted using electrolysis.</p>   | <p>Through teacher input and modelling.</p> <p>Through learning rules for chemical procedures and using these to predict the products of a reaction.</p> <p>Through context-based tasks.</p>  | To appreciate the processes needed to obtain raw materials from natural resources.  | This unit will build on concepts learned in the bonding topic such as forming ions and properties of ionic solutions.   |
| Year 10 – Term 3             |  |   |   |   |
| <b><u>Energy Changes</u></b> | <p>How some chemical reactions release or remove thermal energy.</p> <p>To represent energy changes in a reaction by diagrams.</p> <p>To calculate the energy changes in a reaction.</p> <p><b>TRIPLE ONLY</b></p> <p>How cells and batteries work.</p> <p>How hydrogen fuel cells work and to evaluate their use.</p> | <p>Through teacher input and demonstration.</p> <p>Through practical observations and data analysis.</p> <p>Through independent learning and research.</p> <p>Through the application of knowledge to exam style questions.</p> <p>Through group and class discussion and debate.</p> | <p>To appreciate that energy changes are an important part of chemical reactions.</p> <p>To recognise that interactions between particles can produce heating or cooling effects that are used in a range of everyday applications.</p> <p>To appreciate that some chemical reactions result in the production of electricity and that cells and batteries use these reactions.</p> | <p>This topic builds on the concept of moles from Quantitative Chemistry and develops the Chemical changes topic to look at the energy changes involved.</p> <p>This topic also links to the Rates of Reaction topic looking at how catalysts lower the energy needed for a reaction and to the Quantitative Chemistry topic</p> <p>The ideas involved are developed even further at A level.</p> |

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| <p><b><u>Rates of reaction</u></b><br/><b><u>Part 1</u></b></p> | <p>Collision theory and how this can explain experimental data/observations.</p> <p>How changing temperature, concentration, surface area and adding a catalyst can change rate of reaction.</p> <p>The significance of controlling variables in order to provide valid results.</p>  | <p>Through modelling of key scientific ideas</p> <p>Through planning and execution of practical work.</p> <p>Through observing teacher demonstrations.</p>  | <p>To appreciate that in addition to reactivity of chemicals changing variables can speed up or slow down a reaction.</p> <p>To develop skills of scientific enquiry (making and testing predictions)</p> <p>To be able to plan and carry out robust scientific investigations using a range of variables.</p> | <p>To extend practical skills learned over the year 10 course.</p> <p>To apply knowledge of how science works when planning and carrying out own practical procedures.</p> <p>This unit provides you with an understanding of collision theory and how rate can be changed so that you can build on this in year 11 when using graphs to measure and describe rate .</p> |
| Year 11 – Term 1  |   |   |  |  |
| <p><b><u>Rates of reaction</u></b><br/><b><u>Part 2</u></b></p> | <p>The different ways rate can be measured and practice significance of units in equations.</p> <p>How graphs can be used to clearly represent data and aid in making conclusions.</p> <p>Examples of reversible reactions and the state of dynamic equilibrium.</p> <p><b>TRIPLE ONLY</b><br/>Equilibria and Le chateliers principle and how this can be applied to industrial process (Haber process)</p> | <p>Through modelling of key scientific ideas</p> <p>Through interpreting and drawing conclusions from own and given practical data.</p> <p>Through groupwork and class discussion when presented with “how science works” problems</p> <p>By applying new knowledge and techniques to unfamiliar situations in exam style questions</p> | <p>To gain an understanding of how changes to procedures can affect results and how chemists in industry make changes to optimise a process.</p> <p>To apply skills learned in maths and build on ks3 graphs and HSW skills.</p>   | <p>This follows the study of collision theory as students are expected to use this knowledge to explain the changes to rate that take place during a reaction.</p> <p>You should have now studied gradients and tangents (higher students) in maths. assessing any given information</p>   |

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| <u><b>Organic Chemistry</b></u> | <p>How different substances are separated from crude oil and what these substances are used for.</p> <p>The products formed from burning fuels and the consequences to our atmosphere.</p> <p><b>TRIPLE ONLY</b><br/>Reactions of organic molecules and how these can be used.</p> <p>How polymers, proteins and DNA are formed</p>  | <p>Through teacher input and demonstration.</p> <p>Through practical observations and data analysis.</p> <p>Through independent learning and research.</p> <p>Through the application of knowledge to exam style questions.</p> | <p>To appreciate that the main sources of organic compounds are fossil fuels which are a major resource for the petrochemical industry</p> <p>To develop an understanding of how chemists can modify organic molecules to make new and useful materials</p>   | <p>This topic builds on the Year 8 topic The Atmosphere and extends the concept of covalent bonding and polymers from the GCSE C2 Structure and Bonding topic.</p> <p>This topic also links to the GCSE C9 Chemistry of the Atmosphere topic looking at the products and consequences of burning fossil fuels.</p> <p>The ideas involved are the basis for a large part of the A level course.</p> |
| Year 11 – Term 2                |  |   |   |  |
| <u><b>Chemical Analysis</b></u> | <p>The difference between pure substances, mixtures and formulations and how formulations are used in everyday life.</p> <p>More about chromatography and using it to identify unknown substances.</p> <p>Why instrumental analytical methods are particularly useful.</p> <p><b>TRIPLE ONLY</b><br/>A wider range of tests and techniques. Flame emission spectroscopy.</p> | <p>Through teacher input and demonstration.</p> <p>Through practical observations and data analysis.</p> <p>Through independent learning and research.</p> <p>Through the application of knowledge to exam style questions.</p> | <p>Analysis is a key area of Chemistry and there are many tests and techniques that can be used to identify, measure and test the purity of unknown substances.</p> <p>To develop an understanding of how instrumental analysis can be used for many applications and why it is so widely used.</p> | <p>This topic builds on the tests for gases learned in Year 8 and the Separating Mixtures section of the Year 9 topic Basic Chemistry</p> <p>This topic also links to the and GCSE C1 topic Atomic Structure and to electrolysis studied in C4 Chemical Changes.</p> <p>The ideas involved are developed further in the A level Chemistry course</p>   |

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| <p><b><u>Topic 10: Using Resources</u></b></p> | <p>What resources humans use and the need for sustainable development.</p> <p>How to carry out life cycle assessments.</p> <p>How the water we drink is produced and the treatment of waste water.</p> <p>Higher tier students learn about the alternative methods to extract metals.</p> <p><b>TRIPLE ONLY</b><br/>Students will learn about other useful materials, the Haber process and NPK fertilisers.</p> | <p>Through teacher demonstration and analysing data from investigations into water samples.</p> <p>Through independent research.</p> <p>Through carrying out life cycle assessments of products.</p> <p>Through the application of knowledge to exam style questions.</p> | <p>To understand the importance of sustainable development and the Earth's resources and the role Chemistry plays in this.</p> <p>To know how the water you drink is produced, and how waste water is treated.</p> <p>To know how the use of resources can affect the environment and how human activity impact this.</p> <p>The importance the Haber process and fertilisers in agriculture.</p> | <p>This builds on the work done in Year 7 and Year 9 on separating mixtures and Year 8 looking at resources and waste.</p> <p>It also builds on the C4 Chemical Changes GCSE topic looking at alternative methods of extracting metals.</p> <p>For triple students this links to the GCSE C6 topic looking at reversible reactions and the Haber process.</p> <p>Cross-curricular links to Geography.</p> |
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