

# Science - Chemistry




## Year 10 Curriculum Map



## Year 10 – Autumn Term Chemistry C1 - Atomic Structure & C2 – Bonding and Structure

<b>Prior Learning</b>	<p>Pupils should know from key stage 3, how to identify atoms, elements and compounds and the properties of metal and non-metals. Pupils should be able to explain how the particle model and Dalton's ideas about atoms help to explain the properties of matter. Pupils should be able to explain how elements are arranged in groups and periods the periodic table, including the use of chemical symbols to represent them, and how to represent chemical change with word and symbol equations. Pupils should be able to describe how particles are arranged in solids, liquids and gases and how their energy changes with change of state. Pupils should be able to explain how mixtures differ from pure substances and how to separate some mixtures using filtration, distillation and chromatography. Pupils should be able to explain the structure of the atom including the electronic configuration and explain some typical properties of materials, such as hardness, flexibility, conductivity, transparency etc.</p>
<b>What will I learn?</b>	<p><b>Atomic Structure and Periodic table</b> Pupils are going to learn about the structure of the atom, define what an isotope is, can calculate the relative mass and molecular mass of an isotope. Learn about the periodic table in terms of its history and the different scientists that created the periodic table and how they identified the different elements in groups and periods. Pupils will learn how to construct elements using the electronic structure. Pupils will take part in distillation, filtration and paper chromatography core practical's during this unit.</p> <p><b>Bonding</b> Pupils will learn about how an element becomes an ion and how a metal and a non-metal will form an ionic bond. Pupils will learn about covalent compound linked to non-metals and the different structures such as graphene, diamond and fullerenes. Pupils will then move on to metallic bonding. Pupils will learn about different states of matter (solids, liquids and gases) and different changes of states such as melting and boiling etc. Pupils will learn about nanoparticles and their possible uses such as sunscreen and possible risks.</p> <p><b>Groups</b> Pupils will learn about the reactivity and properties of Group 1 (Alkali Metals), 7 (Halogens) and 0 (Noble Gases) and transition metals.</p>
<b>How will I be assessed?</b>	<p>Formative – Recall 5, Cold calling, skills such as graphs in books, retrieval homework task, mid topic assessment. Summative – End of topic assessment.</p>
<b>Next Steps</b>	<p>The atomic structure and periodic table form the basis everything pupils need to know in chemistry such as atoms and elements to identify acids and alkalis which will take place in C4 - Chemical Change unit. Pupils will need to know about ionic bonding to understand the process of electrolysis again in the C4 – Chemical Change unit. Knowledge about the different groups would provide a basis for C8 – Chemical Analysis when learning about common gases and tests for ions and flame spectroscopy which will take place in Year 11.</p>
<b>Opportunities for Independent Learning</b>	<p><a href="#">Focus eLearning by Focus Educational Software Ltd.</a> <a href="https://www.bbc.co.uk/bitesize/guides/z3sg2nb/revision/3">https://www.bbc.co.uk/bitesize/guides/z3sg2nb/revision/3</a> <a href="https://www.bbc.co.uk/bitesize/guides/z3sg2nb/revision/4">https://www.bbc.co.uk/bitesize/guides/z3sg2nb/revision/4</a> BBC Bitesize Topics &amp; useful videos Atomic Structure - <a href="https://www.bbc.co.uk/bitesize/guides/zscrw6f/revision/1">https://www.bbc.co.uk/bitesize/guides/zscrw6f/revision/1</a> Periodic Table - <a href="https://www.bbc.co.uk/bitesize/guides/zxmmsrd/revision/1">https://www.bbc.co.uk/bitesize/guides/zxmmsrd/revision/1</a> Groups of the periodic table - <a href="https://www.bbc.co.uk/bitesize/topics/zqtpmsg/States of Matter">https://www.bbc.co.uk/bitesize/topics/zqtpmsg/States of Matter</a> <a href="#">Separation and Purification</a> <a href="#">Chromatography core practical</a></p>

	<p><a href="#">Practice exam questions</a> <a href="#">water purification video</a></p> <p>Ionic Compounds: <a href="https://www.bbc.co.uk/bitesize/guides/z9fwrwx/revision/1">https://www.bbc.co.uk/bitesize/guides/z9fwrwx/revision/1</a> Simple Molecules: <a href="https://www.bbc.co.uk/bitesize/guides/zqrxdxs/revision/1">https://www.bbc.co.uk/bitesize/guides/zqrxdxs/revision/1</a> Giant Covalent: <a href="https://www.bbc.co.uk/bitesize/guides/zspdxs/revision/1">https://www.bbc.co.uk/bitesize/guides/zspdxs/revision/1</a> Metallic Bonding: <a href="https://www.bbc.co.uk/bitesize/guides/zcrvtv4/revision/1">https://www.bbc.co.uk/bitesize/guides/zcrvtv4/revision/1</a></p> <p><a href="#">Materials</a> <a href="#">Nanoparticles</a></p>
<b>Personal Development and CEIAG</b>	<p>Through the study of the halogens, pupils will learn about fluorine and chlorine. Pupils will consider their use in our water supply to kill microbes and improve teeth enamel. Pupils may also debate whether inflating party balloons is an appropriate use of helium.</p> <p>Through the study of separating mixtures, pupils will learn about the processes required in the production of clean drinking water. Pupils will consider the importance of a resource which they may take for granted every day.</p> <p>Through the study of nanoparticles, pupils will evaluate the risks and benefits of using nanoparticles. Pupils could consider how the choice of <a href="#">cladding material for the Grenfell</a> tower led to such a huge tragedy.</p> <p>Possible careers in these areas are nanoparticle scientist, forensic scientist, chemical analyst, aerodynamics, pharmacist and dentist.</p>
<b>Enrichment Opportunities (Cultural Capital)</b>	<p>Research Döbereiner and Newland's attempts to organise the elements. Watch the series <a href="#">Atom</a>, featuring Jim Al-Khalili Water: a <a href="#">precious resource</a></p> <p>Research why rock salt is added to the roads in winter. 'The One Show' BBC 2013 about the potential uses of Graphene: <a href="https://www.youtube.com/watch?v=WFacA6OwCjA">https://www.youtube.com/watch?v=WFacA6OwCjA</a> Royal Society of Chemistry Video 'Future Applications of Graphene' <a href="https://www.youtube.com/watch?v=ZzBLsjkNqVc">https://www.youtube.com/watch?v=ZzBLsjkNqVc</a> 'Getting to Grips with Graphene' TEDx Talks <a href="https://www.youtube.com/watch?v=KzeQSZ3bQ2g">https://www.youtube.com/watch?v=KzeQSZ3bQ2g</a></p>

	<h2>Year 10 – Spring Term Chemistry</h2> <h3>C3 – Quantitative Chemistry and C4 – Chemical Changes</h3>
<b>Prior Learning</b>	<p>Pupils should be able to identify a compound and the number of atoms in it. Pupils should be able to explain the difference between an acid and an alkali, the pH scale and the reactivity series. Pupils should know that mass of reactants and products is conserved in chemical reactions. Knowing about atoms, elements and compounds from year 10 autumn term as well as bonding and structures will provide a foundation to C4 - Chemical Changes. Pupils should also know that the useful amount of product formed is called the yield, and how to carry out an acid-alkali titration.</p>
<b>What will I learn?</b>	<p><b>C3 - Quantitative Chemistry</b> Pupils will need to know about the unit of a mole, the 'Law of Conservation of Mass' and the equations to work out the number of moles, the mass and relative formula mass. Pupils need to know how to calculate the mass of reactants or the products. Pupils will need to know to calculate volume of gases in an equation. Pupils will learn about concentration of acids and how to calculate the concentrations. Pupils will need to be able to calculate atom economy and yield and how this is implemented in industry such as making fertilisers.</p> <p><b>C4 - Chemical Changes</b></p>

	<p>Pupils will learn about acids, alkalis, pH and the difference between strong and weak acids. Pupils will need to explain the reaction of acids with metals. Pupils will need to know the reactivity series and the order of the metals in order to understand displacement and redox reactions. Pupils will learn about how to separate metals and non-metals compounds using electrolysis. Pupils will take part in a core practical during this unit on electrolysis of copper sulphate and neutralisation of calcium carbonate.</p>
<b>How will I be assessed?</b>	<p>Formative – Recall 5, Cold calling, skills such as graphs in books, retrieval homework task, mid topic assessment. Summative – End of topic assessment.</p>
<b>Next Steps</b>	<p>Pupils will need to know about concentrations and rates of reaction in C6 - The Rate and Extent of Chemical Change. Pupils will also revisit atom economy in C6 – The Rate and Extent of Chemical Change where they will study reversible reactions. C4 – Chemical Changes is important information for pupils when studying C10 - Using Resources especially investigating properties and materials along with corrosion. Electrolysis from C4 – Chemical Change will enable pupils to understand how a fuel cell and battery works which is covered in C5 – Energy Changes.</p>
<b>Opportunities for Independent Learning</b>	<p><a href="#">Focus eLearning by Focus Educational Software Ltd.</a> BBC Bitesize Topics &amp; useful videos: <a href="#">Bitesize calculations</a> <a href="#">Relative formula mass</a> <a href="#">Calculating concentration</a> <a href="#">Bitesize HT only calculations</a> <a href="#">Moles, Mass, Mr</a> BBC Bitesize Topics Acids and Alkalis <a href="https://www.bbc.co.uk/bitesize/guides/z8jt4qt/revision/1">https://www.bbc.co.uk/bitesize/guides/z8jt4qt/revision/1</a> Salts <a href="https://www.bbc.co.uk/bitesize/guides/zqxyjty/revision/1">https://www.bbc.co.uk/bitesize/guides/zqxyjty/revision/1</a> YouTube Clips Acids and pH scale <a href="https://www.youtube.com/watch?v=vt8fB3MFzLk">https://www.youtube.com/watch?v=vt8fB3MFzLk</a> Strong and Weak Acids <a href="https://www.youtube.com/watch?v=gYBbzqrmE">https://www.youtube.com/watch?v=gYBbzqrmE</a> Neutralisation <a href="https://www.youtube.com/watch?v=IBjwMCHUyBY">https://www.youtube.com/watch?v=IBjwMCHUyBY</a> Core Practical: Investigating Neutralisation <a href="https://www.youtube.com/watch?v=51b8-EUcl_Q">https://www.youtube.com/watch?v=51b8-EUcl_Q</a> Core Practical: Making Soluble Salts <a href="https://www.youtube.com/watch?v=qIOMlwBoe_4">https://www.youtube.com/watch?v=qIOMlwBoe_4</a> <a href="#">Bitesize obtaining and using metals</a> <a href="#">Reduction of metal ore</a> <a href="#">Bitesize electrolysis</a> <a href="#">Electrolysis basics</a> <a href="#">Extracting metals by electrolysis</a> <a href="#">Transition metals</a></p>
<b>Personal Development and CEIAG</b>	<p>Pupils will learn to apply percentage calculations to real world examples and will develop logical problem-solving skills to calculate an unknown concentration or volume using an experimental method.</p> <p>Pupils will develop an understanding of hazard symbols and have an appreciation of safety when using household and workplace chemicals (e.g. bleaches and other chemical cleaners).</p> <p>Possible careers in these areas are farming industry, analytical scientists, motor vehicles, aerodynamics, food industry.</p>
<b>Enrichment Opportunities (Cultural Capital)</b>	<p>BBC Bitesize Topic: Chemical Calculations <a href="https://www.bbc.co.uk/bitesize/guides/zg9rxfr/revision/1">https://www.bbc.co.uk/bitesize/guides/zg9rxfr/revision/1</a> More Chemical Calculations – Higher <a href="https://www.bbc.co.uk/bitesize/guides/zwbyjty/revision/1">https://www.bbc.co.uk/bitesize/guides/zwbyjty/revision/1</a> YouTube Clips: Core Practical Acid-Alkali Titration</p>

	<p><a href="https://www.youtube.com/watch?v=0rvFGKc7wqo">https://www.youtube.com/watch?v=0rvFGKc7wqo</a> Calculating Concentration and Molar Volume videos</p> <p><a href="https://www.youtube.com/watch?v=kJBbu7_vYC8">https://www.youtube.com/watch?v=kJBbu7_vYC8</a> <a href="https://www.youtube.com/watch?v=MEQ1YGxfAQ4">https://www.youtube.com/watch?v=MEQ1YGxfAQ4</a> Using Quantitative Chemistry in Forensic Investigations</p> <p><a href="https://www.youtube.com/watch?v=Q21-AX5abE">https://www.youtube.com/watch?v=Q21-AX5abE</a> Investigating the periodic table with experiments (Royal Institution lecture):</p> <p><a href="https://www.youtube.com/watch?v=kqe9tEcZkno">https://www.youtube.com/watch?v=kqe9tEcZkno</a> The Magic of Chemistry (Royal Institution lecture):</p> <p><a href="https://www.youtube.com/watch?v=0g8lANs6zpQ">https://www.youtube.com/watch?v=0g8lANs6zpQ</a> From rock to copper <a href="#">video</a></p> <p>Where does gold come from? <a href="#">video</a></p> <p>Research different metals and find out the name, appearance and location of their ores. Eg. Bauxite contains aluminium, it is mined in Australia, South America, Africa, and the Caribbean</p>
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	<h2>Year 10 – Summer Term</h2> <h3>Chemistry</h3> <h4>C6 – The Rate and Extent of Chemical Change and C5 – Energy Changes</h4>
<b>Prior Learning</b>	At key stage 3, pupils should have learnt about endothermic and exothermic reactions, carried out experiments measuring the rate of reaction and they should know the different variables – dependent, independent and control. Pupils should have developed their practical skills such as measuring, observing the changes in a chemical reaction and drawing tables and graphs.
<b>What will I learn?</b>	<p>During this term, pupils will learn how to calculate the rate of reaction, identify what factors affect the rate of reaction. Pupils should know the difference between dependent, independent and control variables during different experiments. Pupils will continue to develop their practical skills such as measuring, observing the changes in a chemical reaction and drawing tables and graphs. Pupils will need to interpret graphs and be able to calculate a tangent off a graph. Pupils will need to be able to explain about reversible reactions. Pupils will learn about the Chatelier's Principle and how temperature, pressure and concentration affect a reaction. Pupils will need to know an example in industry of the Chatelier's Principle i.e. Haber Process. Pupils increase their knowledge of endothermic and exothermic reaction by drawing reaction profiles and calculating bond energy's in a reaction. Pupils will learn about how fuel cells and batteries work.</p> <p>Pupils will take part in core practical's during this unit on rate of reaction looking at temperature, surface area, concentration and catalysts, and the reversible reaction between anhydrous copper sulphate and copper sulphate.</p>
<b>How will I be assessed?</b>	Formative – Recall 5, Cold calling, skills such as graphs in books, retrieval homework task, mid topic assessment. Summative – End of topic assessment.
<b>Next Steps</b>	Pupils will use knowledge from C6 about the Chatlier's Principles in C10 where they will study the Haber Process and fertilisers in more detail. Practical skills linked to analysing graphs and data along with practical observation will be revisited in C8 when testing for common gases and flames tests for identifying ions.
<b>Opportunities for Independent Learning</b>	<p>BBC Bitesize Topics: Rates of Reaction and Energy Changes <a href="https://www.bbc.co.uk/bitesize/topics/ztyggdm">https://www.bbc.co.uk/bitesize/topics/ztyggdm</a></p> <p>Youtube Clips: Rates and Energy Revision Video <a href="https://www.youtube.com/watch?v=OyXq2HYCKL0">https://www.youtube.com/watch?v=OyXq2HYCKL0</a> Core Practicals: Measuring the volume of a gas <a href="https://www.youtube.com/watch?v=ssa3wh3RNt0">https://www.youtube.com/watch?v=ssa3wh3RNt0</a></p>

	Observing precipitation <a href="https://www.youtube.com/watch?v=G16LVI7oAlU">https://www.youtube.com/watch?v=G16LVI7oAlU</a>
<b>Personal Development and CEIAG</b>	<p>This topic develops an understanding that increasing temperature, concentration, surface area of reactants will increase chemical reactions. This will develop understanding of using ingredients in powder form when cooking or increasing the temperature will cook food faster. It also develops understanding of industrial chemistry and the factors to be considered to make chemistry profitable.</p> <p>Possible careers in these areas are farming industry, analytical scientists, aerodynamics, and the food industry.</p>
<b>Enrichment Opportunities (Cultural Capital)</b>	<p>How do cold packs work?  <a href="https://www.youtube.com/watch?v=hVh-bpAv4_E">https://www.youtube.com/watch?v=hVh-bpAv4_E</a>  <a href="https://www.youtube.com/watch?v=A5q0NUDbGp8">https://www.youtube.com/watch?v=A5q0NUDbGp8</a></p> <p>Why do chemicals react?  <a href="https://www.youtube.com/watch?v=8m6RtOpqvtU">https://www.youtube.com/watch?v=8m6RtOpqvtU</a></p>