

## Subject Vision

The development of a scientifically literate society is essential for the sustainability of the UK and global society. For those young people aspiring to STEM based careers, including doctors, research scientists and engineers a firm grasp of Chemistry is important. Our future Chemists will be responsible for looking after planet; developing and prescribing medication; and contributing to solving many of the problems that arise in society fulfilling a creative and caring role.

More importantly than this however is developing a society in which all adults can have informed debates based on a grounding of scientific fact and the ability to distinguish evidence from misleading conjecture. Exposing pupils to a plethora of chemical knowledge, cultivating the ability to critically analyse information and confidently justify their opinions will prepare pupils to be active global citizens.

## End Points

**EP1. Demonstrate a deep understanding of science and how it relates to the world around us.**

**EP2. Conduct practical science safely and accurately**

**EP3. Visualise physical and chemical processes**

**EP4. Solve problems, communicate ideas, Enquire and Analyse information**

**EP5. Manipulate mathematical equations**

## Subject Domains of Knowledge

- D1. Particles and matter
- D2. Structure and bonding
- D3. Chemical changes
- D4. Industrial processes
- D5. Earth, atmosphere and resources
- D6. Recording data accurately
- D7. Reporting

## Subject Key Concepts

- C1. Fundamental particles
- C2. Heating and phase changes
- C3. Atoms, elements and compounds
- C4. Pure and impure substances
- C5. Physical and Chemical changes
- C6. Rate
- C7. Equilibrium
- C8. Molarity
- C9. Reactivity
- C10. Periodic table

C11. Sustainability and resources  
C12. Energetics  
C13. Structure and bonding  
C14. Working scientifically

### Medium Term Curriculum Plan

#### Yr 7 Chemistry

Units	Unit 1 Matter	
Unit overview	1.1 Particle Model	1.2 Separating Mixtures
	In this unit students will begin to understand that all matter is made of particles and develop the ability to use the particle model to explain how materials can change state from solids to liquids and gases.	In this unit, students will be able to describe the defining features of elements, compounds and mixtures and explore different methods of separating mixtures.
Lesson Sequence	<ol style="list-style-type: none"> <li><b>Matter</b> – In this lesson students will learn to explain what all things are made from.</li> <li><b>Particle Model</b> - in this lesson students will learn how materials can exist as solids liquids and gases.</li> <li><b>States of Matter</b> - in this lesson students will model the arrangement and movement of particles in solids liquids and gases.</li> <li><b>Changing State</b> - in this lesson students will learn what happens to particles as a substance changes state</li> <li><b>Evaporation</b> - in this lesson students will learn what happens to particles as a liquid evaporates.</li> <li><b>Diffusion</b> - in this lesson students will learn what happens to particles during diffusion.</li> <li><b>Gas pressure</b> - in this lesson students will learn what happens to particles to cause gas pressure</li> </ol>	<ol style="list-style-type: none"> <li><b>Elements, Compounds and Mixtures</b> - in this lesson students will learn the difference between an element of compound and a mixture</li> <li><b>Dissolving</b> - in this lesson students will learn how a solute can dissolve in a solvent to make a solution</li> <li><b>Filtration</b> - in this lesson students will learn how to safely separate a mixture using filtration</li> <li><b>Evaporation and Distillation</b> - in this lesson students will learn to use evaporation and distillation to separate the components of the solution.</li> <li><b>Chromatography</b> - in this lesson students will learn to use chromatography to separate the components of a solution</li> </ol>

<b>Key Domains and Concepts taught in this unit / Topic</b>	D1. Particles and matter D4. Industrial Processes C1. Fundamental particles C2. Heating and phase changes C3. Atoms Elements and Compounds C4. Pure and Impure substances	D1. Particles and matter D4. Industrial Processes C1. Fundamental particles C2. Heating and phase changes C3. Atoms Elements and Compounds C4. Pure and Impure substances
<b>KS4 End Points</b>	<b>EP1. Demonstrate a deep understanding of science and how it relates to the world around us.</b> <b>EP2. Conduct practical science safely and accurately</b> <b>EP3. Visualise physical and chemical processes</b> <b>EP4. Solve problems, communicate ideas, Enquire and Analyse information</b>	<b>EP1. Demonstrate a deep understanding of science and how it relates to the world around us.</b> <b>EP2. Conduct practical science safely and accurately</b> <b>EP3. Visualise physical and chemical processes</b> <b>EP4. Solve problems, communicate ideas, Enquire and Analyse information</b>
<b>Declarative Knowledge (Students should Know)</b>	<p>Properties of solids, liquids and gases can be described in terms of particles in motion.</p> <p>There are differences in the arrangement and movement of these same particles: closely spaced and vibrating (solid), in random motion but in contact (liquid), or in random motion and widely spaced (gas).</p> <p>that observations where substances change temperature or state can be described in terms of particles gaining or losing energy.</p> <p>A substance is a solid below its melting point, a liquid above it, and a gas above its boiling point.</p>	<p>A pure substance consists of only one type of element or compound and has a fixed melting and boiling point.</p> <p>Mixtures may be separated due to differences in their physical properties.</p> <p>The method chosen to separate a mixture depends on which physical properties of the individual substances are different.</p> <p>Liquids have different boiling points</p>
<b>Procedural Knowledge (Students</b>	<p>Explain unfamiliar observations about gas pressure in terms of particles.</p>	<p>Explain how substances dissolve using the particle model.</p> <p>Use the solubility curve of a solute to explain observations about solutions.</p>



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should be able to do)

Explain the properties of solids, liquids and gases based on the arrangement and movement of their particles.

Explain changes in states in terms of changes to the energy of particles.

Draw before and after diagrams of particles to explain observations about changes of state, gas pressure and diffusion.

Extend - Argue for how to classify substances which behave unusually as solids, liquids or gases.

Extend - Evaluate observations that provide evidence for the existence of particles.

Extend - Make predictions about what will happen during unfamiliar physical processes, in terms of particles and their energy

heat a measured volume of water until almost boiling, having selected and used appropriate equipment

Find out at regular intervals the temperature of water being heated and tabulate observations to reveal the pattern

carry out practical procedures using instructions without guidance and in a calm fashion with due regard to the safety of others

HOW SCIENCE WORKS ACTIVITY - Use models to investigate the relationship between the properties of a material and the arrangement of its particles enabling

Use evidence from chromatography to identify unknown substances in mixtures.

Choose the most suitable technique to separate out a mixture of substances.

Use the following practical techniques confidently to separate mixtures.

Filtration,  
Evaporation  
Chromatography

Analyse and interpret solubility curves.

Suggest a combination of methods to separate a complex mixture and justify the choices.

Evaluate the evidence for identifying an unknown substance using separating techniques

HOW SCIENCE WORKS ACTIVITY - Devise ways to separate mixtures, based on their properties  
Enabling students, the opportunity to: Collect data Devise questions Test hypothesis Solve Estimate risks

	<p>students to: Analyse patterns, discuss limitations, Draw conclusions, Present data, Communicate ideas, Construct explanations, Estimate risks and Review theories</p>	
<p><b>Developing Literacy and Numeracy</b></p>	<p><b>Use the following Keywords:</b>  <b>Particle:</b> A very tiny object such as an atom or molecule, too small to be seen with a microscope.  <b>Particle model:</b> A way to think about how substances behave in terms of small, moving particles. Diffusion: The process by which particles in liquids or gases spread out through random movement from a region where there are many particles to one where there are fewer.  <b>Gas pressure:</b> Caused by collisions of particles with the walls of a container.  <b>Density:</b> How much matter there is in a particular volume, or how close the particles are.  <b>Evaporate:</b> Change from liquid to gas at the surface of a liquid, at any temperature.  <b>Boil:</b> Change from liquid to a gas of all the liquid when the temperature reaches boiling point.  <b>Condense:</b> Change of state from gas to liquid when the temperature drops to the boiling point.  <b>Melt:</b> Change from solid to liquid when the temperature rises to the melting point.  <b>Freeze:</b> Change from liquid to a solid when the temperature drops to the melting point.  <b>Sublime:</b> Change from a solid directly into a gas.</p>	<p><b>Use the following Keywords:</b>  <b>Solvent:</b> A substance, normally a liquid, that dissolves another substance.  <b>Solute:</b> A substance that can dissolve in a liquid.  <b>Dissolve:</b> When a solute mixes completely with a solvent.  <b>Solution:</b> Mixture formed when a solvent dissolves a solute.  Soluble (insoluble): Property of a substance that will (will not) dissolve in a liquid.  <b>Solubility:</b> Maximum mass of solute that dissolves in a certain volume of solvent.  <b>Pure substance:</b> Single type of material with nothing mixed in.  <b>Mixture:</b> Two or more pure substances mixed together, whose properties are different to the individual substances.  <b>Filtration:</b> Separating substances using a filter to produce a filtrate (solution) and residue. Distillation: Separating substances by boiling and condensing liquids.  <b>Evaporation:</b> A way to separate a solid dissolved in a liquid by the liquid turning into a gas.  <b>Chromatography:</b> Used to separate different coloured substances.</p>
<p><b>Assessment</b></p> <p><b>Summative and Formative</b></p>	<p>Formative – questioning in class, live marking and MS Forms online homework</p> <p>Summative – End of unit test</p>	<p>Formative – questioning in class, live marking and MS Forms online homework</p> <p>Summative – End of unit test</p>

<b>Links to Prior Learning</b>	<p>In Key Stage 2</p> <ul style="list-style-type: none"> <li>demonstrate that dissolving, mixing and changes of state are reversible changes</li> </ul>	<p>In Key Stage 2</p> <ul style="list-style-type: none"> <li>know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</li> <li>use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> <li>demonstrate that dissolving, mixing and changes of state are reversible changes</li> </ul>
<b>Next steps in learning</b>	<p>At GCSE, students learn about measuring and calculating density, linked to particle arrangement.</p>	<p>At GCSE, students revisit the different separation techniques and detail the use of fractional distillation in separating the components of crude oil</p>
<b>Common barriers to learning in this unit</b>	<p>C19 missed learning at KS2</p>	<p>C19 missed learning at KS2</p>

Units	<b>Unit 2 Reactions</b>	
<b>Unit overview</b>	<b>2.1 Acids and Alkalis</b> In this unit, students will learn the features of acids and alkalis, the role of indicators and investigate the neutralisation reaction and its uses	<b>2.2 Metals and Non-Metals</b> In this unit, students will be investigating the reactions of metals and non-metals with oxygen, the reaction of metals with acids and using investigations into reactivity to construct a reactivity series which can be used to make predictions about the behaviour of unknown elements in chemical reactions.
<b>Lesson Sequence</b>	<ol style="list-style-type: none"> <li>1. <b>Acids alkalis and indicators</b> - in this lesson students will learn to identify acids and alkalis using different indicators</li> <li>2. <b>Hazard symbols and the pH scale</b> - in this lesson students will learn to use the pH scale to measure the strength of acids and alkalis and use Hazard symbols appropriately</li> <li>3. <b>Neutralisation and concentration</b> - in this lesson students will learn to define and describe concentration and neutralisation</li> <li>4. <b>Neutralisation in action</b> - in this lesson students will learn to describe and explain their uses of neutralisation</li> <li>5. <b>Metals and acids</b> - in this lesson students will learn to describe the reactions between metals and acids</li> <li>6. <b>Acid rain and metal carbonates</b> - in this lesson students will learn to describe the reactions between metal carbonates and acids and assess the effects of acid rain.</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Metals and non-metals</b> - in this lesson students will learn to recognise the properties of metals and non-metals</li> <li>2. <b>Materials with special properties</b> - in this lesson students will learn to describe the properties of specific materials and select the best material for an application</li> <li>3. <b>The reactions of metals with water</b> - in this lesson students will learn to describe the reactions of metals with water</li> <li>4. <b>Reactions with oxygen</b> - in this lesson students will learn to describe the reactions of metals and non- metals with oxygen</li> <li>5. <b>Displacement and the reactivity series</b> - in this lesson students will learn to describe displacement reactions and the reactivity series</li> <li>6. <b>Extracting metals</b> - in this lesson students will learn to describe how metals can be extracted from ores</li> </ol>





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<b>Key Domains and Concepts taught in this unit / Topic</b>	D1. Particles and matter D3 Chemical Changes D5. Earth, atmosphere, and resources D6. Recording data accurately D7 Reporting C5. Chemical Changes C9. Reactivity C11. Sustainability and resources C14. Working Scientifically	D1. Particles and matter D3 Chemical Changes D5. Earth, atmosphere, and resources D6. Recording data accurately D7 Reporting C5. Chemical Changes C9. Reactivity C11. Sustainability and resources C14. Working Scientifically
<b>KS4 End Points</b>	<b>EP1. Demonstrate a deep understanding of science and how it relates to the world around us.</b> <b>EP2. Conduct practical science safely and accurately</b> <b>EP3. Visualise physical and chemical processes</b> <b>EP4. Solve problems, communicate ideas, Enquire and Analyse information</b>	<b>EP1. Demonstrate a deep understanding of science and how it relates to the world around us.</b> <b>EP2. Conduct practical science safely and accurately</b> <b>EP3. Visualise physical and chemical processes</b> <b>EP4. Solve problems, communicate ideas, Enquire and Analyse information</b>
<b>Declarative Knowledge (Students should Know)</b>	<p>The pH of a solution depends on the strength of the acid: strong acids have lower pH values than weak acids.</p> <p>Mixing an acid and alkali produces a chemical reaction, neutralisation, forming a chemical called a salt and water.</p> <p>Acids have a pH below 7, neutral solutions have a pH of 7, alkalis have a pH above 7.</p> <p>Acids and alkalis can be corrosive or irritant and require safe handling.</p> <p>Hydrochloric, sulfuric and nitric acid are strong acids.</p> <p>Acetic and citric acid are weak acids</p>	<p>Metals and non-metals react with oxygen to form oxides which are either bases or acids.</p> <p>Metals can be arranged as a reactivity series in order of how readily they react with other substances.</p> <p>Some metals react with acids to produce salts and hydrogen.</p> <p>Iron, nickel and cobalt are magnetic elements.</p> <p>Mercury is a metal that is liquid at room temperature.</p> <p>Bromine is a non-metal that is liquid at room temperature.</p>





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<b>Procedural Knowledge (Students should be able to do)</b>	<p>Explain how neutralisation reactions are used in a range of situations.</p> <p>Identify the best indicator to distinguish between solutions of different pH, using data provided.</p> <p>Use data and observations to determine the pH of a solution and explain what this shows.</p> <p>Extend - Given the names of an acid and an alkali, work out the name of the salt produced when they react.</p> <p>Extend - Deduce the hazards of different alkalis and acids using data about their concentration and pH.</p> <p>Extend - Estimate the pH of an acid based on information from reactions</p> <p>Describe a method for how to make a neutral solution from an acid and alkali.</p> <p>HOW SCIENCE WORKS ACTIVITY - Devise an enquiry to compare how well indigestion remedies work enabling students to: Analyse patterns Discuss limitations Draw conclusions Present data Communicate ideas Construct explanations Critique claims Collect data Devise questions Plan variables Test hypothesis and Estimate risks.</p>	<p>Describe an oxidation, displacement, or metal acid reaction with a word equation.</p> <p>Use particle diagrams to represent oxidation, displacement, and metal-acid reactions.</p> <p>Identify an unknown element from its physical and chemical properties.</p> <p>Place an unfamiliar metal into the reactivity series based on information about its reactions</p> <p>HOW SCIENCE WORKS ACTIVITY - Use experimental results to suggest an order of reactivity of various metals. Enabling Students, the opportunity to: Analyse patterns Discuss limitations Draw conclusions Present data Communicate ideas Construct explanations Test hypothesis Estimate risks Examine consequences</p>
<b>Developing Literacy and Numeracy</b>	<p><b>Use the following Keywords:</b> <b>pH:</b> Scale of acidity and alkalinity from 0 to 14. Indicators: Substances used to identify whether unknown solutions are acidic or alkaline.</p>	<p><b>Use the following Keywords:</b> <b>Metals:</b> Shiny, good conductors of electricity and heat, malleable and ductile, and usually solid at room temperature.</p>

	<p><b>Base:</b> A substance that neutralises an acid – those that dissolve in water are called alkalis.</p> <p><b>Concentration:</b> A measure of the number of particles in a given volume.</p>	<p><b>Non-metals:</b> Dull, poor conductors of electricity and heat, brittle and usually solid or gaseous at room temperature.</p> <p><b>Displacement:</b> Reaction where a more reactive metal takes the place of a less reactive metal in a compound.</p> <p><b>Oxidation:</b> Reaction in which a substance combines with oxygen.</p> <p><b>Reactivity:</b> The tendency of a substance to undergo a chemical reaction.</p>
<b>Assessment Summative and Formative</b>	<p>Formative – questioning in class, live marking and MS Forms online homework</p> <p>Summative – End of unit test</p>	<p>Formative – questioning in class, live marking and MS Forms online homework</p> <p>Summative – End of unit test</p>
<b>Links to Prior Learning</b>	<p>In Key Stage 2</p> <ul style="list-style-type: none"> <li>explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda</li> </ul>	<p>In Key Stage 2</p> <ul style="list-style-type: none"> <li>explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda</li> </ul>
<b>Next steps in learning</b>	<p>In Year 8, students will study the Reactions 2 unit which covers reactivity series, types of reaction and energy changes in reactions</p>	<p>In Year 8, students will study the Reactions 2 unit which covers reactivity series, types of reaction and energy changes in reactions</p>
<b>Common barriers to learning in this unit</b>	<p>C19 missed learning at KS2</p>	<p>C19 missed learning at KS2</p>



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