

## 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 8 Chemistry

Units	Unit 1: Reactions Types of Reaction	Unit 2: Atmosphere and Climate
<b>Unit Overview</b>	In this unit students will learn about different types of chemical reaction and represent them with both word and symbol equations. Students will also categorise reactions as being endothermic or exothermic based on observations.	In this unit students will learn about the composition of the Earth's atmosphere and how the balance of the gases is kept constant due to natural cycling of elements and compounds. Students will also study the effect of human activity on climate change and look at the possible consequences of global warming
<b>Lesson Sequence</b>	<ol style="list-style-type: none"> <li>1. <b>Combustion</b> – In this lesson students will learn about combustion reactions and their uses.</li> <li>2. <b>Sustainability of fuels</b> - In this lesson students will learn how to compare fuels by considering their combustion reactions.</li> <li>3. <b>Displacement Reactions</b> – In this lesson students will learn what is meant by displacement reactions and their uses</li> <li>4. <b>Thermal decomposition</b> – In this lesson students will learn what is meant by a thermal decomposition reaction and their uses.</li> <li>5. <b>Collision Theory</b> – In this lesson students will learn about the conditions required for chemical reactions to occur</li> <li>6. <b>Concentration and reaction rate</b> – In this lesson students will learn how concentration of reactants affects the rate of a chemical reaction</li> <li>7. <b>Surface area, temperature and reaction rate</b> – In this lesson students will learn how surface area of solid reactants and temperature affects the rate of a reaction</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>The atmosphere</b> – in this lesson students will learn how natural gases create a greenhouse effect for a warm Earth</li> <li>2. <b>The carbon cycle</b> – in this lesson students will learn about the processes which recycle carbon atoms in the environment</li> <li>3. <b>Human influences</b> – in this lesson students will learn how human activities affect the carbon cycle</li> <li>4. <b>Global warming</b> – in this lesson students will learn how human activity contributes to global warming</li> <li>5. <b>Climate change</b> – in this lesson students will learn about the possible effects of climate change</li> <li>6. <b>Reducing carbon emissions</b> – in this lesson students will learn about the steps that we can take to slow down climate change</li> </ol>

	<p>8. <b>Exothermic and Endothermic reactions</b> – In this lesson students will learn what is meant by an endo and exothermic reaction and be able to identify them from experimental observations</p>	
<p><b>Key Domains and Concepts taught in this unit / Topic</b></p>	<p>D1. Particles and matter D2. Structure and bonding D3. Chemical changes D4. Industrial processes D5. Earth, atmosphere and resources D6. Recording data accurately C2. Heating and phase changes C3. Atoms, elements and compounds C5. Physical and Chemical changes C6. Rate C9. Reactivity C12. Energetics C14. Working scientifically</p>	<p>D3. Chemical changes D4. Industrial processes D5. Earth, atmosphere and resources D6. Recording data accurately C3. Atoms, elements and compounds C11. Sustainability and resources</p>
<p><b>KS4 End Points</b></p>	<p><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></p>	<p><b>EP1. Demonstrate a deep understanding of science and how it relates to the world around us.</b> <b>EP3. Visualise physical and chemical processes</b> <b>EP4. Solve problems, communicate ideas, Enquire and Analyse information</b></p>
<p><b>Declarative Knowledge (Students should Know)</b></p>	<p>Combustion is a reaction with oxygen in which energy is transferred to the surroundings as heat and light.</p> <p><b>Thermal decomposition is a reaction where a single reactant is broken down into simpler products by heating. Chemical changes can be described by a model where atoms and molecules in reactants rearrange to make the products and the total number of atoms is conserved.</b></p>	<p>Carbon is recycled through natural processes in the atmosphere, ecosystems, oceans and the Earth's crust (such as photosynthesis and respiration) as well as human activities (burning fuels).</p> <p>Greenhouse gases reduce the amount of energy lost from the Earth through radiation and therefore the temperature has been rising as the concentration of those gases has risen.</p>

	<p>During a chemical reaction bonds are broken (requiring energy) and new bonds formed (releasing energy).</p> <p>If the energy released is greater than the energy required, the reaction is exothermic. If the reverse, it is endothermic.</p>	<p>Scientists have evidence that global warming caused by human activity is causing changes in climate.</p> <p>Methane and carbon dioxide are greenhouse gases. Earth's atmosphere contains around 78% nitrogen, 21% oxygen,</p>
<p><b>Procedural Knowledge (Students should be able to do)</b></p>	<p>Explain why a reaction is an example of combustion or thermal decomposition.</p> <p>Predict the products of the combustion or thermal decomposition of a given reactant and show the reaction as a word equation.</p> <p>HOW SCIENCE WORKS ACTIVITY: Carry out investigations into displacement reactions and factors affecting the rate of reaction</p> <p><b>Extend:</b> Explain observations about mass in a chemical or physical change.</p> <p><b>Extend:</b> Use particle diagrams to show what happens in a reaction.</p> <p><b>Extend:</b> Compare the pros and cons of fuels in terms of their products of combustion.</p> <p><b>Extend:</b> Use known masses of reactants or products to calculate unknown masses of the remaining reactant or</p>	<p>Use a diagram to show how carbon is recycled in the environment and through living things.</p> <p>Describe how human activities affect the carbon cycle.</p> <p>Describe how global warming can impact on climate and local weather patterns.</p> <p>EXTEND - Evaluate the implications of a proposal to reduce carbon emissions.</p> <p>EXTEND - Evaluate claims that human activity is causing global warming or climate change.</p> <p>EXTEND - Compare the relative effects of human-produced and natural global warming.</p>

product.

**Extend:** Devise a general rule for how a set of compounds reacts with oxygen or thermally decomposes. Balance a symbol equation. Use mass of reactant in equation to determine mass of product eg magnesium and oxygen.

HOW SCIENCE WORKS ACTIVITY: Use experimental observations to distinguish exothermic and endothermic reactions.

**Extend:** Predict whether a chemical reaction will be exothermic or endothermic given data on bond strengths.

**Extend:** Use energy data to select a reaction for a chemical hand warmer or cool pack.

Developing  
Literacy and  
Numeracy

**Use the following Keywords:**

**Fuel:** Stores energy in a chemical store which it can release as heat.

**Chemical reaction:** A change in which a new substance is formed.

**Physical change:** One that changes the physical properties of a substance, but no new substance is

**Use the following Keywords:**

**Global warming:** The gradual increase in surface temperature of the Earth.

**Fossil fuels:** Remains of dead organisms that are burned as fuels, releasing carbon dioxide.

**Carbon sink:** Areas of vegetation, the ocean or the soil, which absorb and store carbon.

	<p>formed.</p> <p><b>Reactants:</b> Substances that react together, shown before the arrow in an equation.</p> <p><b>Products:</b> Substances formed in a chemical reaction, shown after the reaction arrow in an equation.</p> <p><b>Conserved:</b> When the quantity of something does not change after a process takes place.</p> <p><b>Catalysts:</b> Substances that speed up chemical reactions but are unchanged at the end.</p> <p><b>Exothermic reaction:</b> One in which energy is given out, usually as heat or light.</p> <p><b>Endothermic reaction:</b> One in which energy is taken in, usually as heat.</p> <p><b>Chemical bond:</b> Force that holds atoms together in molecules.</p>	<p><b>Greenhouse effect:</b> When energy from the sun is transferred to the thermal energy store of gases in Earth's atmosphere.</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>
<p><b>Links to Prior Learning</b></p>	<p>In Year 7 students learned about the reactions of acids and alkalis</p>	<p>This concept is new to Key Stage 3</p>

<p><b>Next steps in learning</b> Next steps in learning</p>	<p>At GCSE, students study units on the nature and rate of chemical reactions</p>	<p>At GCSE students will learn about the role of greenhouse gases in regulating the temperature of the atmosphere as well as the effect of atmospheric pollutants</p>
<p><b>Common barriers to learning in this unit</b></p>	<p>Abstract concept to model and visualise</p>	<p>Misconceptions regarding the cause and consequences of global warming</p>