

KS4 Chemistry – Chemistry in Our World

Subject curriculum intent:	<p>To develop in our students:</p> <ul style="list-style-type: none"> • An enjoyment of Science by providing relevant, interesting and challenging experiences and activities. • Observational skills, by looking for patterns and contrasts. • An inquiring mind and a logical approach to problem solving. • The ability to draw conclusions from simple experiments and, where appropriate, to devise suitable experiments for further investigations. • Communication skills in speaking and listening, written, diagrammatic and symbolic forms. • Co-operation and a respect for others by being able to work as part of a team – the development of appropriate social skills. • Confidence in their own abilities. • A respect for the environment and a careful use of resources. • An interest in the world about them and a greater understanding of it. 		
End of KS3 intent/outcome	End of KS4 intent/outcome	End of KS5 intent/outcome	
Students will build on their knowledge of science through the different areas – biology chemistry and physics. Students will ‘work scientifically’ to achieve the goals of each topic area they encounter.	Students will continue to develop their scientific knowledge through the different areas – biology, chemistry and physics. Students will ‘work scientifically’ to achieve the goals of each topic area they encounter. Students will be able to relate their scientific experiences to everyday life and have an understanding that science is all around them.	N/A	
Intent for this topic:	<p>Students will learn to identify when chemical reactions have occurred and how to carry out reactions safely, using the appropriate equipment. They will learn new skills of measuring liquids and solids. Students will be able to name common household acids and bases and carry out tests to identify them. Students will create indicators that allow them to identify acids and bases and will start to explore the meaning of pH. Some students will start to develop skills in naming or identifying chemicals. The pollution being caused in our environment will be investigated by all students and they will learn how to test for different types of pollution. They will also investigate how water is cleaned for drinking and learn how to clean dirty water.</p> <p>Students will ‘work scientifically’ to achieve these goals, learning the key features of scientific enquiry; observing over time, pattern seeking, identifying, classifying, investigating (fair tests) and researching.</p>		

Core vocabulary needed for this subject/topic:	<p>Subject: Biology, Chemistry, Physics Observe, pattern, identifying, classifying, investigating, fair test, researching</p> <p>Topic: Hazard safety symbol, acid, base, neutral, indicator, solution, chemical, reaction, pollution, equipment, environment, measure, safety, solid, liquid.</p>			
Vocabulary pupils will have accessed in other topics or subject areas:	Equipment, hazard, symbol, pollution, environment, measure, safety, solid, liquid, gas, millilitres, grams			
Key vocabulary taught within this topic:	Hazard safety symbol, acid, base, neutral, indicator, solution, chemical, reaction, pollution			
Prior knowledge: what pupils may already have studied				
Key stage	Subject	Topic title	Term/year taught	Content/What might pupils already know?
KS3	Science	Properties of materials	Spring 1/Year 1	Know that materials have different properties and are able to identify the properties of different materials.
KS3	Science	Solids, Gases and liquids	Spring 1/Year 2	Students will be aware that all materials can be categorised into solids, liquids and gases and may be able to identify different properties of solids, liquids and gases.
KS3	Science	Changing materials	Spring 2/Year 2	Students may have explored how materials change state and understand that some changes are reversible and some are irreversible.
KS3	Maths	Measurement: Capacity	Summer 1/All Years	Students may have measured liquids in different containers using a scale in ml.
KS3	Cook-it		Cook it/ All Years	Students will have measured out ingredients and followed recipes to make different foods. Students may have used different cleaning products to clean surfaces before and after cooking.
KS3	PSHCE	Caring for the environment	Autumn 2/Year 2	Students may be aware of different types of pollution and how it can harm the environment.
KS3	PSHCE	The world's largest lesson – Global issues:	Spring 2/Year 3	Students may be aware of how water is polluted and may have explored how water is cleaned.

Goal 14&15 –
life below water
and on land

Links to other subjects: Life Skills, Maths, Cook-it

	<u>OU P 5-6</u>	<u>OU P 7-8</u>	<u>OU Step 1</u>	<u>OU Step 2</u>	<u>OU Step 3</u>
<u>Subject specific knowledge</u>	<p>Know that certain symbols mean that you need to take extra care.</p> <p>Can choose an acid from a list of chemicals.</p> <p>Can choose appropriate safety equipment that should be used when using acids or bases.</p> <p>Know that indicators change colour.</p>	<p>Know the shape and colour of a hazard warning symbol.</p> <p>Can choose an acid and a base from a list of chemicals.</p> <p>Can suggest appropriate safety equipment that should be used when using acids or bases.</p> <p>Know that indicators change colour and that you can use indicators to identify them.</p>	<p>Know the shape and colour of a hazard warning symbol and can label the different symbols.</p> <p>Can name a common acid and chose a base from list.</p> <p>Know that there are 3 types of chemical; acid, base or neutral.</p> <p>Can understand that indicators change colour in different acids or bases.</p> <p>Can describe the dangers of strong acids and suggest appropriate safety equipment.</p>	<p>Know the shape and colour of a hazard warning symbol and name some of the common ones.</p> <p>Know the names of common household acids and bases.</p> <p>Can start to explain what a neutral is.</p> <p>Know that indicators change colour in different strengths of acid or base.</p> <p>Know that acids/bases can be strong or weak.</p> <p>Can describe the dangers of strong acids and how we protect ourselves from them.</p>	<p>Know the names of and recognise hazard warning symbols and describe safety precautions.</p> <p>Know the names of common household acids and bases.</p> <p>Can explain that a neutral solution is in between an acid or a base.</p> <p>Know that acids/bases can be strong or weak and are measured in pH.</p> <p>Can describe how strong acids and bases may be harmful.</p> <p>Can name the features you need to look for when a chemical reaction has taken place.</p>

	<p>Can choose types of pollution from list.</p> <p>Knows that water that looks clean may be dirty.</p>	<p>Know the names of types of pollution.</p> <p>Can describe the difference between clean and dirty water.</p>	<p>Know the names of types of pollution to specific environments.</p> <p>Can explain what can make water dirty or unsafe to drink.</p>	<p>Can link types of pollution to specific problems and environments.</p> <p>Can describe a test that could be carried out to identify pollution.</p> <p>Can explain what can make water dirty or unsafe to drink.</p>	<p>Knows that pollution is any foreign substance that causes harm to a specific environment.</p> <p>Can describe the tests that could be carried out to identify pollution in a specific habitat.</p> <p>Can describe the stages of producing clean water from dirty water.</p>
<p><u>Subject specific skills</u></p>	<p>Is able to collect equipment needed for an activity using photographs of the equipment.</p> <p>Is able to copy stages of a demonstration to create an indicator solution.</p> <p>Is able to use a paper indicator to identify a colour change.</p> <p>Is able to follow simple symbols and diagrams to carry out chemical reactions.</p> <p>Is able to choose a piece of safety equipment and</p>	<p>Is able to collect equipment needed for an activity using a mixture of symbols and photographs of the equipment.</p> <p>Is able to follow a set of picture instructions to create an indicator solution asking for assistance when needed.</p> <p>Is able to use a paper indicator to identify whether a chemical is an acid/base.</p> <p>Is able to follow simple written/symbol instructions with diagrams to carry out chemical reactions.</p>	<p>Is able to collect equipment needed for an activity using symbols of the equipment.</p> <p>Is able to follow a set of written and picture instructions to create an indicator solution asking for assistance when needed.</p> <p>Is able to use a paper indicator to identify whether a chemical is an acid/base/neutral</p> <p>Is able to follow simple written instructions with diagrams to carry out chemical reactions.</p>	<p>Is able to collect equipment needed for an activity using symbols and labels of the equipment.</p> <p>Is able to independently follow a set of written and picture instructions to create an indicator solution.</p> <p>Is able to use a paper indicator to identify specific pH.</p> <p>Is able to follow simple written instructions to carry out chemical reactions.</p>	<p>Is able to collect equipment needed for an activity using a list of the equipment.</p> <p>Is able to follow a set of written instructions to create an indicator solution.</p> <p>Is able to use a paper or liquid indicator carefully to identify specific pH.</p> <p>Is able to follow written methods to carry out a range of chemical reactions.</p> <p>Is able to display a good knowledge of safety when carrying</p>

	<p>demonstrate how to use it.</p> <p>Is able to measure liquids to a clear mark on a measuring cylinder after practicing the skill.</p> <p>Is able to measure out solids using teaspoons or spatulas, up to 5.</p> <p>Is able to follow a set of picture instructions to help build a water filter using different sizes of stones/sand, cotton wool and cloth.</p> <p>Is able to follow a set of demonstrations to carry out a simple investigation.</p>	<p>Is able to choose a piece of safety equipment that is appropriate to the situation and demonstrate how to use it.</p> <p>Is able to confidently measure liquids to a clear mark on a measuring cylinder.</p> <p>Is able to confidently use a top pan balance to measure solids (powders) to the nearest 10 grams and with help identify when it is too much or too little.</p> <p>Is able to copy a real life example to help build a water filter using different sizes of stones/sand, cotton wool and cloth.</p> <p>Is able to identify similarities and differences between themselves and a peer.</p> <p>Is able to follow a picture method to carry out a simple investigation.</p>	<p>Is able to choose a piece of safety equipment that is appropriate to the situation and identify what it protects and how.</p> <p>Is able to confidently measure liquids to the nearest 10 millilitres.</p> <p>Is able to confidently use a top pan balance to measure solids (powders) to the nearest 10 grams and identify when it is too much or too little.</p> <p>Is able to copy a diagram to build a water filter using different sizes of stones/sand, cotton wool and cloth.</p> <p>Is able to follow a word and picture method to carry out a simple investigation.</p>	<p>Is able to identify pieces of safety equipment that are appropriate to the situation and identify what it protects and how.</p> <p>Is able to confidently measure liquids to the nearest 5 millilitres.</p> <p>Is able to confidently use a top pan balance to measure solids (powders) to the nearest 5 grams knowing when to add more or take some away.</p> <p>Is able to build a water filter using different sizes of stones/sand, cotton wool and cloth.</p> <p>Is able to follow a written set of instructions to carry out a simple investigation.</p> <p>Is able to record results in a suitable table.</p>	<p>out science experiments.</p> <p>Is able to confidently measure liquids to the nearest millilitre.</p> <p>Is able to confidently use a top pan balance to measure solids (powders) to the nearest gram, knowing when to add more or take some away.</p> <p>Is able to design and build a water filter using different sizes of stones/sand, cotton wool and cloth.</p> <p>Is able to follow a written set of instructions to carry out a simple investigation.</p> <p>Is able to record results in a suitable table.</p> <p>Is able to draw conclusions from their results.</p>
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<p><u>Personal development</u></p>	<p><u>Problem solving</u> Investigations and matching exercises</p> <p><u>Communication skills</u> Working as pairs in investigations, asking and answering questions</p> <p><u>Self-belief</u> Learning new skills, practising them and demonstrating them.</p> <p><u>Self-management</u> Working with new equipment</p> <p><u>Teamwork</u> Working as groups to solve problems or find out new information</p>
<p><u>Suggested activities</u></p>	<p>Naming/identifying the different hazard symbols. Looking at different household products and identifying the hazard symbols on the products. How to stay safe when using different products/chemicals. Look at different safety equipment and how/when to use it. Look at different equipment that you may use for an investigation and name them. Practise setting up different equipment. Practise using different equipment including measuring. Using universal indicator on a range of household substances Investigating pH. Making red cabbage indicator. Neutralisation. Exploring different chemical reactions. Measuring liquids and solids. Looking at different type of pollution. Explore how water gets polluted. Cleaning drinking water with home-made filters.</p>
<p><u>Possible Investigations</u></p>	<p>Testing different household items to see if they are an acid or a base. Investigating pH Making red cabbage indicator. Exploring different chemical reactions.</p>
<p><u>Online resources</u> Twinkl CLEAPPS for risk assessments BBC bitesize for video resources.</p>	

Evidencing Work

All work / evidence sheets need to be printed off, annotated by staff, self-assessed by pupils and stored in student folders.

RRS Articles:

This unit of work is linked to Articles of the UN Convention on the Rights of the Child.

Article 13 (freedom of expression)

Article 24 (health and health services)

Article 29 (goals of education)