

# Scheme of work: Chemistry in our world

## Entry Level Certificate Chemistry – Component 4

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This resource provides guidance for teaching component 4: Chemistry in our world from our new Entry Level Certificate Science. It is based on the specification (5960).

The scheme of work is designed to be a flexible medium term plan for teaching content and development of the skills that will be assessed.

We have provided it in Word format to help you create your own teaching plan – you can edit and customise it according to your needs. This scheme of work is not exhaustive; it only suggests activities and resources you could find useful in your teaching.

### 3.4 Component 4 – Chemistry: Chemistry in our world

Spec ref.	Summary of the specification content	Learning outcomes <i>What most students should be able to do</i>	Suggested timing (hours)	Opportunities to develop Scientific Communication skills	Opportunities to develop and apply practical and enquiry skills	Resources
3.4.1 O1	Acids and metal reactions	<p>Recall that acids react with some metals to produce hydrogen.</p> <p>Recall that hydrochloric acid produces chlorides.</p> <p>Recall that sulfuric acid produces sulfates.</p> <p>Write word equations for the reactions when given the names of the reactants.</p> <p>Describe the test for hydrogen.</p>	1	<p>Use scientific vocabulary correctly.</p> <p>Write word equations using the correct terms and structure.</p> <p>AQA Teachit KS3: Acids and alkalis pH match up cards.</p> <p>AQA Teachit KS3: Acids and alkalis.</p> <p>AQA Teachit KS3: Acids and alkalis – prior learning.</p>	<p>Investigate the reactions of magnesium, zinc and iron with hydrochloric and sulfuric acids.</p> <p>Carry out the 'pop' test for hydrogen produced in these reactions.</p> <p>TDA opportunity: Investigate the amount of hydrogen produced when acids react with different metals.</p>	<p><a href="#">BBC Bitesize - Neutralising acids and alkalis</a></p> <p><a href="#">BBC Bitesize - Making salts</a></p>
O2	Neutralisation	<p>Recall that an acid is neutralised by an alkali or base to produce a salt and water.</p> <p>Recall that an acid is neutralised by a carbonate to produce a salt, water and carbon dioxide.</p>	2	<p>Use scientific vocabulary correctly.</p> <p>Write word equations using the correct terms and structure.</p>	<p>Investigate the neutralisation of acids by bases, alkalis and carbonates.</p>	<p>Household chemicals can be used here.</p>

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		<p>Write word equations for the reactions when given the names of the reactants.</p> <p>Describe the test for carbon dioxide.</p> <p>Describe how to crystallise a salt solution to produce solid salt.</p>		<p>AQA Teachit KS3: Everyday neutralisation.</p> <p>AQA Teachit KS4: Acid and base – making copper sulphate crystals.</p> <p>AQA Teachit KS3: Taboo – acids and alkalis.</p>	<p>Carry out the limewater test for carbon dioxide.</p> <p>Produce solid salt crystals by evaporation of a salt solution.</p>	
3.4.2 O3	Energy and rate of reaction	<p>Describe reactions that transfer energy to the surroundings so that temperature increases.</p> <p>Describe reactions that take in energy from the surroundings so the temperature decreases.</p>	1	Use scientific vocabulary correctly. (Students do not need to recall the terms exothermic or endothermic.)	<p>Investigate the temperature changes that take place in combustion, oxidation and neutralisation reactions.</p> <p>Investigate the temperature changes when eg ammonium chloride dissolves in water or citric acid reacts</p>	<a href="#">BBC Bitesize - Endothermic and exothermic reactions</a>

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					with sodium hydrogen carbonate.	
O4	Increasing the rate of a chemical reaction	<p>Describe the increase in the rate of a reaction caused by increasing the:</p> <ul style="list-style-type: none"> <li>• temperature</li> <li>• concentration of reactants</li> <li>• surface area of reactants</li> </ul> <p>or by adding a catalyst.</p> <p>Measure and record the:</p> <ul style="list-style-type: none"> <li>• time for a reactant to be used up.</li> <li>• volume of gas produced</li> <li>• time for a solution to change colour/clarity.</li> </ul>	2	<p>Use scientific vocabulary correctly.</p> <p>Record experimental measurements in an appropriate table using headings and units.</p>	TDA opportunity: Investigate how to make a chemical reaction go faster.	<a href="#">BBC Bitesize - Rates of reaction</a>
3.4.3 O5	Changes in Earth's atmosphere	<p>Describe how the Earth's current atmosphere developed.</p> <p>Recall the word equation for photosynthesis.</p>	1	<p>Use scientific vocabulary correctly.</p> <p>Write the word equation for photosynthesis.</p>	TDA opportunity: Investigate the production of oxygen by aquatic plants in different conditions by counting bubbles.	<a href="#">Atmospheric gases</a>

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		Describe how photosynthesis led to changes in the early atmosphere.		AQA Teachit KS3: Earth's atmosphere – spot the difference.		
O6	The current atmosphere	Describe how most carbon dioxide from the early atmosphere has been locked up as carbonates and fossils in rocks.  Recall the present composition of the Earth's atmosphere.	½	Use scientific vocabulary correctly.  Use a pie-chart to show the composition of the Earth's atmosphere.	TDA opportunity: Compare the amount of carbon dioxide in fresh air and exhaled air.	<a href="#">BBC Bitesize - Exploring gases</a>
3.4.4 O7	Crude oil and fuels	Recall that crude oil is a mixture of a large number of compounds.  Describe the location of crude oil.  Explain how useful fuels, such as petrol and diesel, are produced from crude oil by fractional distillation.	1	Use scientific vocabulary correctly.  Card sort to match fractions with their uses.  AQA Teachit KS4: Modelling fractional distillation.	Compare prepared samples of fractions from crude oil.  Observe a demonstration of fractional distillation of prepared crude oil sample.	<a href="#">What is crude oil?</a>  <a href="#">How oil refining works</a>  <a href="#">Youtube - Crude Oil distillation process</a>

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				AQA Teachit KS4: Crude oil: fractional distillation (cut and paste diagrams)		<a href="#">BBC Bitesize - Fractional distillation</a>  <a href="#">What are fossil fuels?</a>
O8	Burning fuels	<p>Recall that the products of total combustion of a fuel are carbon dioxide, water vapour and oxides of nitrogen.</p> <p>Recall that some fuels produce sulfur dioxide when burned.</p> <p>Recall that partial combustion due to a limited air supply results in the production of carbon monoxide and, often, soot particles.</p> <p>Explain why burning fossil fuels may harm the environment.</p> <p>Recall that:</p> <ul style="list-style-type: none"> <li>oxides of sulfur and nitrogen (N<sub>ox</sub>) cause</li> </ul>	2	<p>Use scientific vocabulary correctly.</p> <p>Research and discuss the impact of burning fossil fuels on the environment.</p>	<p>Investigate the products of combustion.</p> <p>Compare 'roaring' and 'safety' Bunsen burner flames.</p> <p>Investigate the production of acid rain (spray a large cotton wool 'cloud' with water; hold above burning matches; squeeze the 'cloud' over a UI solution).</p>	<a href="#">BBC Bitesize - Combustion of natural gas</a>  <a href="#">BBC Newsround - Global warming</a>  <a href="#">Learn Chemistry - Identifying the products of combustion</a>  <a href="#">NHS - Carbon monoxide poisoning</a>  <a href="#">BBC Bitesize - Products and effects of combustion</a>

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		<p>acid rain and may harm human health.</p> <ul style="list-style-type: none"> <li>carbon monoxide can cause death.</li> <li>Solid particles can cause global dimming and harm human health.</li> </ul>		Research and discuss the use of carbon monoxide monitors in the home.	TDA opportunity: Compare the amount of soot produced when burning different fuels.	
O9	Human influences on the atmosphere	<p>Recall that carbon dioxide is produced by burning fossil fuels.</p> <p>Recall that methane is produced from landfills and farming.</p> <p>Describe the effects of increased carbon dioxide and methane on the temperature of the atmosphere.</p>	1	Discuss the effects of increased atmospheric temperature on global warming.		<p><a href="#">BBC Bitesize - How do we know the Earth is getting warmer?</a></p> <p><a href="#">BBC Bitesize - Fossil fuels and the environment</a></p>
3.4.5 O10	Water for drinking	Recall that safe drinking water has few dissolved substances and low levels of microbes.	1	Use scientific vocabulary correctly.	Distil a salt water solution to produce fresh water.	<a href="#">BBC Bitesize - Water purity</a>

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		Describe how safe drinking water is produced by filtration and sterilisation.		Order information to produce a flow chart to show the purification of water.	TDA opportunity: Investigate the amount of dissolved solids in water from different locations by evaporating samples and weighing residues.	<a href="#">Portsmouth Water - Resources</a>