Scheme of work: Chemistry in our world

Entry Level Certificate Chemistry – Component 4

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**  *What most students should be able to do* | **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 | Recall that acids react with some metals to produce hydrogen.  Recall that hydrochloric acid produces chlorides.  Recall that sulfuric acid produces sulfates.  Write word equations for the reactions when given the names of the reactants.  Describe the test for hydrogen. | 1 | Use scientific vocabulary correctly.  [Laboratory equipment (teachit.co.uk)](https://www.teachit.co.uk/resources/science/laboratory-equipment)  Write word equations using the correct terms and structure.  [Acids and alkalis worksheet|KS3 Chemistry|Teachit](https://www.teachit.co.uk/resources/chemistry/acids-and-alkalis-100-sheet) | Investigate the reactions of magnesium, zinc and iron with hydrochloric and sulfuric acids.  Carry out the ‘pop’ test for hydrogen produced in these reactions.  TDA opportunity: Investigate the amount of hydrogen produced when acids react with different metals. | [Chemistry KS3/GCSE: Acids and alkalis - BBC Teach](https://www.bbc.co.uk/teach/class-clips-video/chemistry-ks3-gcse-acids-and-alkalis/zfrqpg8)  [Naming salts - Making salts - GCSE Chemistry (Single Science) Revision - Other - BBC Bitesize](https://www.bbc.co.uk/bitesize/guides/zg34tyc/revision/1) |
| O2 | Neutralisation | Recall that an acid is neutralised by an alkali or base to produce a salt and water.  Recall that an acid is neutralised by a carbonate to produce a salt, water and carbon dioxide.  Write word equations for the reactions when given the names of the reactants.  Describe the test for carbon dioxide.  Describe how to crystallise a salt solution to produce solid salt. | 2 | Use scientific vocabulary correctly.  [Neutralisation worksheet|KS3 chemistry|Teachit](https://www.teachit.co.uk/resources/chemistry/everyday-neutralisation)  Write word equations using the correct terms and structure.  [pH scale worksheet|KS3 Chemistry|Teachit](https://www.teachit.co.uk/resources/chemistry/make-your-own-ph-scale)  [KS3 neutralisation investigation worksheet|KS3 Chemistry|Teachit](https://www.teachit.co.uk/resources/chemistry/tummy-trouble-neutralisation-investigation)  [Word game acids and alkalis|KS3|Teachit](https://www.teachit.co.uk/resources/chemistry/taboo-acids-and-alkalis) | Investigate the neutralisation of acids by bases, alkalis and carbonates.  Carry out the limewater test for carbon dioxide.  Produce solid salt crystals by evaporation of a salt solution.  TDA opportunity: Investigate which is the best indigestion tablet. | Household chemicals can be used here. |
| 3.4.2  O3 | Energy and rate of reaction | Describe reactions that transfer energy to the surroundings so that temperature increases.  Describe reactions that take in energy from the surroundings so the temperature decreases. | 1 | Use scientific vocabulary correctly. (Students do not need to recall the terms exothermic or endothermic.)  [Endothermic exothermic worksheet|KS3 Chemistry|Teachit](https://www.teachit.co.uk/resources/chemistry/endothermic-or-exothermic) | Investigate the temperature changes that take place in combustion,  oxidation and  neutralisation reactions.  Investigate the temperature changes when eg ammonium chloride dissolves in water or citric acid reacts with sodium hydrogen carbonate. | [BBC Bitesize - Endothermic and exothermic reactions](http://www.bbc.co.uk/education/clips/zpvmpv4) |
| O4 | Increasing the rate of a chemical reaction | Describe the increase in the rate of a reaction caused by increasing the:   * temperature * concentration of reactants * surface area of reactants   or by adding a catalyst.  Measure and record the:   * time for a reactant to be used up. * volume of gas produced * time for a solution to change colour/clarity. | 2 | Use scientific vocabulary correctly.  Record experimental measurements in an appropriate table using headings and units. | TDA opportunity:  Investigate how to make a chemical reaction go faster. | [BBC Bitesize - Rates of reaction](http://www.bbc.co.uk/education/clips/zcw34wx) |
| 3.4.3  O5 | Changes in Earth’s atmosphere | Describe how the Earth’s current atmosphere developed.  Recall the word equation for photosynthesis.  Describe how photosynthesis led to changes in the early atmosphere. | 1 | Use scientific vocabulary correctly.  Write the word equation for photosynthesis.  [Carbon cycle jigsaw |Climate | KS3 Chemistry | Teachit](https://www.teachit.co.uk/resources/chemistry/carbon-cycle-jigsaw)  [Earth's atmosphere - spot the difference (teachit.co.uk)](https://www.teachit.co.uk/resources/chemistry/earths-atmosphere-spot-difference) | TDA opportunity:  Investigate the production of oxygen by aquatic plants in different conditions by counting bubbles. | [GCSE Chemistry - Evolution of the Atmosphere #52 - Bing video](https://www.bing.com/videos/search?q=video+atmospheric+gases&&view=detail&mid=E80C838C650330AA518AE80C838C650330AA518A&&FORM=VDRVRV) |
| 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. | [BBC Bitesize - Exploring gases](http://www.bbc.co.uk/education/clips/zdf7tfr) |
| 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.  [Crude oil (teachit.co.uk)](https://www.teachit.co.uk/resources/chemistry/crude-oil)  [Crude oil – fractional distillation (teachit.co.uk)](https://www.teachit.co.uk/resources/chemistry/crude-oil-fractional-distillation) | Compare prepared samples of fractions from crude oil.  Observe a demonstration of fractional distillation of prepared crude oil sample. | [What is crude oil?](http://resources.schoolscience.co.uk/SPE/knowl/4/2index.htm?crude.html)  [How oil refining works](http://science.howstuffworks.com/environmental/energy/oil-refining4.htm)  [Fractional distillation of crude oil - Oil and cracking - GCSE Chemistry (Single Science) Revision - WJEC - BBC Bitesize](https://www.bbc.co.uk/bitesize/guides/zh8tng8/revision/1)  [What are fossil fuels?](http://www.discoveringfossils.co.uk/fossilfuels.htm) |
| O8 | Burning fuels | Recall that the products of total combustion of a fuel are carbon dioxide, water vapour and oxides of nitrogen.  Recall that some fuels produce sulfur dioxide when burned.  Recall that partial combustion due to a limited air supply results in the production of carbon monoxide and, often, soot particles.  Explain why burning fossil fuels may harm the environment.  Recall that:   * oxides of sulfur and nitrogen (NOX) cause acid rain and may harm human health. * carbon monoxide can cause death. * Solid particles can cause global dimming and harm human health. | 2 | Use scientific vocabulary correctly.  Research and discuss the impact of burning fossil fuels on the environment.  Research and discuss the use of carbon monoxide monitors in the home. | Investigate the products of combustion.  Compare ‘roaring’ and ‘safety’ Bunsen burner flames.  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).  TDA opportunity:  Compare the amount of soot produced when burning different fuels. | [Combustion of fuels - Products and effects of combustion - GCSE Chemistry (Single Science) Revision - Other - BBC Bitesize](https://www.bbc.co.uk/bitesize/guides/zx6sdmn/revision/1)  [Learn Chemistry - Identifying the products of combustion](http://www.rsc.org/learn-chemistry/resource/res00000707/identifying-the-products-of-combustion)  [BBC Newsround - Global warming](http://news.bbc.co.uk/cbbcnews/hi/find_out/guides/world/global_warming/newsid_1575000/1575441.stm)  [NHS - Carbon monoxide poisoning](http://www.nhs.uk/Conditions/Carbon-monoxide-poisoning/Pages/Introduction.aspx) |
| O9 | Human influences on the atmosphere | Recall that carbon dioxide is produced by burning fossil fuels.  Recall that methane is produced from landfills and farming.  Describe the effects of increased carbon dioxide and methane on the temperature of the  atmosphere. | 1 | Discuss the effects of increased atmospheric temperature on global warming. |  | [Global Warming - video for kids - YouTube](https://www.youtube.com/watch?v=Vztjbm6HA58)  [Using fossil fuels - The formation and usage of fossil fuels - 4th level Science Revision - BBC Bitesize](https://www.bbc.co.uk/bitesize/guides/zxxq4xs/revision/2) |
| 3.4.5  O10 | Water for drinking | Recall that safe drinking water has few dissolved substances and low levels of microbes.  Describe how safe drinking water is produced by filtration and sterilisation. | 1 | Use scientific vocabulary correctly.    Order information to produce a flow chart to show the purification of water. | Distil a salt water solution to produce fresh water.  TDA opportunity:  Investigate the amount of dissolved solids in water from different locations by evaporating samples and weighing residues. | [Potable water - Water - AQA - GCSE Chemistry (Single Science) Revision - AQA - BBC Bitesize](https://www.bbc.co.uk/bitesize/guides/zpcjsrd/revision/1)  [Portsmouth Water - Resources](http://portsmouthwater.co.uk/education-learning/) |