



Discovering Science: Atmospheric Chemistry

Scheme of Work

	Lesson 1	Lesson 2	Lesson 3
Length	Approx. 1 hour	Approx. 1 hour	Approx. 1 hour
Objectives	<p>To define key terms in atmospheric chemistry.</p> <p>To explain the role that greenhouse gases play in atmospheric chemistry.</p> <p>To explore how chemistry may be able to address issues of global warming.</p>	<p>To consider chemistry solutions for reducing the amount of CO₂ in our atmosphere.</p> <p>To understand the concept of 'planet hacking'.</p> <p>To identify ways in which we can reduce our consumption of gas and electricity.</p>	<p>To describe elements required for life on a planet.</p> <p>To investigate examples of planets that scientists believe could support life.</p> <p>To evaluate how scientists are searching for life on a habitable planet.</p>

Lesson plans for each session can be found on the following pages.

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Lesson 1 plan

<p>Starter activity</p> <p>Students brainstorm and list everything they know about:</p> <ul style="list-style-type: none"> • global warming • stratosphere • greenhouse gases • the ozone layer. 	<p>Learning objectives</p> <ul style="list-style-type: none"> • To define key terms in atmospheric chemistry. • To explain the role that greenhouse gases play in atmospheric chemistry. • To explore how chemistry may be able to address issues of global warming.
<p>Main activities</p> <p>The class watches the video in Step 1.3 (The role of chemistry in climate change) and students take notes. Ask questions to check understanding, including:</p> <ul style="list-style-type: none"> • What is the role of the hydroxyl radical? • What is ozone? <p>Put students into small groups, and hand out the exercise from Step 1.4 (Radiation and greenhouse gases exercise). In their groups, students use the internet to research and answer the exercise questions.</p> <p>Hand out the educator's feedback for the exercise, and ask groups to self-assess their answers.</p> <p>Still in their groups, ask students to discuss the following question and note down their answers. They can conduct more research if they wish.</p> <ul style="list-style-type: none"> • Do you think chemistry will be able to solve the problem of global warming? If so, how? 	<p>Resources required</p> <ol style="list-style-type: none"> 1. Device for watching video. 2. Exercise from Step 1.4. 3. Devices to conduct research. 4. Materials to collect ideas and answers. <p>Assessment for Learning</p> <p>Discussion contributions, exercise answers and feedback.</p> <p>Differentiation</p> <p>SEND: Videos have subtitles. Low ability: Peer-learning. Gifted and Talented: Peer-teaching.</p> <p>Plenary</p> <p>Share and discuss the group answers to the question as a class. Collect a list of thoughts and ideas on the board.</p>

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Lesson 2 plan

<p>Starter activity</p> <p>Students watch the video in Step 1.10 (Impacts of a warmer climate) and make notes.</p> <p>Discuss some of the key points and ask students to identify anything specific they learned/anything that surprised them.</p>	<p>Learning objectives</p> <ul style="list-style-type: none"> To consider chemistry solutions for reducing the amount of CO₂ in our atmosphere. To understand the concept of 'planet hacking'. To identify ways in which we can reduce our consumption of gas and electricity.
<p>Main activities</p> <p>In small groups, students will now research ways to combat climate change in order to create a poster which outlines ideas and possible solutions.</p> <p>Their poster should answer the following questions:</p> <ul style="list-style-type: none"> What is 'planet hacking'? What can we do in our everyday lives to reduce our consumption of electricity or gas? What other solutions can you find that have been developed or are in development? <p>Links provided in Step 1.10 and 1.11 will be useful sources.</p> <p>Posters should demonstrate scientific understanding of the topic, give the definition of 'planet hacking', and outline some possible solutions to global warming.</p>	<p>Resources required</p> <ol style="list-style-type: none"> Device for watching video. Devices for conducting research. Materials for creating posters. <p>Assessment for Learning</p> <p>Posters and presentations, discussion contributions.</p> <p>Differentiation</p> <p>SEND: Videos have subtitles. Low ability: Peer-learning. Gifted and Talented: Peer-teaching.</p> <p>Plenary</p> <p>Each group should present their poster to the rest of the class and receive feedback from other students.</p> <p>Ask students if they can identify any of the solutions presented that they would be able and willing to commit to in their everyday lives.</p>

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Lesson 3 plan

<p>Starter activity</p> <p>Students watch the video from Step 2.9 (The search for life or a habitable planet).</p> <p>Ask students to take notes on the video, including specifically the elements required for life. Share notes and discuss in small groups.</p>	<p>Learning objectives</p> <ul style="list-style-type: none"> To describe elements required for life on a planet. To investigate examples of planets that scientists believe could support life. To evaluate how scientists are searching for life on a habitable planet.
<p>Main activities</p> <p>Students conduct individual research and produce a short report which investigates examples of planets that scientists believe could support life. They can research:</p> <ul style="list-style-type: none"> TRAPPIST-1 Enceladus (moon of Saturn) any others they identify. <p>Links in Step 2.9 will be useful sources. In their research, students should consider:</p> <ul style="list-style-type: none"> What is the proof for this hypothesis? Conversely, what have scientists used to disprove this hypothesis? What do we know about their atmospheres? <p>Reports should be informative, demonstrate scientific understanding, and give fair and balanced views on the topic. Students should explain concepts simply and use accessible language which is aimed at a non-specialist audience.</p>	<p>Resources required</p> <ol style="list-style-type: none"> Device for watching video. Devices and materials for conducting research. Materials for producing reports. <p>Assessment for Learning</p> <p>Individual reports and peer feedback.</p> <p>Differentiation</p> <p>SEND: Videos have subtitles and teacher support. Low ability: Peer-learning. Gifted and Talented: Peer-teaching.</p> <p>Plenary</p> <p>Students should swap reports with a partner and provide peer-feedback on each other's reports. Students should try to give constructive feedback, including consideration of the following questions:</p> <ul style="list-style-type: none"> Is the report well written, clear, with a logical structure designed to support a non-specialist audience? Does the report provide fair and balanced views? Does the report demonstrate scientific understanding of the selected topic?