



# Discovering Science: Atmospheric Chemistry

*What can we learn about Earth, and other planets in and beyond our solar system, by studying their atmospheres?*

If your students are completing the whole of this course online and are not participating in the teacher-led lessons based on it, then they can complete useful and engaging activities based on the content covered. You can choose for your students to complete individual tasks by themselves or encourage group work. Though you may have your own ideas about what your students can do with the course content, we've made things easy for you by suggesting some activities that you can submit to your students below. Instructions for the students can be found later in this document.

## Individual student tasks taken from the course

**Reflection:** Students write a 500 word reflection on what they learned from the course, including anything they might do differently now as a result of their learning, and anything additional they found out from their own reading around the topic. They will submit this reflection as a written essay, podcast or video.

**Activity:** Students watch the video in Step 1.3 (The role of chemistry in climate change) and take notes. They write a short assignment answering these questions:

- What is the role of the hydroxyl radical?
- What is ozone?

Encourage students to use diagrams in their answers.

**Research task:** Students watch the video in Step 2.9 (The search for life or a habitable planet), then research and produce a report which investigates examples of planets that scientists believe could support life. They can research:

- TRAPPIST-1
- Enceladus (moon of Saturn)
- any others they identify.

Links in Step 2.9 will be useful sources. In their research, students should consider:

- What is the proof for this hypothesis?
- Conversely, what have scientists used to disprove this hypothesis?
- What do we know about their atmospheres?

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.

## Group tasks based on the course

**Research task:** In groups, students research ways to combat climate change in order to create a poster which outlines ideas and possible solutions. Their posters should answer the following questions:

- 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?

Links provided in Step 1.10 and 1.11 will be useful sources. Posters should demonstrate scientific understanding of the topic, give the definition of 'planet hacking', and outline some possible solutions to global warming which specifically relate to their learning on atmospheric chemistry.

**Discussion task:** Groups discuss the following question and note down their answers. They can conduct research to inform their discussions if they wish.

- Do you think chemistry will be able to solve the problem of global warming? If so, how?

## Additional support

You can use the [How to use FutureLearn guide](#) with your students to get them started. There is also a school-facing [Guide to safeguarding and security on FutureLearn](#) if you need it.

## Test

You can use the test questions listed in the student instructions below as a short assessment to enable your students to demonstrate what they have learned on the course. The assessment has 15 marks in total.

The questions have been designed to be flexible and open. The questions indicate which steps the answers can be found on. The marks available reflect the likely length and complexity of the answer expected, and how many points they are likely to make. For example, a 5-mark question might reflect a longer, more complex question, or one where they have asked to describe or explain a number of elements. Depending on the level and ability of your students, you can decide how you wish to award the marks so they are appropriate for your class.

Each question suggests which steps the students may wish to return to answer the questions. **You can decide if you want to include this information when you share the assessment with your students.**

# Student instructions

## Reflection

Write a 500 word reflection of what you have learned from the course. It should include anything you might do differently now because of what you learned, and anything additional you found out in your reading around the topic. Submit this reflection to your teacher as a written essay, podcast or video.

## Activity

Watch the video in Step 1.3 (The role of chemistry in climate change) and take notes. Complete a short assignment answering these questions:

- What is the role of the hydroxyl radical?
- What is ozone?

Try to use diagrams in your answers. Submit your assignment to your teacher.

## Research task

Watch the video in Step 2.9 (The search for life on a habitable planet), then research and produce a report which investigates examples of planets that scientists believe could support life. You could research:

- TRAPPIST-1
- Enceladus (moon of Saturn)
- any other planets you identify.

Links in Step 2.9 will be useful sources. In your research, you should consider:

- What is the proof for this hypothesis?
- What have scientists used to disprove this hypothesis?
- What do we know about their atmospheres?

Reports should be informative, demonstrate scientific understanding, and give fair and balanced views on the topic. You should explain concepts simply and use accessible language which is aimed at a non-specialist audience.

## Group discussion

In your group, discuss the following question and note down your answers and ideas. You can conduct research to inform your discussions if you wish.

- Do you think chemistry will be able to solve the problem of global warming? If so, how?

Submit your notes to your teacher,

## Group research task

In your group, research ways to combat climate change in order to create a poster which outlines ideas and possible solutions. Your poster should answer the following questions:

- 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?

Links provided in Step 1.10 and 1.11 will be useful sources. Posters should demonstrate scientific understanding of the topic, give the definition of 'planet hacking', and outline some possible solutions to global warming which specifically relate to your learning on atmospheric chemistry.

# Test

Complete the assessment questions below to demonstrate your understanding of the course. You can refer back to the course to find the answers or more detail as you need to. You should not however share your answers with other students.

Your answers should be written in full sentences and be appropriately detailed. Make sure you read the questions carefully before starting to answer. Each question shows how many marks are available – use this to guide how much detail or how many points you need to include.

[The questions also indicate where you can start to look to find the answer. You can also include information from other steps if that is relevant.]

1. What is a hydroxyl radical and what does it do? (3 marks) [Step 1.3]
2. What is 'planet hacking'? (2 marks) [Step 1.11]
3. What are some drawbacks of planet hacking? (2 marks) [Step 1.11]
4. Explain some actions we could take in our everyday lives to reduce our consumption of electricity or gas. (3 marks) [Step 1.11]
5. List three elements required for life on another planet. (3 marks) [Step 2.9]
6. Give two examples of planets that scientists believe could support life. (2 marks) [Step 2.10]