

# Comp + Evolution of the Earth atm

## Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Chemistry
Exam Board	AQA
Topic	5.9 Chemistry of the Atmosphere
Sub-Topic	Comp + Evolution of the Earth atm
Difficulty Level	Gold Level
Booklet	Question Paper 1

Time Allowed: 38 minutes

Score: /37

Percentage: /100

Grade Boundaries:

**Q1.** There is less carbon dioxide in the Earth's atmosphere now than there was in the Earth's early atmosphere.

- (a) The amount of carbon dioxide in the Earth's early atmosphere decreased because it was used by plants and algae for photosynthesis, dissolved in the oceans and formed fossil fuels.

Give **one** other way that the amount of carbon dioxide in the Earth's early atmosphere decreased.

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(1)

- (b) Carbon dioxide is a greenhouse gas.

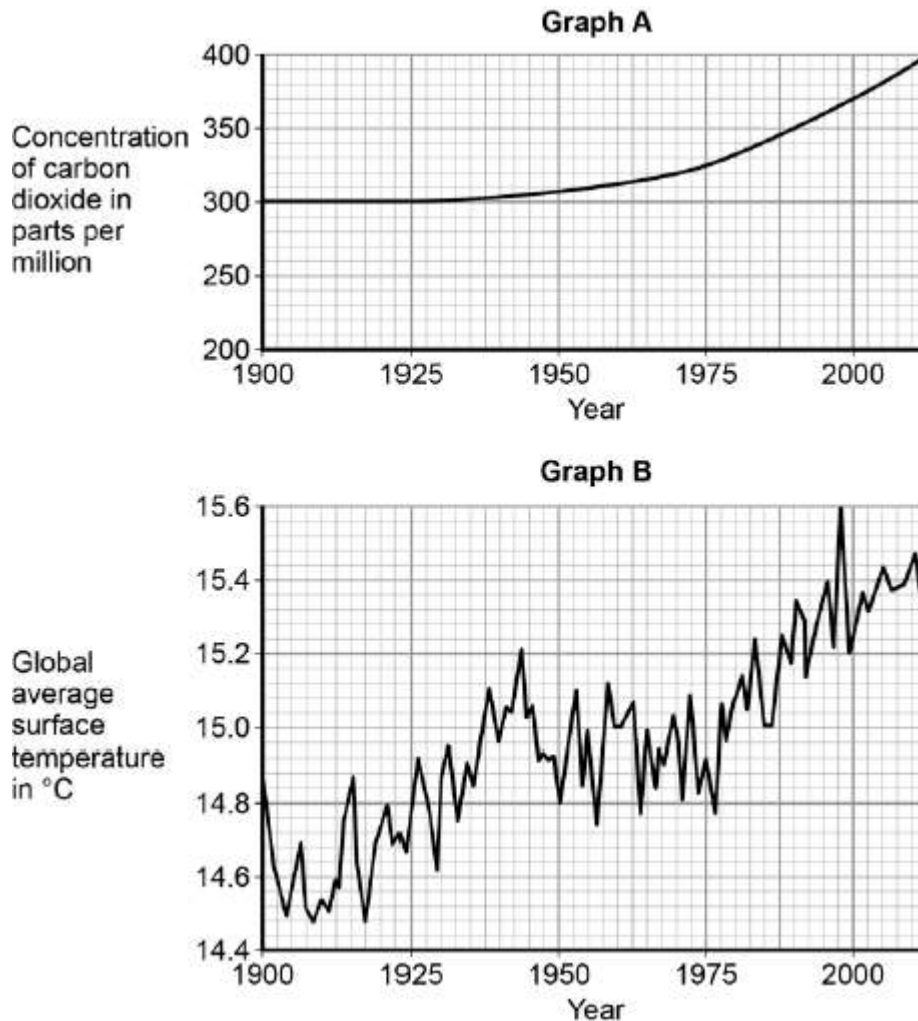
Describe the greenhouse effect.

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(4)

- (c) The graphs in **Figure 1** show the concentration of carbon dioxide in the atmosphere and global average surface temperature since 1900.

**Figure 1**



Calculate the percentage increase in the concentration of carbon dioxide from 1975 to 2000.

..... %

(1)

- (d) What was the global average surface temperature in 1980?

Global average surface temperature = ..... °C

(1)

- (e) A student stated: 'The graphs show that increasing the concentration of carbon dioxide in the atmosphere causes global temperature increases.'

Discuss why this statement is only partially true.

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(4)  
(Total 11 marks)

**Q2.** Scientists study the atmosphere on planets and moons in the Solar System to understand how the Earth's atmosphere has changed.

- (a) Millions of years ago the Earth's atmosphere was probably just like that of Mars today.

The table shows data about the atmosphere of Mars and Earth today.

Mars today		Earth today	
nitrogen	3%	nitrogen	78%
oxygen	trace	oxygen	21%
water	trace	water	trace
Carbon dioxide	95%	Carbon dioxide	trace
Average surface temperature $-23^{\circ}\text{C}$		Average surface temperature $15^{\circ}\text{C}$	

The percentages of some gases in the Earth's atmosphere of millions of years ago have changed to the percentages in the Earth's atmosphere today.

For **two** of these gases describe how the percentages have changed **and** suggest what caused this change.

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(2)

- (b) Titan is the largest moon of the planet Saturn.  
Titan has an atmosphere that contains mainly nitrogen.  
Methane is the other main gas.

Main gases in Titan's atmosphere	Percentage (%)	Boiling point in °C
Nitrogen	95	–196
Methane	5	–164
Average surface temperature –178°C		

When it rains on Titan, it rains methane!

Use the information above and your knowledge and understanding to explain why.

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(2)

- (c) Ultraviolet radiation from the Sun produces simple alkenes, such as ethene (C<sub>2</sub>H<sub>4</sub>) and propene (C<sub>3</sub>H<sub>6</sub>) from methane in Titan's atmosphere.

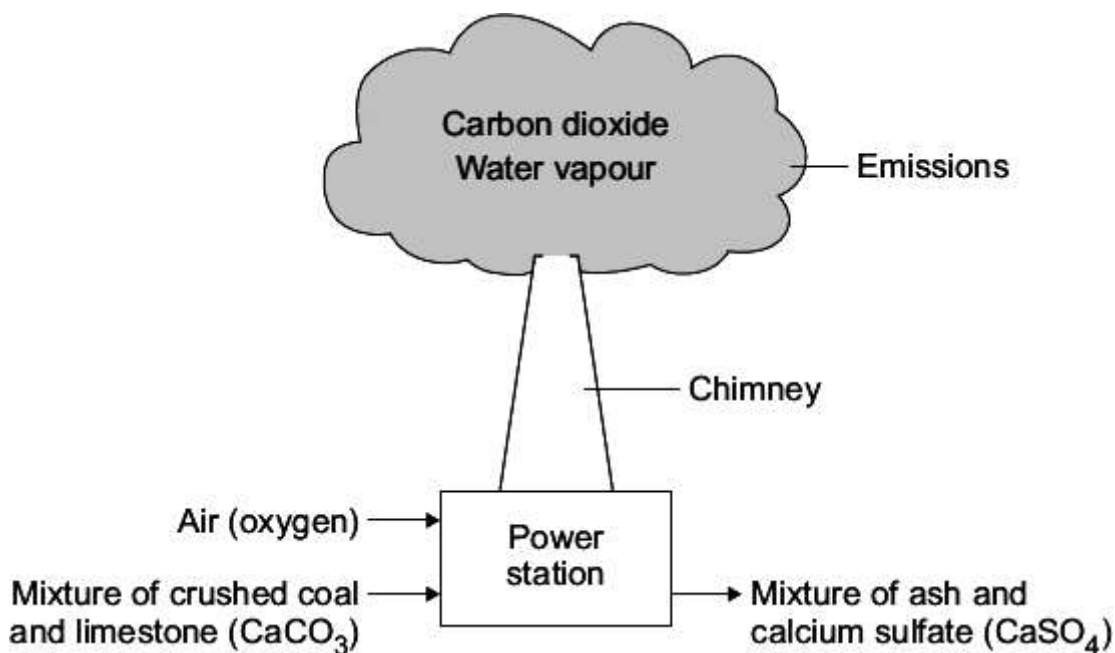
State the general formula for alkenes.

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(1)

(Total 5 marks)

- Q3.** Most power stations burn coal to generate electricity. Burning coal gives off sulfur dioxide gas which can be removed from the waste gases by using limestone. This prevents sulfur dioxide from entering the atmosphere and causing acid rain. One disadvantage of using limestone in a power station is that it releases 'locked up carbon dioxide' into the atmosphere.



(a) How does the limestone used in a power station:

(i) release carbon dioxide

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(1)

(ii) remove sulfur dioxide?

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(1)

(b) The waste gases from the chimney are monitored. One toxic gas that should not be released is carbon monoxide.

Explain how carbon monoxide would be formed.

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(2)

- (c) The use of limestone in a power station releases 'locked up carbon dioxide' into the atmosphere.

- (i) Explain the meaning of 'locked up carbon dioxide'.

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(2)

- (ii) Why does the release of this carbon dioxide cause an environmental problem?

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(1)

(Total 7 marks)

- Q4.** (a) For the last 200 million years the amount of carbon dioxide in the atmosphere has remained almost the same.

Describe the natural processes which remove carbon dioxide from the atmosphere.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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(4)

- (b) The amount of carbon dioxide in the atmosphere has increased over the last one hundred years. Suggest **two** reasons why this has happened.

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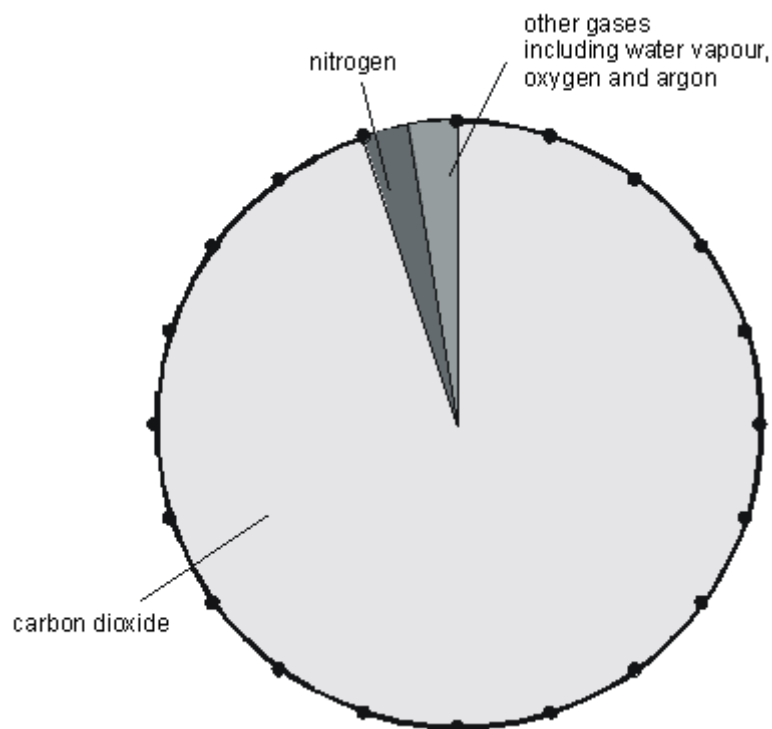
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(2)

(Total 6 marks)

**Q5.** The pie chart below shows the composition of the atmosphere on the planet Mars.





- (a) Use the pie chart above to calculate the percentage of carbon dioxide in the atmosphere on Mars.

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 ..... %

(2)

- (b) The atmosphere on Earth is very different from that on Mars. One important difference is that the Earth's atmosphere contains a large amount of oxygen.

Give **two** other ways in which the Earth's atmosphere is different from the atmosphere on Mars.

1. ....  
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 2. ....  
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(2)

- (c) When the Earth was formed its atmosphere is thought to have been similar to the atmosphere on Mars. Explain how green plants and other organisms have changed the composition of the Earth's atmosphere.

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(4)  
(Total 8 marks)