AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.9.2.2

# Human activities which contribute to an increase in greenhouse gases in the atmosphere

## Past-paper questions

| | |
|---|---|
| Tier | **Higher** |
| Question groups | **6** |
| Available paper years | **2018–2025** |

## Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

**Name:** _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

**5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere**

**Question 01**

June 2018 | 8464/C/2H | Original Q2

**0 2** This question is about the Earth's atmosphere.

**0 2 . 1** Carbon dioxide is a greenhouse gas.

What is another greenhouse gas?

**[1 mark]**

Tick **one** box.

Argon ☐

Methane ☐

Nitrogen ☐

Oxygen ☐

**0 2 . 2** Greenhouse gases cause global climate change.

Give **two** effects of global climate change.

**[2 marks]**

1 _____

_____

2 _____

_____

**0 2 . 3** 4.1 kg of a plastic, used to make plastic bottles, has a carbon footprint of 6.0 kg of carbon dioxide.

Calculate the carbon footprint of one plastic bottle of mass 23.5 g

**[2 marks]**

_____

_____

_____

_____

Carbon footprint = _____ kg of carbon dioxide

**5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere**

**Question 01 · continued**



**0 2 . 4** Give **one** way that carbon dioxide emissions can be reduced when a plastic bottle is manufactured.

**[1 mark]**

**0 2 . 5** Explain how the percentages of nitrogen, oxygen and carbon dioxide in the Earth's atmosphere today have changed from the Earth's early atmosphere.

**[6 marks]**

**12**

**5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere**

**Question 02**

June 2019 | 8464/C/2H | Original Q7

**0 7** This question is about hydrocarbons and crude oil.

**0 7 . 1** Hydrocarbon fuels are produced from crude oil.

Describe how crude oil is separated into fractions.

**[4 marks]**

Butane is a hydrocarbon.

**0 7 . 2** Two equations for the combustion of butane are:

- $2\,C_4H_{10} + 13\,O_2 \rightarrow 8\,CO_2 + 10\,H_2O$
- $2\,C_4H_{10} + 5\,O_2 \rightarrow 8\,C + 10\,H_2O$

Why are different products formed?

**[1 mark]**

**0 7 . 3** One other product of the combustion of butane is carbon monoxide.

Balance the equation.

**[1 mark]**

____ $C_4H_{10}$ + ____ $O_2$ → ____ $CO$ + ____ $H_2O$

**5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere**

**Question 02 · continued**



**0 7 . 4** Carbon dioxide is a greenhouse gas.

Describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter.

**[4 marks]**

**10**

5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Question 03

November 2020 | 8464/C/2H | Original Q6

**0 6** This question is about the Earth's atmosphere.

**0 6 . 1** Carbon dioxide is a greenhouse gas.

The greenhouse effect happens in four stages.

The four stages are:

Stage **A** Carbon dioxide stops longer wavelength radiation escaping

Stage **B** Radiation is absorbed by the Earth

Stage **C** Longer wavelength radiation is emitted

Stage **D** Shorter wavelength radiation enters the atmosphere

What is the correct order of stages **A**, **B**, **C** and **D**?

**[1 mark]**

Tick (✓) **one** box.

**C**, **A**, **B**, **D** ☐

**C**, **D**, **B**, **A** ☐

**D**, **B**, **C**, **A** ☐

**D**, **C**, **B**, **A** ☐

**Question 6 continues on the next page**

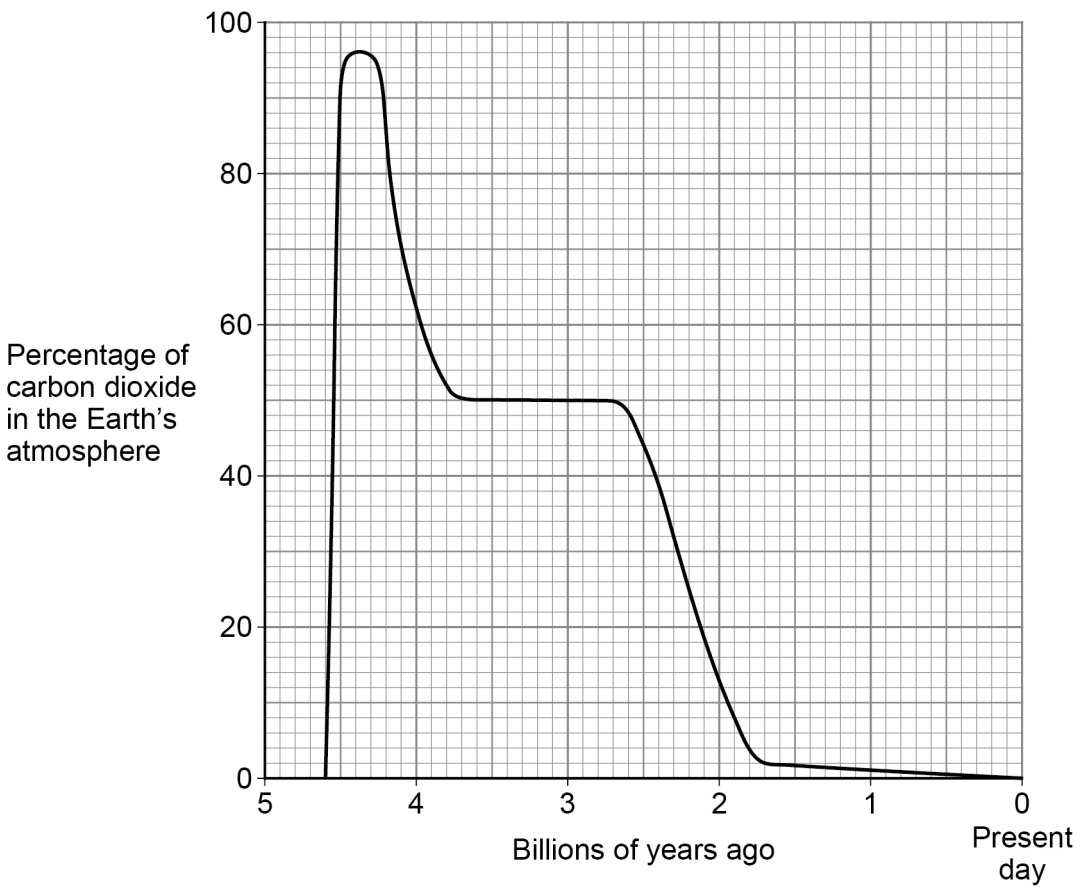
5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Question 03 · continued



**Figure 6** shows how the percentage of carbon dioxide in the Earth's atmosphere has changed over 4.6 billion years.

**Figure 6**




**0 6 . 2** The mass of gas in Earth's atmosphere remains constant at $5.15 \times 10^{18}$ kg

Determine the maximum mass of carbon dioxide that was in the Earth's atmosphere.

Use **Figure 6**.

**[3 marks]**

Mass of carbon dioxide = _____ kg

**5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere**

**Question 03 · continued**



**0 6 . 3** Describe the processes that have caused the main **changes** in the percentage of carbon dioxide in the Earth's atmosphere over the last 4.6 billion years.

Use **Figure 6**.

**[6 marks]**

**10**

5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

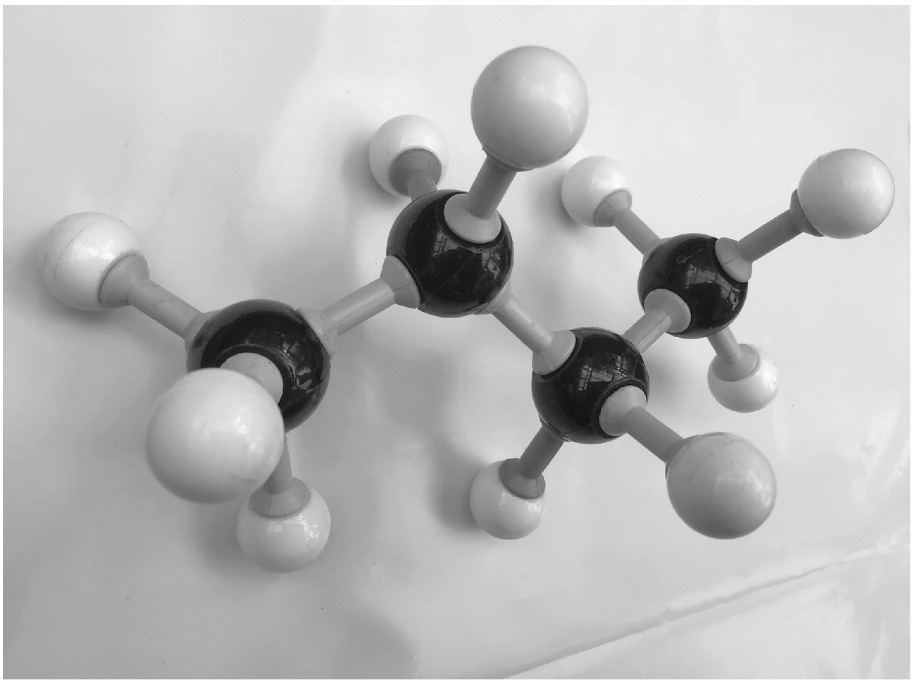
Question 04



**0 4** This question is about hydrocarbons and the uses of hydrocarbons.

**0 4 . 1** **Figure 6** shows a model of an alkane.

**Figure 6**



What is the name of the alkane in **Figure 6**?

**[1 mark]**

**0 4 . 2** What is a hydrocarbon?

**[1 mark]**

5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Question 04 · continued



Large hydrocarbon molecules are cracked.

**0 4 . 3** When $C_{11}H_{24}$ is cracked, three products are formed.

Complete the equation for the reaction.

**[2 marks]**

$$C_{11}H_{24} \rightarrow C_5H_{10} + 2 \text{ _____} + \text{ _____}$$

**0 4 . 4** Explain why **one** of the products of cracking is in high demand.

**[2 marks]**

**Question 4 continues on the next page**

5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Question 04 · continued



**0 4 . 5** Window frames can be manufactured from wood or from plastic.

**Table 2** shows data from a life cycle assessment (LCA) for a wooden window frame and a plastic window frame.

Both window frames are the same size.

**Table 2**

| | Wood | Plastic |
|---|---|---|
| Sources of hydrocarbons used for production in kg | 5.37 | 18.23 |
| Greenhouse gases released during production, use and disposal in kg equivalent of $CO_2$ | 457 | 487 |
| Oxides of nitrogen and sulfur dioxide produced in arbitrary units | 29.6 | 37.7 |
| Waste materials in kg | 16.5 | 28.8 |
| Total energy consumption in production, use and disposal in MJ | 9150 | 9713 |
| Lifetime cost to customer to buy and maintain in £ | 147 | 102 |

**5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere**

**Question 04 · continued**



Evaluate the sustainability of wooden and plastic window frames.

You should include environmental and economic factors.

**[6 marks]**

**12**

**5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere**

**Question 05**



**0 5** An increase of greenhouse gases in the Earth's atmosphere is causing global warming.

Global warming is causing global climate change.

**0 5 . 1** Give **one** effect of global climate change.

**[1 mark]**

**0 5 . 2** Explain how greenhouse gases cause global warming.

**[4 marks]**

**0 5 . 3** Explain how planting trees reduces global warming.

**[3 marks]**

**8**

5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere

Question 06



**0 2** The proportions of most gases in the Earth's atmosphere have not changed much for the past 200 million years.

**0 2 . 1** About one-fifth of the atmosphere is oxygen.

Describe the test for oxygen gas.

Give the result of the test.

**[2 marks]**

Test _____

_____

Result _____

_____

**0 2 . 2** **Table 1** shows the percentages of some gases in the Earth's early atmosphere and in the Earth's atmosphere today.

**Table 1**

| | Percentage (%) of gas in the atmosphere | |
|---|---|---|
| **Gas** | **Earth's early atmosphere** | **Earth's atmosphere today** |
| Carbon dioxide | 95 | 0.04 |
| Nitrogen | 3 | 78.0 |
| Oxygen | Less than 1 | 21.0 |

**5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere**

**Question 06 · continued**



Explain how the percentages of gases have changed from Earth's early atmosphere to Earth's atmosphere today.

You should refer to all three gases in **Table 1**.

**[6 marks]**

Extra space

**0 2 . 3** Methane is a greenhouse gas.

Give **two** ways to reduce methane emissions into the atmosphere.

**[2 marks]**

1

2

**5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere**

**Question 06 · continued**



The percentage of sulfur dioxide in the Earth's atmosphere increased between 1850 and 1980.

**0 2 . 4** Describe how sulfur dioxide emissions are produced.

**[2 marks]**

**0 2 . 5** Give **one** harmful effect of sulfur dioxide emissions.

**[1 mark]**

**0 2 . 6** Suggest **one** reason why the percentage of sulfur dioxide in the Earth's atmosphere has decreased since 1980.

**[1 mark]**

**14**