AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.9.2.3

Global climate change

Past-paper questions

Tier	**Higher**
Question groups	**7**
Available paper years	**2007–2023**

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.

4.9.2.3 Global climate change

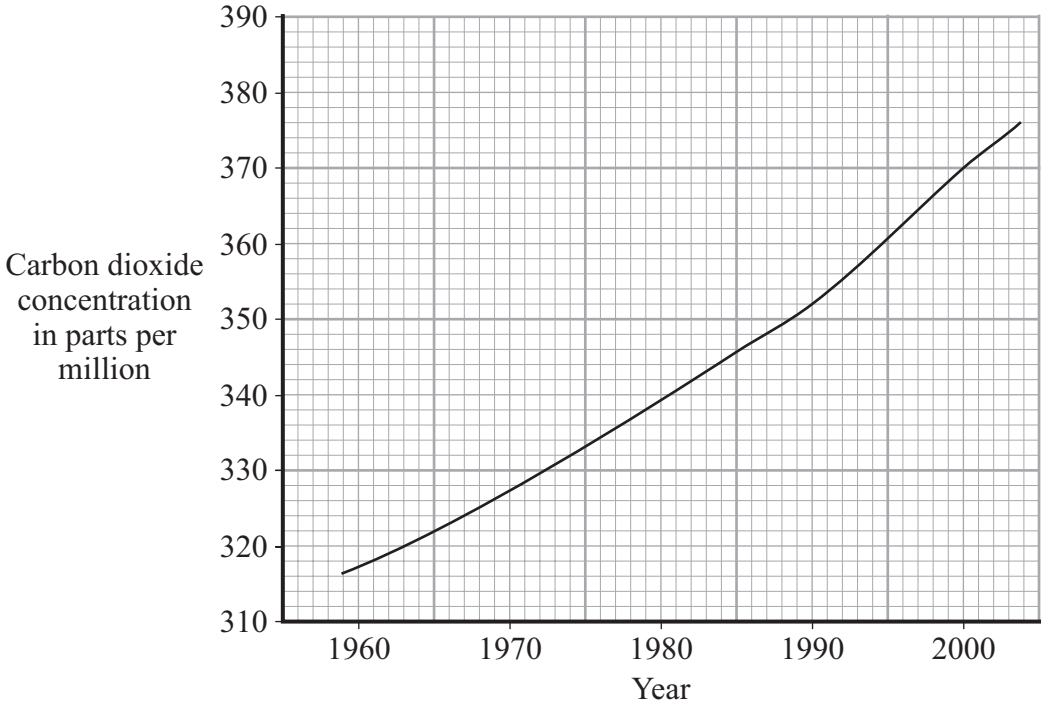
Question 01

November 2007 | CHY1B | Original Q4 | Legacy

QUESTION FOUR

Measurements of carbon dioxide in the atmosphere have been made continuously for almost 50 years at the Mauna Loa Observatory, 4000 metres up a mountain in Hawaii.
This site is far enough away from any large carbon dioxide source to be a reliable measuring point.

Atmospheric carbon dioxide levels measured at Mauna Loa, Hawaii



4A What is the mean (average) rate of increase per year of carbon dioxide (in parts per million) in the atmosphere at Mauna Loa between 1990 and 2000?

1 1.8

2 18.0

3 352.0

4 370.0

4B The change in carbon dioxide concentration over the past 50 years is thought to be a result of . . .

1 increased volcanic activity.

2 an increase in the use of fossil fuels.

3 variations in the Sun's energy output.

4 an increase in ocean temperatures.

4.9.2.3 Global climate change

Question 01 · continued

4C Many scientists think that there is a close link between atmospheric carbon dioxide levels and global warming.
Some political leaders have taken no action to reduce carbon dioxide emissions.

One possible reason is that . . .

1 restrictions on industrial development might result.

2 their countries have few oil reserves.

3 they do not think that scientists are qualified to make important judgements.

4 they do not think that global warming will affect their country.

4D Concerns about carbon dioxide levels and global warming have increased research and technical development in some areas.

Which of these has **not** been part of this development?

1 the use of ethanol as a fuel in cars

2 the use of diesel oil instead of petrol in cars

3 the use of vegetable oils as a fuel in cars

4 the development of electric cars

4.9.2.3 Global climate change

Question 02

January 2008 | CHY1H | Original Q5 | Legacy

5 Since 2000 there has been a lot more research into alternative, environmentally-friendly fuels for road transport.
Several pollutants are found in the exhaust emissions produced when fossil fuels are used for road transport.

Carbon monoxide (CO) interferes with the way that red blood cells carry oxygen.
Carbon dioxide (CO_2) increases the level of carbon dioxide in the atmosphere and causes global warming.

Oxides of nitrogen (NO_x) are produced at high temperatures when nitrogen and oxygen from the atmosphere combine.

Sulfur dioxide (SO_2) is produced when sulfur impurities in the fuel combine with oxygen in the atmosphere.

Tiny particles of solids are produced when the fuel does not burn completely.
This increases the level of particulates (PM10) in the atmosphere.

(a) Name the environmental effect caused by:

(i) oxides of nitrogen (NO_x) and sulfur dioxide (SO_2)

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(1 mark)

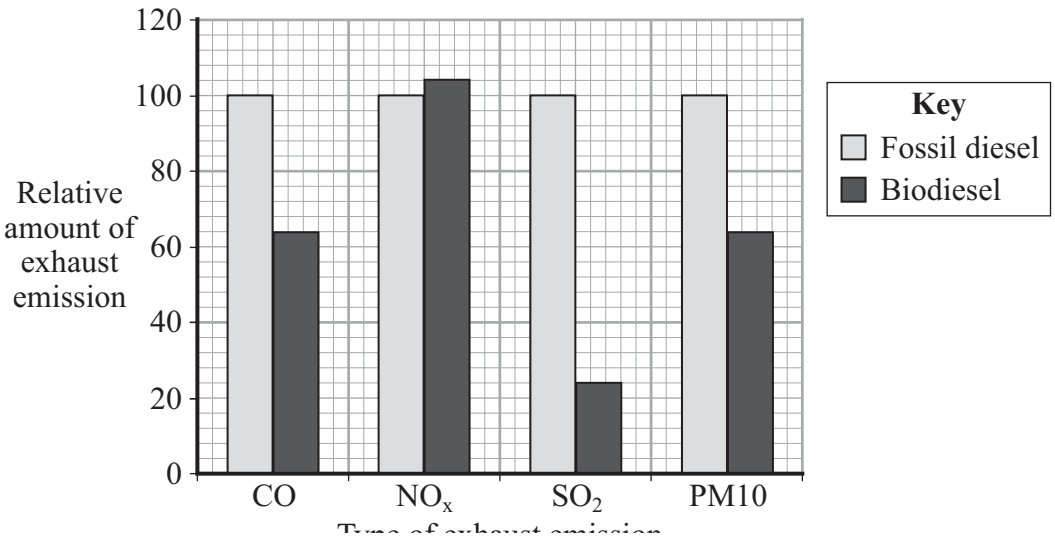
(ii) the increased level of particulates (PM10).

.....

(1 mark)

(b) Diesel obtained from crude oil is often called fossil diesel.
Biodiesel can be made from many vegetable oils.
One research project compared the exhaust emissions when fossil diesel or biodiesel were used as fuels.

Some of the relative amounts of these exhaust emissions are shown in the bar chart.



4.9.2.3 Global climate change

Question 02 · continued

BLANK

(i) Use your knowledge and the information opposite to explain the environmental benefits of using biodiesel as a sustainable, low pollution fuel.

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(3 marks)

(ii) Biodiesel is called a green fuel.

This is because the life-cycle emission of carbon dioxide from biodiesel is less than that from fossil diesel.

Use your knowledge and the information opposite to explain why biodiesel's contribution to global warming is considered to be much less than that of fossil diesel.

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(3 marks)

8

4.9.2.3 Global climate change

Question 03

March 2009 | CHY1AP | Original Q7 | Legacy

QUESTION SEVEN

Calcium carbonate decomposes on heating to give calcium oxide and carbon dioxide.

$$CaCO_3 \rightarrow CaO + CO_2$$

100 g of calcium carbonate, on complete decomposition, produces 56 g of calcium oxide.

If the carbon dioxide is not allowed to escape, it will recombine with the calcium oxide. This can happen at any temperature.

The carbon dioxide formed could be:

- used by oil companies
- used by ice-cream companies
- reacted with sodium hydroxide to make sodium carbonate for glass-making.

7A Calculate the mass of carbon dioxide that would be released by completely decomposing 400 tonnes of calcium carbonate.

(1 tonne = 1 000 000 g)

1 17.6 tonnes

2 22.4 tonnes

3 176.0 tonnes

4 224.0 tonnes

7B If calcium oxide is left exposed to the air, it will increase in mass.

Which of the following could **not** be the reason for this?

1 The calcium oxide is recombining with carbon dioxide from the air.

2 The calcium oxide is reacting with water from the air.

3 The calcium oxide is still thermally decomposing.

4 The calcium oxide is reverting back to calcium carbonate.

4.9.2.3 Global climate change

Question 03 · continued

7C A company makes calcium oxide from calcium carbonate.

The best way for this company to benefit economically, and at the same time reduce environmental damage, is to . . .

1 store the carbon dioxide in holes in the ground made by oil companies.

2 offer the carbon dioxide to oil companies so that they can use it to flush oil out of the ground.

3 sell solid carbon dioxide to ice-cream companies for keeping ice-cream cold.

4 sell the carbon dioxide to glass-making companies for conversion into sodium carbonate.

7D Graphs of global temperatures compared with the amount of carbon dioxide in the atmosphere over the past 50 years follow each other very closely.

The best conclusion that can be drawn from this is that . . .

1 burning fossil fuels causes global warming.

2 decomposing limestone causes global warming.

3 the heat from processing limestone causes global warming.

4 rising levels of carbon dioxide probably add to global warming.

4.9.2.3 Global climate change

Question 04

June 2009 | CHY1AP | Original Q6 | Legacy

QUESTION SIX

Two problems caused by the gases released when fossil fuels are burned are:

- acid rain, caused by sulfur dioxide and oxides of nitrogen
- global warming, caused by carbon dioxide.

Fuel manufacturers have introduced low-sulfur fuels to try to reduce the sulfur dioxide emissions.

6A Low-sulfur fuels were introduced in the UK in 2000. The amount of acid rain gases from transport increased from 2000 to 2004.

This increase could be due to . . .

1 the partial combustion of low-sulfur fuels.

2 an increasing number of vehicles on the UK's roads.

3 increasing emissions of carbon monoxide.

4 some sulfur dioxide not dissolving in rain water.

6B Carbon monoxide and oxides of nitrogen can be removed by a catalytic converter in the exhaust system of vehicles. The two gases, carbon monoxide (CO) and nitrogen dioxide (NO_2), react to produce carbon dioxide (CO_2) and nitrogen (N_2).

The balanced equation that correctly describes this reaction is . . .

1 $CO + NO_2 \rightarrow CO_2 + N_2$

2 $2CO + NO_2 \rightarrow 2CO_2 + N_2$

3 $3CO + 2NO_2 \rightarrow 3CO_2 + N_2$

4 $4CO + 2NO_2 \rightarrow 4CO_2 + N_2$

6C The conversion of carbon monoxide and nitrogen dioxide to carbon dioxide and nitrogen will . . .

1 decrease acid rain and decrease global warming.

2 decrease acid rain and increase global warming.

3 increase acid rain and increase global warming.

4 increase acid rain and decrease global warming.

4.9.2.3 Global climate change

6D Environmentalists have encouraged the use of hydrogen as a fuel instead of petrol because . . .

1 hydrogen is a renewable fuel obtained from sugar.

2 carbon monoxide is the main product of combustion.

3 no carbon dioxide is produced when hydrogen is burned.

4 hydrogen produces only low levels of sulfur dioxide when burned.

Turn over for the next question

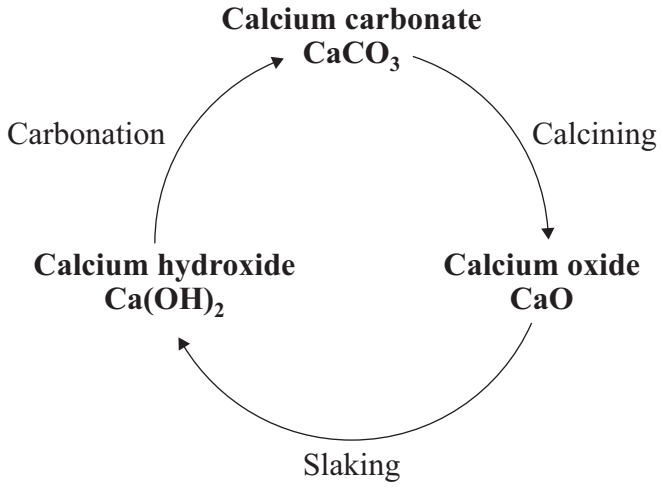
4.9.2.3 Global climate change

Question 05

November 2009 | CHY1AP | Original Q5 | Legacy

QUESTION FIVE

The diagram shows substances and processes in the lime cycle.



The words calcining, slaking and carbonation are used in the lime industry to name the processes involved.

5A What type of reaction is described as *calcining* in the diagram?

1 neutralisation

2 thermal decomposition

3 combustion

4 hydration

5B What substance reacts with calcium oxide during *slaking*?

1 carbon dioxide

2 calcium hydroxide

3 hydrogen

4 water

4.9.2.3 Global climate change

Question 05 · continued

5C Which of the following is the correct equation for *carbonation*?

1 $Ca(OH)_2 \rightarrow CaCO_3 + H_2O$

2 $CaCO_3 \rightarrow CaO + CO_2$

3 $CaO + H_2O \rightarrow Ca(OH)_2$

4 $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

5D Which of the following parts of the lime cycle contributes to global warming?

1 calcining

2 slaking

3 carbonation

4 slaking and carbonation

Turn over for the next question

4.9.2.3 Global climate change

Question 06

June 2016 | CH1HP | Original Q5 | Legacy

5 This question is about vegetable oils.

5 (a) Explain why using vegetable oils as biofuels does **not** increase global warming.

[3 marks]

5 (b) Describe how **and** explain why vegetable oils are hardened for use in foods.

[5 marks]

8

4.9.2.3 Global climate change

Question 07

June 2023 | 8462/2H | Original Q4

0 4 This question is about greenhouse gases and climate change.

Carbon dioxide and methane are greenhouse gases.

0 4 . 1 Which of the following is also a greenhouse gas?

[1 mark]

Tick (✓) **one** box.

Chlorine ☐

Nitrogen ☐

Oxygen ☐

Water vapour ☐

In the past 50 years, there has been an increase in:

- the world population
- the concentration of carbon dioxide in the atmosphere
- the concentration of methane in the atmosphere
- the mean temperature of the atmosphere at the Earth's surface.

Most scientists think this information can be used to explain climate change.

0 4 . 2 Explain why the increase in world population may have caused the increase in the concentration of carbon dioxide in the atmosphere.

[2 marks]

4.9.2.3 Global climate change

Question 07 · continued

0 4 . 3 Explain why the increase in world population may have caused the increase in the concentration of methane in the atmosphere.

[2 marks]

0 4 . 4 Describe **two** potential effects of the increase in the mean temperature of the atmosphere at the Earth's surface.

[2 marks]

1

2

0 4 . 5 The mean temperature of the atmosphere at the Earth's surface has increased.

Most scientists think that this has been caused by an increase in the concentration of greenhouse gases in the atmosphere.

Give **one** reason why some scientists do **not** accept this theory.

[1 mark]

8