AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.9.1.3

How oxygen increased

Past-paper questions

Tier	**Higher**
Question groups	**8**
Available paper years	**2007–2025**

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.

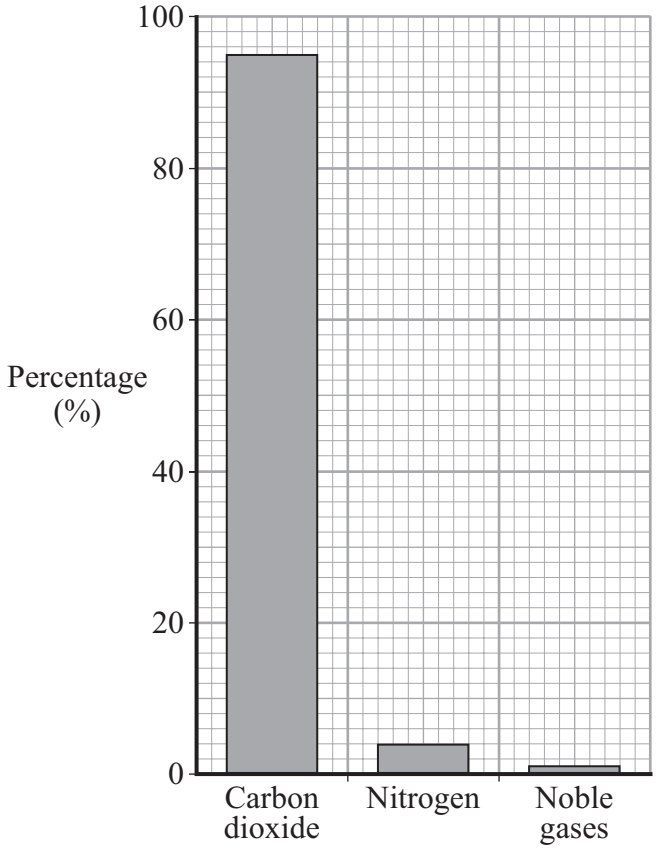
4.9.1.3 How oxygen increased

Question 01

June 2007 | CHY1B | Original Q5 | Legacy

QUESTION FIVE

The bar chart shows the composition of a sample of the atmosphere on Mars.



5A Earth's early atmosphere also contained a high percentage of carbon dioxide.

Scientists think that most of the carbon dioxide . . .

1 came out of solution from the oceans.

2 was released from volcanoes.

3 was given off as carbonate rocks decomposed.

4 was released as fossil fuels formed.

5B One way in which Earth's atmosphere today is different from that on Mars is that the Earth's atmosphere.. . .

1 contains less nitrogen.

2 contains more carbon dioxide.

3 does not contain noble gases.

4 contains more water vapour.

4.9.1.3 How oxygen increased

Question 01 · continued June 2007 | CHY1B | Original Q5 | Legacy

5C The first plants are thought to have appeared on Earth about 2 billion years ago.

What effect did the plants have on the Earth's atmosphere?

1 They increased the percentage of carbon dioxide.

2 They decreased the percentage of nitrogen.

3 They increased the percentage of oxygen.

4 They increased the percentage of ammonia.

5D Filament lamps are normally filled with a noble gas.

The metal filament in a lamp would quickly burn away if the bulb was filled with air because air contains . . .

1 carbon dioxide.

2 nitrogen.

3 oxygen.

4 ammonia.

4.9.1.3 How oxygen increased

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)

.....

(1 mark)

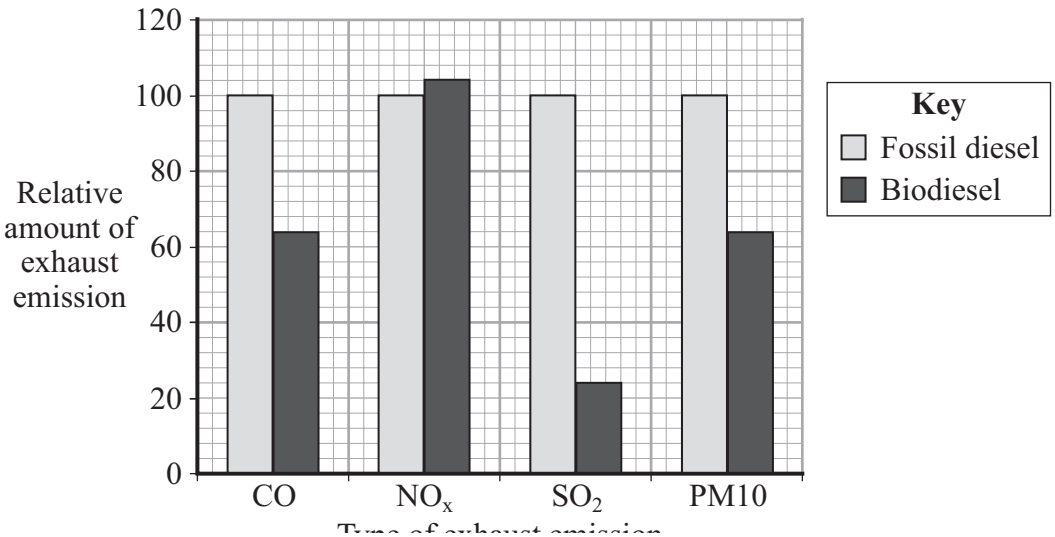
(ii) the increased level of particulates (PM10).

.....

(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.



4.9.1.3 How oxygen increased

Question 02 · continued

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

.....

.....

.....

.....

.....

.....

(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.

.....

.....

.....

.....

.....

.....

(3 marks)

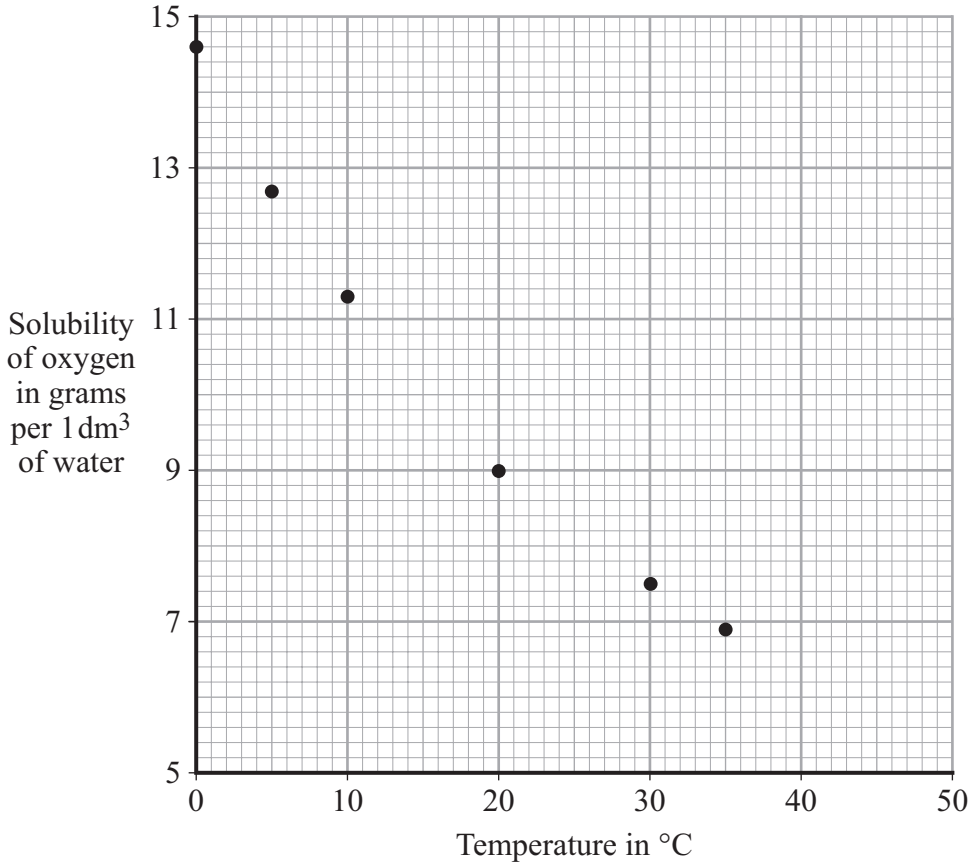
8

4.9.1.3 How oxygen increased

Question 03

January 2008 | CHY3H | Original Q2 | Legacy

2 The points on the graph show the mass of oxygen that dissolves in 1 dm^3 of water at different temperatures.



Use the graph to answer the following questions.

(a) (i) Draw a smooth curve through the points, extending your curve to 50 °C.

(1 mark)

(ii) Use your curve to estimate the mass of oxygen that dissolves in 1 dm^3 of water at 50 °C.

Mass = ... g

(1 mark)

4.9.1.3 How oxygen increased

Question 03 · continued

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(iii) What mass of oxygen gas comes out of 1 dm^3 of water when the temperature increases from 15 °C to 50 °C?

.....

.....

Mass = ... g

(2 marks)

(iv) A student claimed that they were more sure of the value at 15 °C than the value at 50 °C.

Do you agree? Explain the reason for your answer.

.....

.....

(1 mark)

Question 2 continues on the next page

4.9.1.3 How oxygen increased

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(b) Read the following information and then answer the questions.

> Dissolved oxygen is essential for aquatic life. For example, trout need about 7 g/dm^3 of dissolved oxygen. They can live in concentrations down to about 5 g/dm^3 for short periods but are likely to die if the water temperature is above 26 °C.
>
> The amount of oxygen dissolved in water depends on many factors, including whether it is summer or winter, day or night. Factors such as photosynthesis and the action of wind add oxygen to water. Respiration of aquatic plants at night, decomposition of organic matter and higher temperatures remove oxygen.
>
> The management of a factory wants to put small amounts of waste hot water at 50 °C directly into a lake that contains trout. The local council has objected to this proposal and there is to be an Independent Public Enquiry.

(i) Suggest why it is important to have an Independent Public Enquiry into adding hot water to this lake.

.....

.....

(1 mark)

(ii) Suggest how the experience and status of the people giving evidence at the Public Enquiry could influence the final decision.

.....

.....

(1 mark)

4.9.1.3 How oxygen increased

Question 03 · continued

BLANK

(iii) At the Public Enquiry, the factory management and the council gave their opinions. Suggest what these opinions were by completing the sentences.

The factory management said that there was **no** risk to the trout because .....

.....

.....

.....

The council said that there **was** a risk to the trout because .....

.....

.....

.....

(2 marks)

9

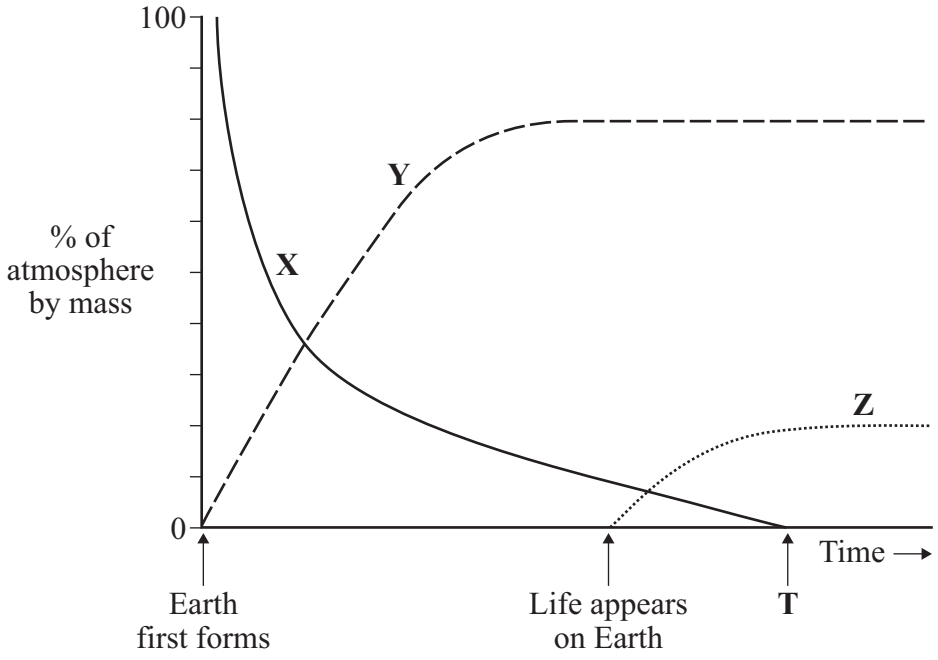
4.9.1.3 How oxygen increased

Question 04

March 2008 | CHY1BP | Original Q7 | Legacy

QUESTION SEVEN

The diagram below shows how the levels of nitrogen, oxygen and carbon dioxide in the Earth's atmosphere have changed with time.



7A What is the ratio, by mass, of gas **Z** to gas **Y** at time **T**?

1 1:4

2 1:5

3 4:1

4 5:1

7B Which one of the following correctly matches the lines on the graph?

1 **X** is carbon dioxide, **Y** is nitrogen and **Z** is oxygen

2 **X** is oxygen, **Y** is nitrogen and **Z** is carbon dioxide

3 **X** is nitrogen, **Y** is oxygen and **Z** is carbon dioxide

4 **X** is carbon dioxide, **Y** is oxygen and **Z** is nitrogen

4.9.1.3 How oxygen increased

Question 04 · continued March 2008 | CHY1BP | Original Q7 | Legacy

7C During the last 200 million years, . . .

1 the burning of fossil fuels has decreased the proportion of oxygen in the Earth's atmosphere.

2 intense volcanic activity has substantially changed the atmosphere of the Earth.

3 the percentage of carbon dioxide in the Earth's atmosphere has decreased considerably.

4 the proportion of nitrogen in the Earth's atmosphere has remained fairly constant.

7D It is thought that there is no oxygen in the atmosphere of the planet Venus.

This is because . . .

1 animals used it up in respiration.

2 it is locked up in sedimentary rocks.

3 it is locked up in fossil fuels.

4 there are no plants to produce it by photosynthesis.

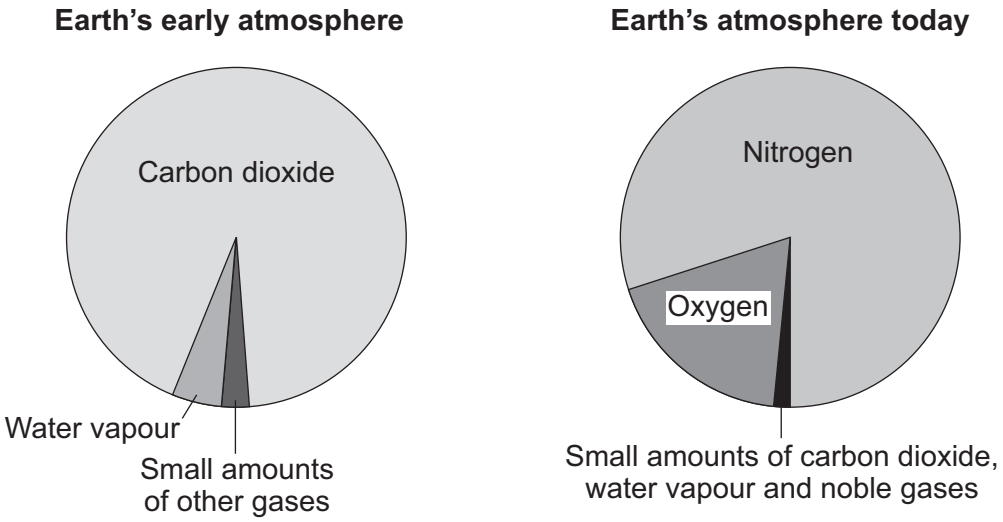
4.9.1.3 How oxygen increased

Question 05

June 2011 | CHY1BP | Original Q3 | Legacy

QUESTION THREE

The pie charts show the amounts of gases in the Earth's early atmosphere and in the Earth's atmosphere today.



3A Very small amounts of a hydrocarbon gas are thought to have been in the Earth's early atmosphere.

This gas is . . .

1 ammonia, NH_3

2 helium, He

3 methane, CH_4

4 oxygen, O_2

4.9.1.3 How oxygen increased

Question 05 · continued

3B As the Earth's early atmosphere was forming, it contained water vapour.

Which row in the table shows where the water vapour came from **and** why the quantity in the atmosphere reduced?

	Water vapour came from	Water vapour reduced because
1	evaporation from the ground.	it condensed to form the oceans.
2	evaporation from the ground.	there was less rainfall.
3	volcanic activity.	it condensed to form the oceans.
4	volcanic activity.	there was less rainfall.

3C Why was there no oxygen in the Earth's early atmosphere?

1 There was no carbon dioxide for the plants to use to make oxygen.

2 Living organisms had used up the oxygen.

3 There were no plants on Earth.

4 Oxygen is a very reactive gas.

3D The quantity of carbon dioxide in the Earth's atmosphere today is very different from the quantity that was in the Earth's early atmosphere.

One of the reasons why it is very different is that . . .

1 there are a lot of cars on our roads today.

2 it is locked up as carbon in fossil fuels.

3 most homes use fossil fuels for central heating.

4 plants produce carbon dioxide by photosynthesis.

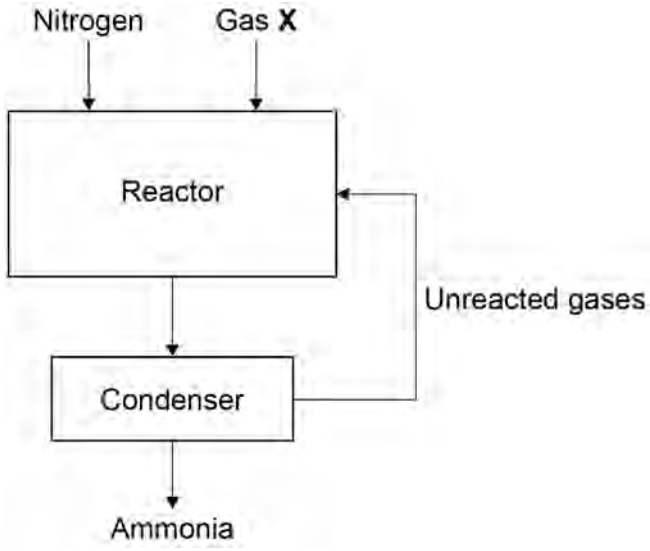
4.9.1.3 How oxygen increased

Question 06

0 3 This question is about gases.

Figure 3 shows how nitrogen is used in the Haber Process to produce ammonia.

Figure 3



0 3 . 1 Gas **X** in **Figure 3** is obtained from methane.

Name gas **X**.

[1 mark]

_____

0 3 . 2 Give the approximate temperature and pressure used in the reactor.

[2 marks]

Temperature _____

Pressure _____

0 3 . 3 The mixture of gases from the reactor cools in the condenser.

Suggest why ammonia condenses but the other gases do not.

[1 mark]

_____

_____

4.9.1.3 How oxygen increased

Question 06 · continued

The Earth's early atmosphere was different to Earth's atmosphere today.

Scientists think that the Earth's early atmosphere was like the atmosphere found on Venus today.

Table 2 shows the amounts of carbon dioxide and oxygen in the atmospheres of Venus and Earth today.

Table 2

Gas	Percentage (%) in Venus' atmosphere today	Percentage (%) in Earth's atmosphere today
Carbon dioxide	96.50	0.04
Oxygen	0.00	20.95

0 3 . 4 The percentages of carbon dioxide and oxygen have changed from Earth's early atmosphere to Earth's atmosphere today.

Explain the processes that led to these changes.

[6 marks]

4.9.1.3 How oxygen increased

Question 06 · continued

0 3 . 5 Why are scientists **not** certain about the percentage of each gas in the Earth's early atmosphere?

[1 mark]

11

Turn over for the next question

4.9.1.3 How oxygen increased

Question 07

June 2023 | 8462/2H | Original Q7

0 7 Manganese dioxide catalyses the decomposition of hydrogen peroxide solution.

Oxygen and water are produced.

0 7 . 1 Explain how a manganese dioxide catalyst increases the rate of decomposition of hydrogen peroxide.

[2 marks]

A student investigated the rate of this reaction.

This is the method used.

1. Add 50 cm^3 of 2.0 mol/dm^3 hydrogen peroxide solution to a conical flask.

2. Add 1.0 g of manganese dioxide to the conical flask.

3. Place the conical flask on a balance and start a timer.

4. Record the total mass lost from the conical flask every 20 seconds for 180 seconds.

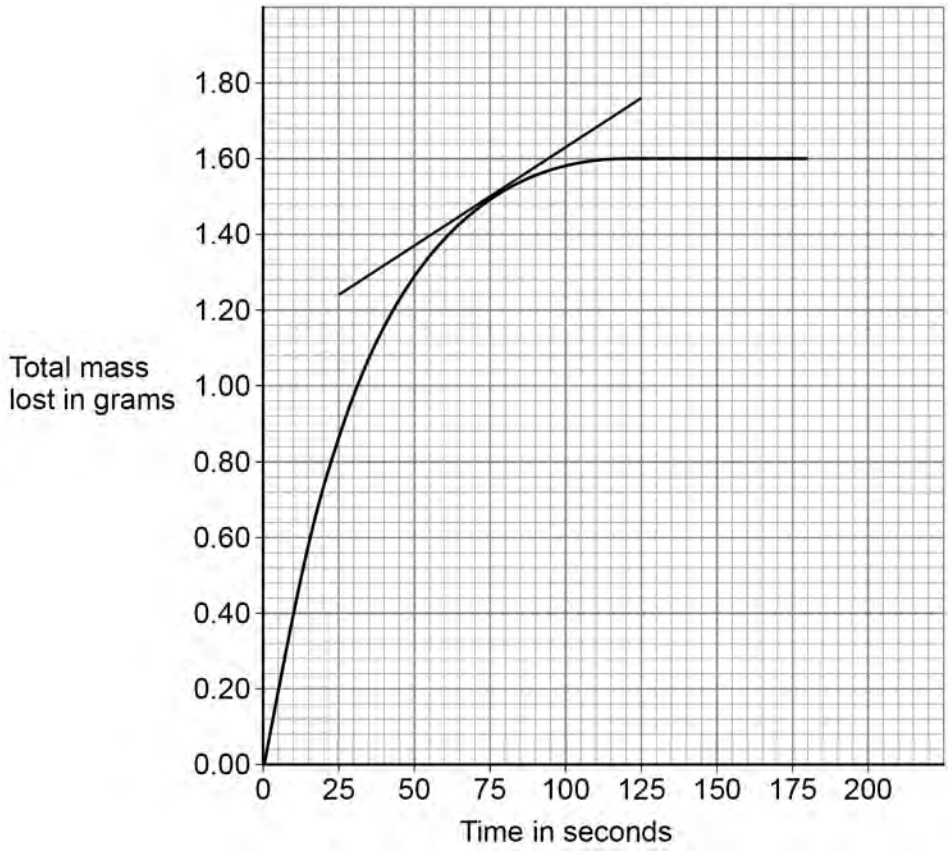
0 7 . 2 Explain why the mass of the conical flask and contents decreased.

[2 marks]

0 7 . 3 **Figure 4** shows the results for 50 cm^3 of 2.0 mol/dm^3 hydrogen peroxide solution and 1.0 g of manganese dioxide.

A tangent to the line has been drawn at 75 seconds.

Figure 4



Determine the rate of reaction when the time was 75 seconds.

Give your answer to 2 significant figures.

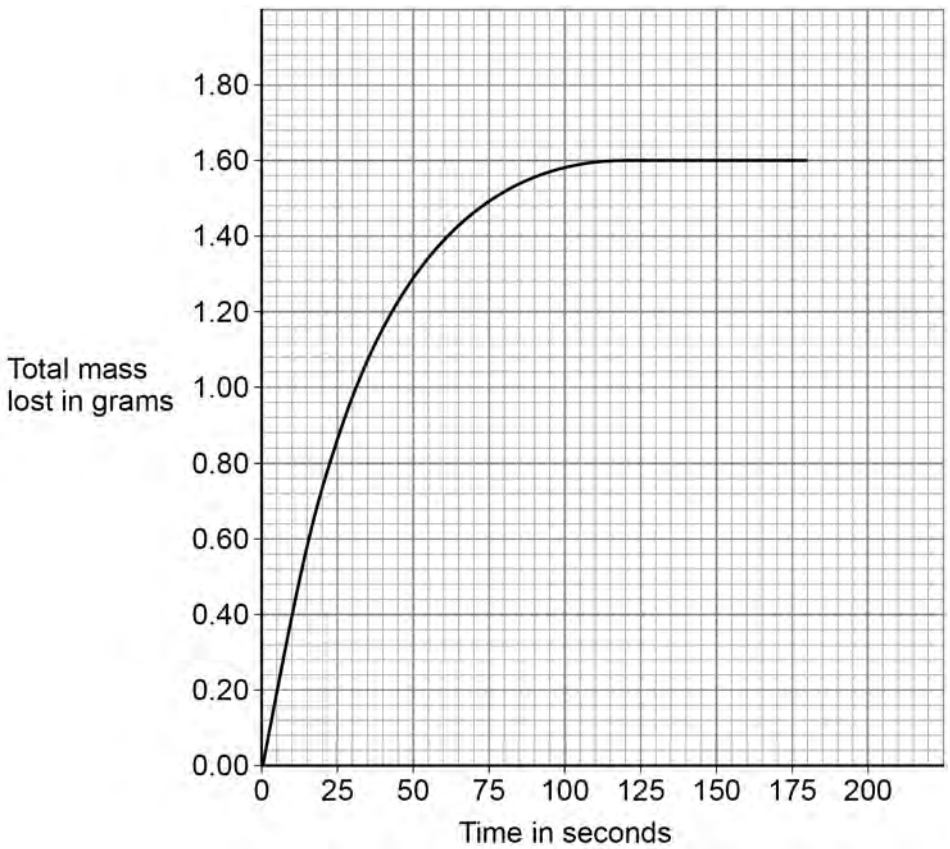
[4 marks]

Rate (2 significant figures) = _____ g/s

4.9.1.3 How oxygen increased

0 7 . 4 The results for 50 cm^3 of 2.0 mol/dm^3 hydrogen peroxide solution and 1.0 g of manganese dioxide are shown again on **Figure 5**.

Figure 5



The student repeated the investigation using 50 cm^3 of 1.0 mol/dm^3 hydrogen peroxide solution and 1.0 g of manganese dioxide.

Sketch the expected results for 1.0 mol/dm^3 hydrogen peroxide solution on **Figure 5**.

[2 marks]

10

4.9.1.3 How oxygen increased

Question 08

0 4 The Earth's atmosphere has changed over time.

0 4 . 1 Explain how the percentage of nitrogen changed in the Earth's early atmosphere.

[2 marks]

0 4 . 2 **Table 4** shows the percentage (%) of carbon dioxide present in the Earth's early atmosphere.

Table 4

Time in billions of years ago	Percentage (%) of carbon dioxide in the Earth's early atmosphere
4.5	98
4.0	54
3.5	30
3.0	21

The percentage of carbon dioxide in the Earth's **early** atmosphere changed between 4.5 billion and 3.0 billion years ago.

Give **two** reasons why.

[2 marks]

1

2

4.9.1.3 How oxygen increased

Question 08 · continued

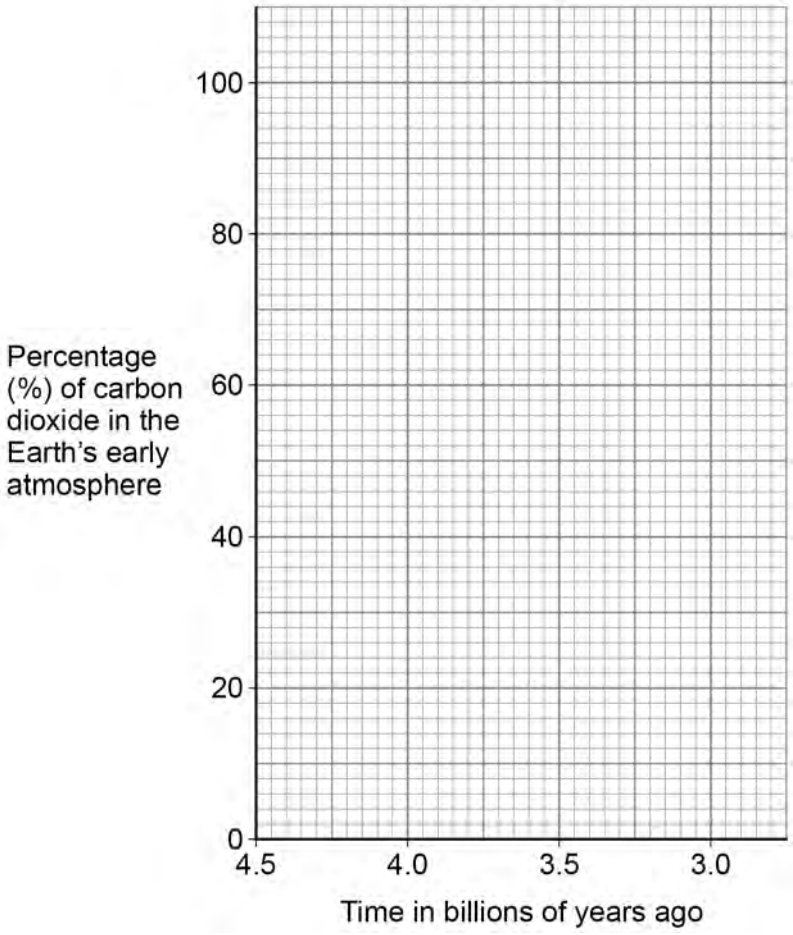
0 4 . 3 Complete **Figure 3**.

You should:

- plot the data in **Table 4**
- draw a line of best fit.

[2 marks]

Figure 3



Question 4 continues on the next page

0 4 . 4 **Table 5** shows information about the percentage (%) of carbon dioxide and of oxygen present in the Earth's atmosphere over time.

Table 5

Time in billions of years ago	Percentage (%) of gas in the Earth's atmosphere	
	Carbon dioxide	Oxygen
2.5	18	1
2.0	15	2
1.5	10	8
1.0	3	17
0.5	1	19

The percentages of carbon dioxide and of oxygen in the Earth's atmosphere changed between 2.5 billion and 0.5 billion years ago.

Explain how.

[3 marks]

9