

C12 The Earth's Atmosphere Homework task 1

Q1.

This question is about the atmospheres of Earth and Mars.

- (a) Earth's early atmosphere may have been like the atmosphere of Mars today.

Why are scientists **not** certain about the percentage of gases in the Earth's early atmosphere?

(1)

- (b) What was formed from the water vapour in the Earth's early atmosphere?

Tick (✓) **one** box.

Crude oil

Limestone

Natural gas

Oceans

(1)

The table below shows the percentage of some gases in the atmospheres of Earth and Mars.

Gas	Percentage of gas in atmosphere (%)	
	Earth	Mars
Argon	0.9	1.9
Carbon dioxide	0.04	95
Nitrogen	78	2.6
Oxygen	21	0.2

(c) Why are animals **not** able to live on Mars?

Tick (✓) **one** box.

The atmosphere of Mars does not contain enough argon.

The atmosphere of Mars does not contain enough nitrogen.

The atmosphere of Mars does not contain enough oxygen.

(1)

(d) There is more carbon dioxide on Mars than on Earth.

Which **other** gas is found in larger quantities on Mars than on Earth?

(1)

(e) Calculate how many times more nitrogen than oxygen there is in the atmosphere of Earth.

Use the table above.

Give your answer to 2 significant figures.

Number of times more nitrogen than oxygen (2 significant figures) = _____

(3)

(Total 7 marks)

Q2.

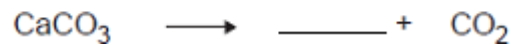
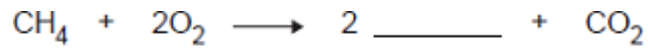
The amount of carbon dioxide in the Earth's atmosphere has changed since the Earth was formed.

The amount of carbon dioxide continues to change because of human activities.

- (a) Cement is produced when a mixture of calcium carbonate and clay is heated in a rotary kiln. The fuel mixture is a hydrocarbon and air.

Hydrocarbons react with oxygen to produce carbon dioxide.
Calcium carbonate decomposes to produce carbon dioxide.

- (i) Complete each chemical equation by writing the formula of the other product.



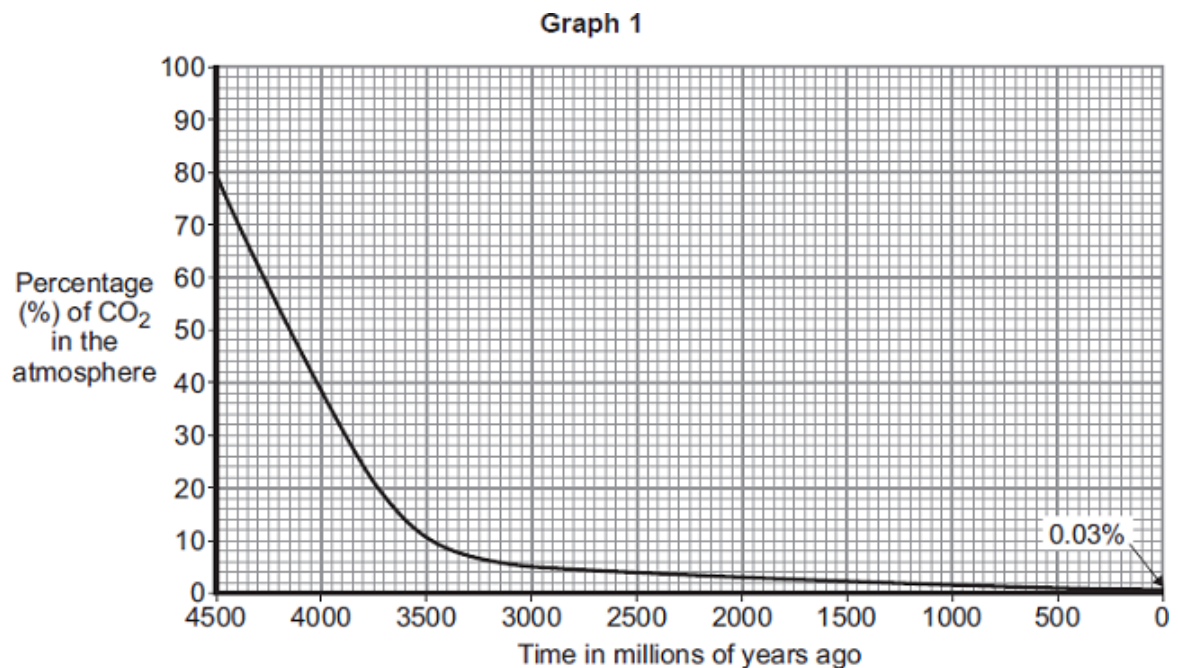
(2)

- (ii) Hydrocarbons and calcium carbonate contain *locked up* carbon dioxide.

What is *locked up* carbon dioxide?

(2)

- (b) **Graph 1** shows how the percentage of carbon dioxide in the atmosphere changed in the last 4500 million years.



Use information from **Graph 1** to answer these questions.

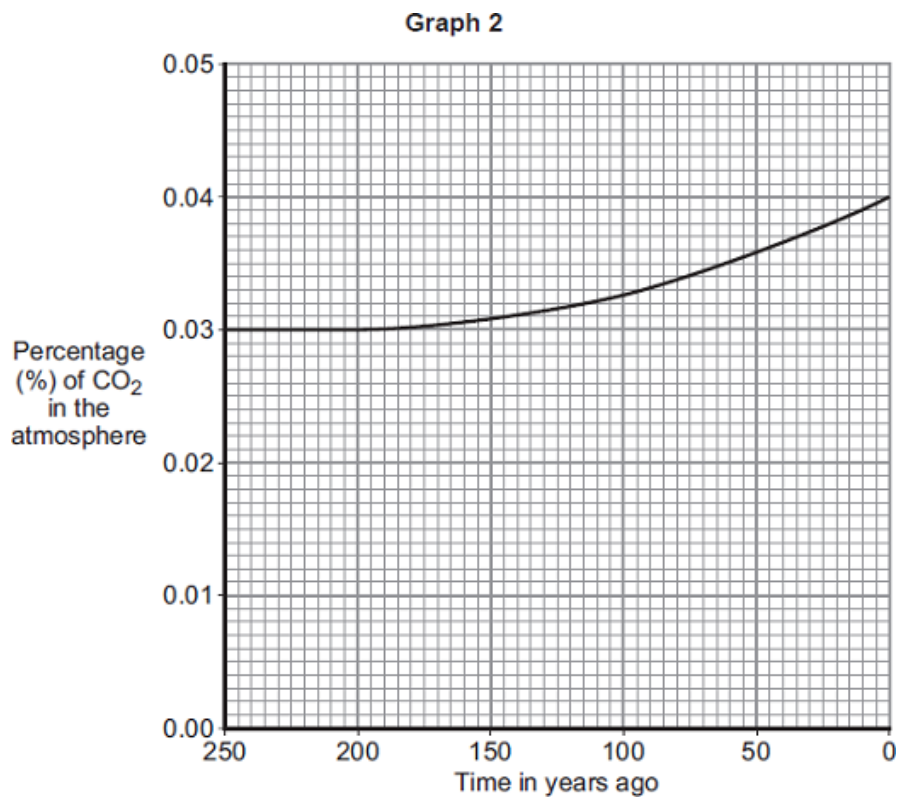
- (i) Describe how the percentage of carbon dioxide has changed in the last 4500 million years.

(2)

- (ii) Give **two** reasons why the percentage of carbon dioxide has changed.

(2)

- (c) **Graph 2** shows how the percentage of carbon dioxide in the atmosphere changed in the last 250 years.



Should we be concerned about this change in the percentage of carbon dioxide?

Explain your answer.

(2)

(Total 10 marks)

HIGHER TIER QUESTIONS

Q3.

This question is about life, the Earth and its atmosphere.

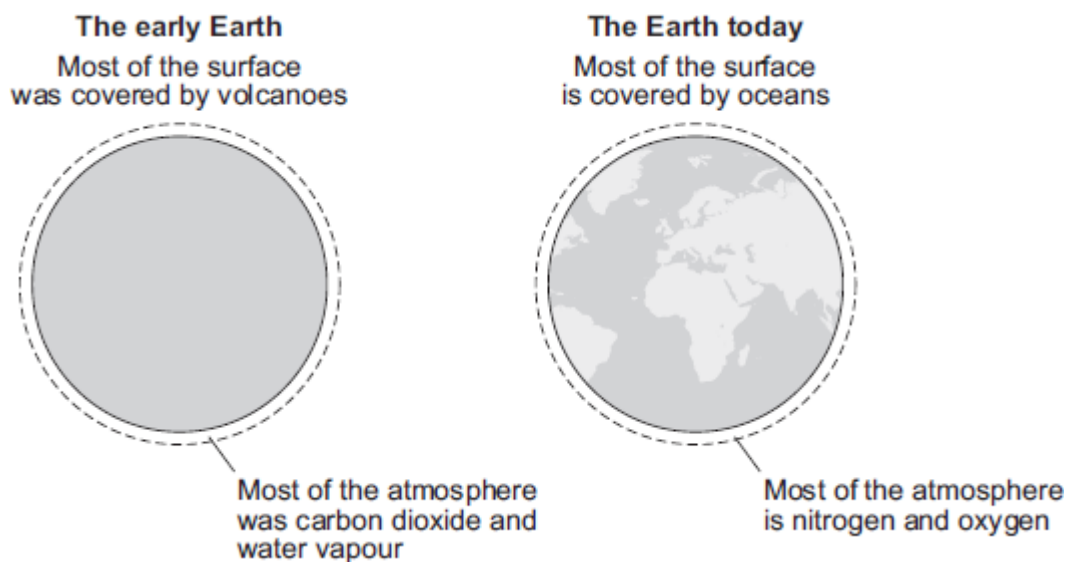
- (a) There are many theories about how life was formed on Earth.

Suggest **one** reason why there are many theories.

(1)

- (b) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

This Earth and its atmosphere today are not like the early Earth and its atmosphere.



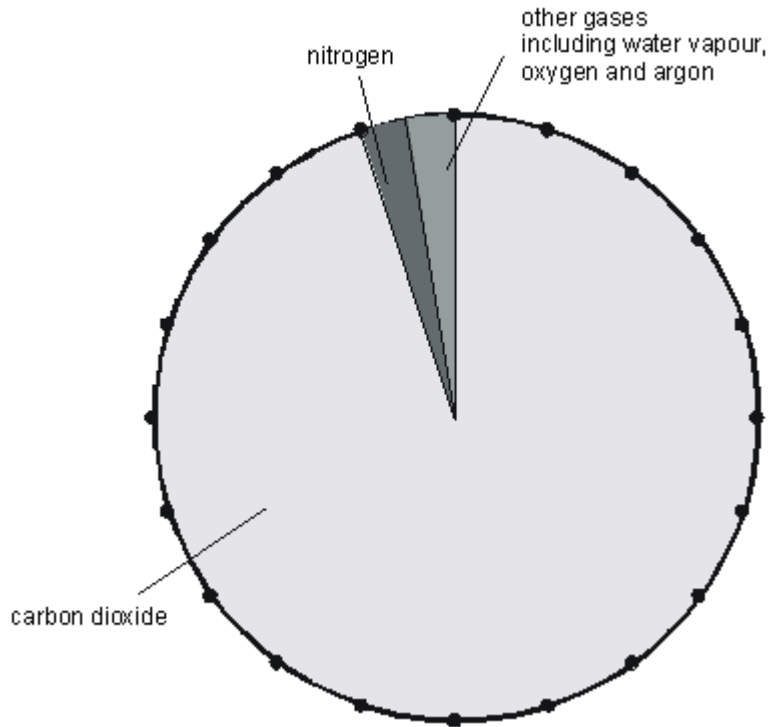
Describe and explain how the surface of the early Earth and its atmosphere have changed to form the surface of the Earth and its atmosphere today.

(6)

(Total 7 marks)

Q4.

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.

%

(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. _____

2. _____

(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.

(4)

(Total 8 marks)

Mark schemes

Q1.

- (a) any **one** from:
- occurred (4.6) billion years ago
 - limited evidence
- ignore nobody was there ignore no proof*
- 1
- (b) oceans
- 1
- (c) the atmosphere of Mars does not contain enough oxygen
- 1
- (d) argon
- allow Ar*
- 1
- (e) $\frac{78}{21}$
- = 3.714
- do **not** accept a subsequent step in the calculation*
- 1
- = 3.7
- allow an answer correctly calculated to 2 significant figures which uses the values in the question*
- 1
- [7]

Q2.

- (a) (i) H₂O
- must be formula*
- 1
- CaO
- must be formula*
- 1
- (ii) carbon dioxide from the air / (Earth's early) atmosphere
- it = carbon (dioxide)*
- accept carbon dioxide from millions of years ago*
- 1
- formed (sedimentary) rocks **or** fossil fuels
- ignore trapped / stored*
- 1
- (b) (i) decreases rapidly at first

it = carbon (dioxide)

1

then slowly **or** levels off

allow both marks if the description is correct using either 'rapidly' or 'slowly'

allow correct use of figures for either marking point

if no other mark awarded, allow CO₂ decreased for 1 mark

1

(ii) any **two** from:

it = carbon (dioxide)

accept photosynthesis

- used by plants
- dissolved in oceans
- 'locked up' in fossil fuels **or** formed fossil fuels
- 'locked up' in rocks **or** formed rocks

2

(c) (yes)

it = percentage of carbon (dioxide)

ignore yes or no

because the percentage of carbon dioxide is increasing

1

which causes global warming (to increase)

allow (carbon dioxide) causes greenhouse effect/climate change

1

or

(no)

because the percentage of carbon dioxide is low (1)

compared to millions of years ago (1)

allow global warming can be caused by other factors (e.g. Sun / water vapour / methane)

[10]

Q3.

(a) any **one** from:

- not enough evidence or proof
allow no evidence or no proof
- (life and the Earth were created) billions of years ago
allow a long time ago
ignore different beliefs or no one was there.

1

- (b) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking Guidance and apply a 'best-fit' approach to the marking.

0 marks

No relevant content

Level 1 (1–2 marks)

Statements based on diagrams

Level 2 (3–4 marks)

Description of how one change occurred

Level 3 (5–6 marks)

Descriptions of how at least two changes occurred

Examples of chemistry points made in the response could include:

Main changes

- oxygen increased because plants / algae developed and used carbon dioxide for photosynthesis / growth producing oxygen; carbon dioxide decreased because of this
- carbon dioxide decreased because oceans formed and dissolved / absorbed carbon dioxide; carbon dioxide became locked up in sedimentary / carbonate rocks and / or fossil fuels
- oceans formed because the Earth / water vapour cooled and water vapour in the atmosphere condensed
- continents formed because the Earth cooled forming a supercontinent / Pangaea which formed the separate continents
- volcanoes reduced because the Earth cooled forming a crust.

Other changes

- nitrogen has formed because ammonia in the Earth's early atmosphere reacted with oxygen / denitrifying bacteria.

6

[7]

Q4.

- (a) 95% (1 mark for working) 2
- (b) Much less carbon dioxide
Much more nitrogen 2
- (c) Plants take up CO₂
plants give out oxygen
when they die trap CO₂ in rocks and fossil fuels
methane and ammonia reacted with oxygen
nitrogen gas produced
by reaction of oxygen and ammonia
and by denitrifying bacteria
formation of ozone layer
any 4 for 1 mark each

4

