

Name:

Date:

C9 - Test 4
ATMOSPHERE
Intermediate

GCSE

CHEMISTRY

AQA - Triple Science

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

Information

- The marks for the questions are shown in brackets

1.

(a) Burning fuels changes the Earth's atmosphere. The new substances produced are mainly gases.

The following is a list of types of reaction.

combustion **cracking** **electrolysis**
fermentation **neutralisation** **reduction**

Choose, from the list, the word which has the same meaning as burning.

(1)

(b) The table shows the gases formed when four fuels, **A** to **D**, are completely burned in air.

FUEL	GAS FORMED ON BURNING		
	CARBON DIOXIDE CO ₂	WATER VAPOUR H ₂ O	SULPHUR DIOXIDE SO ₂
A	✓	✓	✗
B	✗	✓	✗
C	✓	✗	✗
D	✓	✓	✓

Which fuel, **A** to **D**, is hydrogen, H₂? _____

(1)

(Total 2 marks)

2.

Read the passage, which is from the start of a magazine article. It will help you to answer the questions.

Third rock from the Sun

Geologists now have evidence that the Earth's crust began to form about four and a half billion years ago. The surface of the Earth was then at temperatures well above 100 °C and the atmosphere was mostly carbon dioxide with some ammonia, methane and water vapour. About a quarter of a billion years after it had first formed, the crust had become thicker and had cooled down to below 100 °C.

Slowly, over a period of about three billion years, oxygen became established in the atmosphere. Some was released from the Earth's interior by volcanoes and some was produced, by the process of photosynthesis, by algae which had evolved in the seas.

(a) Explain how the first seas formed.

(2)

(b) Briefly describe **two** processes which reduced the proportion of carbon dioxide in the Earth's atmosphere over the period of three billion years.

1. _____

2. _____

(2)

(Total 4 marks)

3. 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)

4.

A mixture of petrol and air is burned in a car engine.
Petrol is a mixture of alkanes. Air is a mixture of gases.

The tables give information about the composition of petrol and the composition of air.

Petrol		Air	
Alkane	Formula	Gas	Percentage (%)
hexane	C_6H_{14}	nitrogen	78
heptane		oxygen	21
octane	C_8H_{18}	carbon dioxide	0.035
nonane	C_9H_{20}	Small amounts of other gases and water vapour	
decane	$C_{10}H_{22}$		

(a) Use the information above to answer these questions.

(i) Give the formula for heptane

(1)

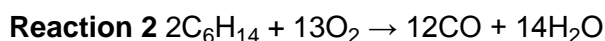
(ii) Complete the general formula of alkanes.
n = number of carbon atoms



(1)

(b) Alkanes in petrol burn in air.

The equations represent two reactions of hexane burning in air.



Reaction 2 produces a different carbon compound to **Reaction 1**.

(i) Name the carbon compound produced in **Reaction 2**.

(1)

(ii) Give a reason why the carbon compounds produced are different.

(1)

(c) The table shows the percentages of some gases in the exhaust from a petrol engine.

Name of gas	Percentage (%)
nitrogen	68
carbon dioxide	15
carbon monoxide	1.0
oxygen	0.75
nitrogen oxides	0.24
hydrocarbons	0.005
sulfur dioxide	0.005
other gases	

(i) What is the percentage of the other gases in the table?

(1)

(ii) What is the name of the compound that makes up most of the other gases?

(1)

(iii) Give a reason why sulfur dioxide is produced in a petrol engine.

(1)

(iv) State how nitrogen oxides are produced in a petrol engine.

(2)

- (d) Many scientists are concerned about the carbon dioxide released from burning fossil fuels such as petrol.

Explain why.

(2)

(Total 11 marks)

5.

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

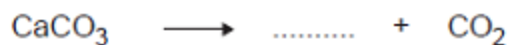
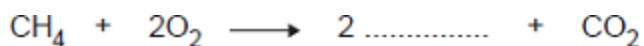
The amount of carbon dioxide continues to change because of human activities.

- (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.



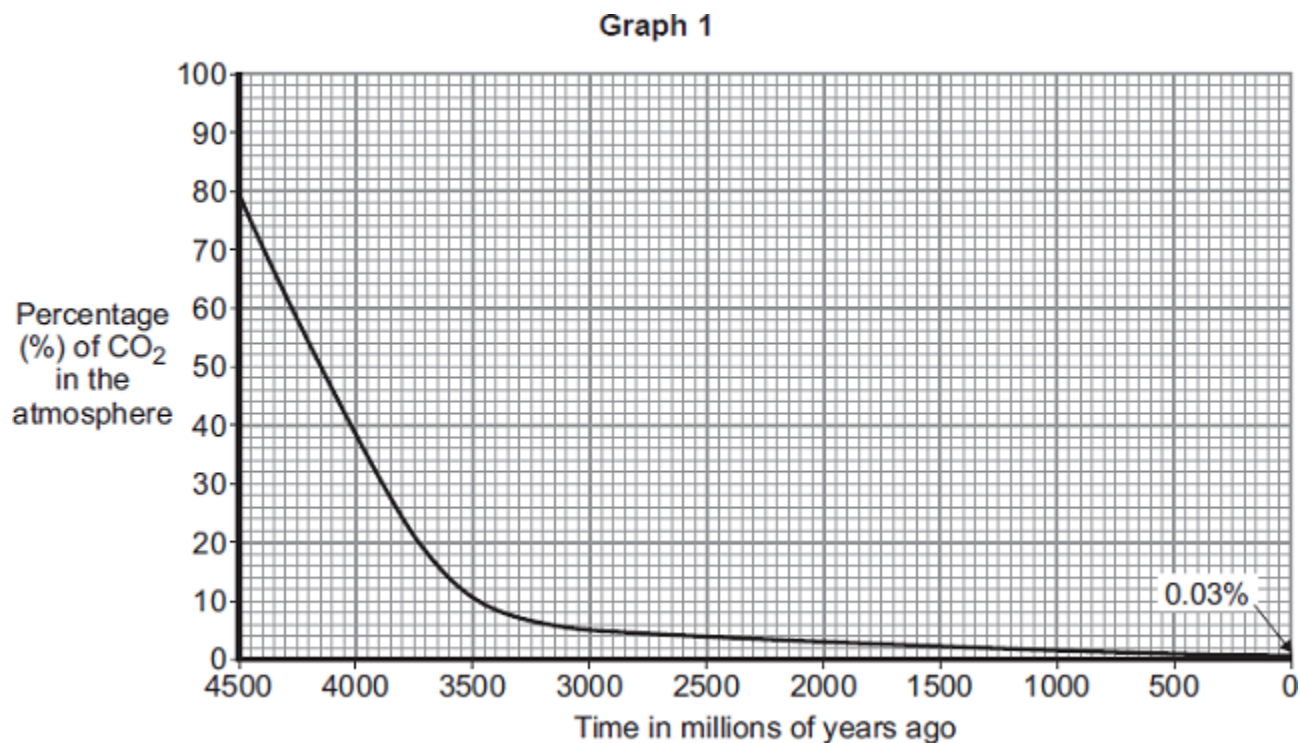
(2)

- (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.

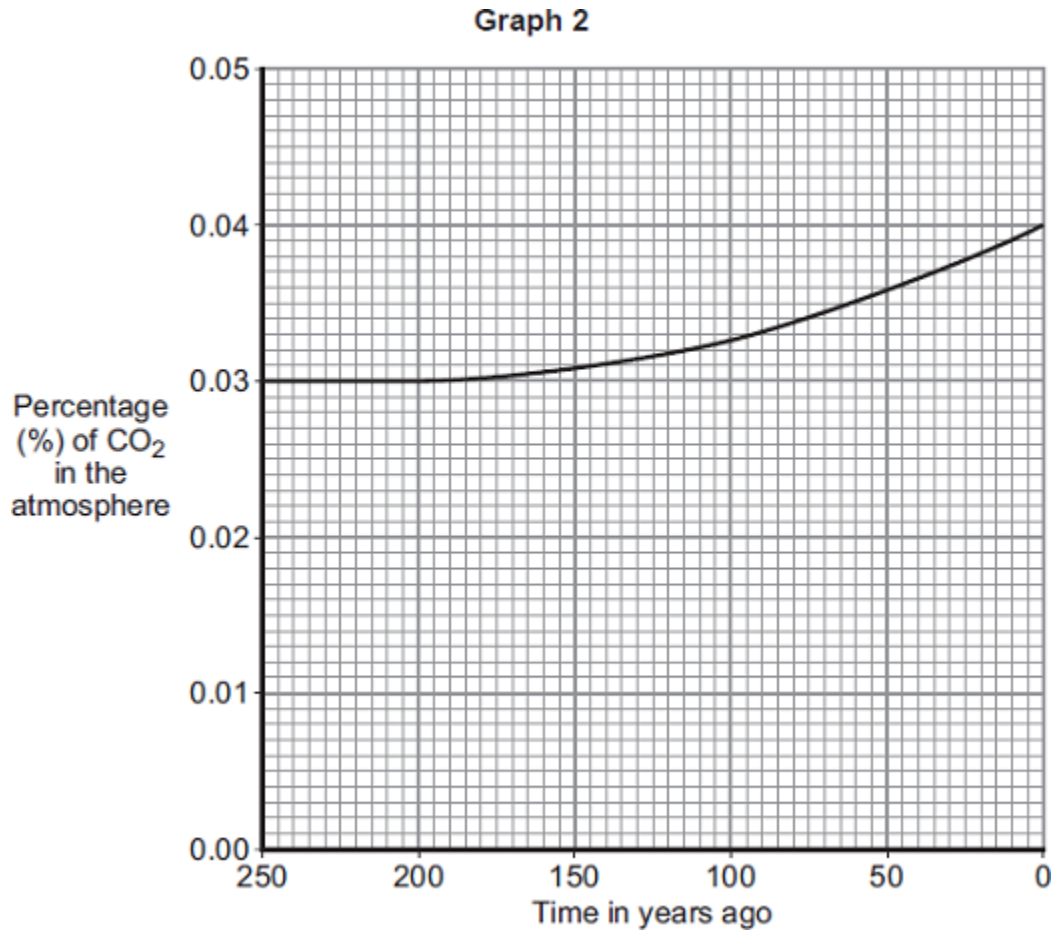
- (i) Describe how the percentage of carbon dioxide has changed in the last 4500 million years.

(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?

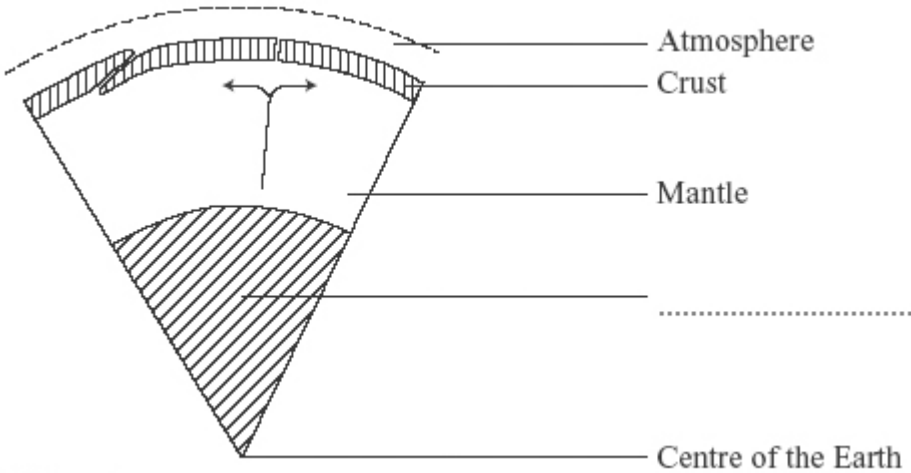
Explain your answer.

(2)
(Total 10 marks)

6.

The Earth is shaped like a sphere and is surrounded by an atmosphere.

(a) The diagram shows a section of the layered structure of the Earth.



Not to scale

(i) Complete the diagram by writing in the missing label.

(1)

(ii) Earthquakes within the Earth's crust can be sudden and disastrous. Scientists cannot accurately predict when earthquakes will occur.

Explain why.

To obtain full marks you must support your answer with a description of what causes earthquakes.

(4)

- (b) Some theories suggest that the Earth's early atmosphere was like the atmosphere of Mars today.

Gases	The atmosphere of Mars today	The atmosphere of Earth today
Carbon dioxide %	95	0.03
Nitrogen %	3	
Argon %	1.5	0.97
Oxygen %	0.5	21

- (i) Complete the table by writing in the percentage of nitrogen in the atmosphere of Earth today.

(1)

- (ii) Use the information in the table to describe the changes that have happened to **two** of the gases in the Earth's atmosphere.

Explain what has caused these changes.

(4)

(Total 10 marks)