

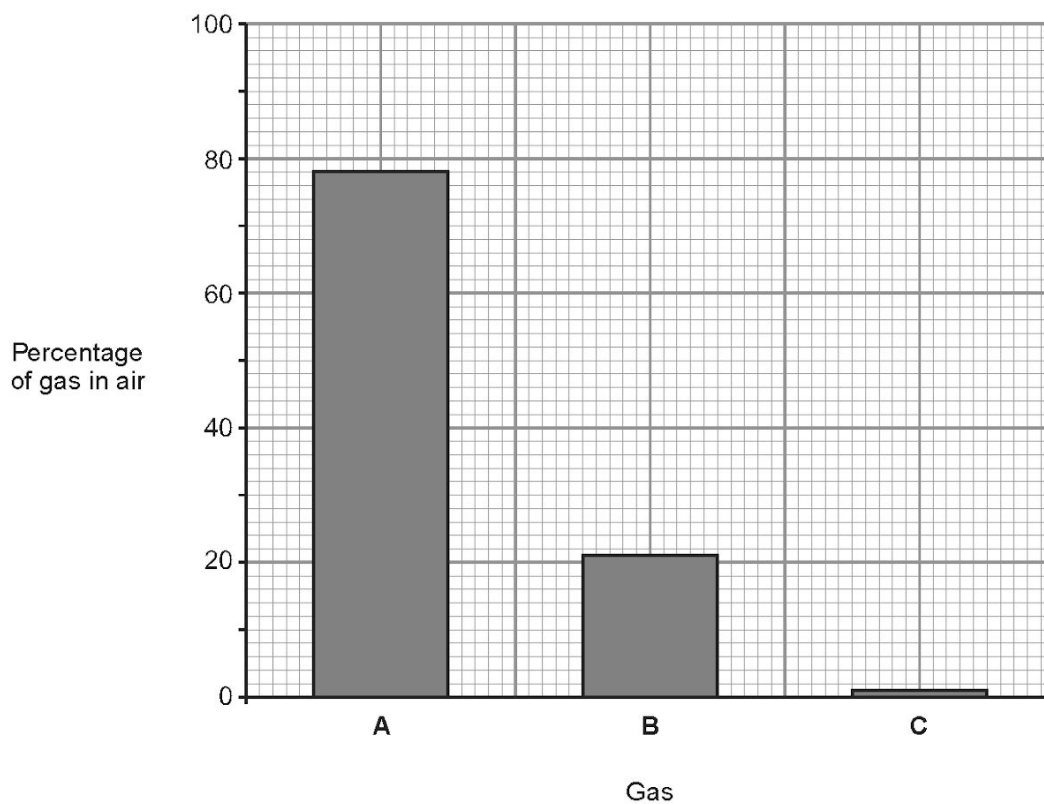
WJEC Chemistry GCSE

12: The Earth and its Atmosphere

Practice Questions

England Specification

1. (a) The bar chart below shows the percentage of the three main gases in air.



Choose from the box below the names of gases A, B and C.

[3]

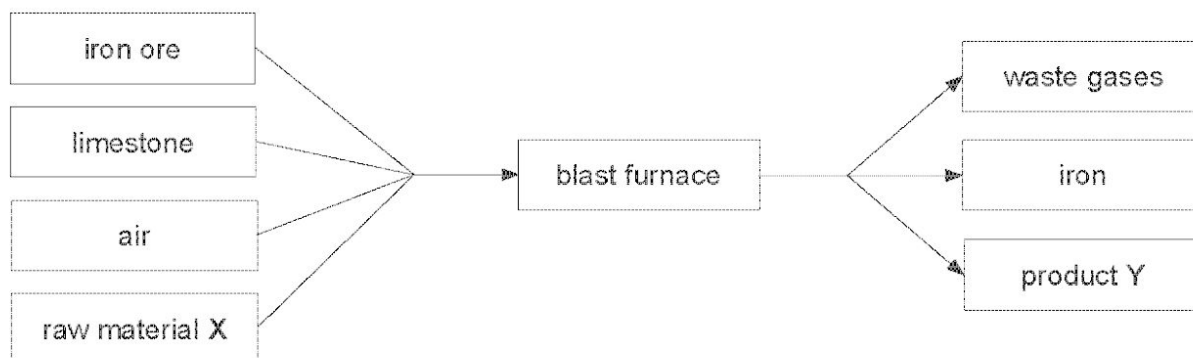
argon	chlorine	hydrogen
methane	nitrogen	oxygen

A

B

C

- (b) Air is one of the raw materials used in the extraction of iron from iron ore in the blast furnace. The following flow diagram summarises the process.



- (i) Give the names of [2]

raw material X,

product Y.

- (ii) Name the gas present in the air which is used up during combustion inside the blast furnace. [1]

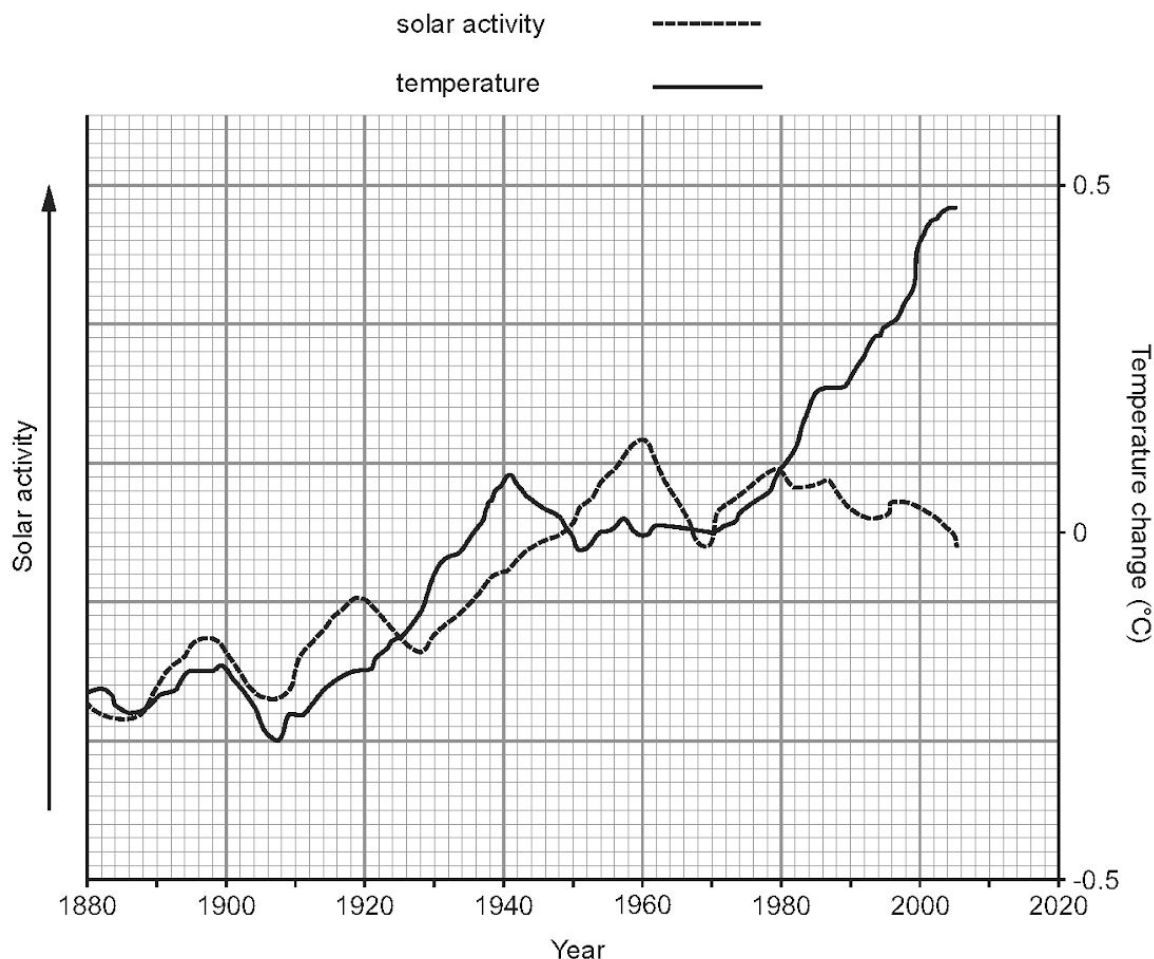
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- (iii) Balance the following symbol equation which represents a reaction that takes place in the blast furnace. [1]



2.

- (a) A small minority of scientists believe that it is changes in solar activity (i.e. changes in the brightness and warmth of the sun) that causes global warming. The graphs below show the changes in solar activity and atmospheric temperature since 1880.



Using the information from the graphs, state how well the evidence supports the argument that solar activity is the cause of global warming. [2]

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- (b) Most scientists believe the main cause of global warming is the increase in carbon dioxide levels in the atmosphere.

(i) State the **main** cause of this increase in carbon dioxide levels. [1]

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(ii) Describe **one** method of reducing current atmospheric carbon dioxide levels. [1]

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3.

Explain how natural processes keep the carbon dioxide and oxygen content of the atmosphere approximately constant. Discuss how human activities are changing the balance between these gases. [6 QWC]

[illegible]

	6

4.

The percentage of carbon dioxide in air is 0.04%.

State, giving a reason in each case, how you would expect the percentage of carbon dioxide to change

(a) in a crowded classroom, [2]

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(b) in a greenhouse full of plants on a sunny day, [2]

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(c) in the furnace of a coal-fired power station. [2]

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5.

It is believed that the Earth's original atmosphere was produced from volcanoes. The following tables show the gases given out by a volcano and the gases present in today's atmosphere.

Gas	Amount given out by a volcano (%)
water vapour	79.0
carbon dioxide	12.0
sulfur dioxide	6.5
nitrogen	1.5
others	1.0

Gas	Amount present in today's atmosphere (%)
nitrogen	78.0
oxygen	21.0
carbon dioxide	0.04
others including water vapour	0.9

- (a) Using the information in the tables describe three differences between the gases given out by a volcano and today's atmosphere. [3]

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- (b) Levels of carbon dioxide and oxygen have remained approximately constant for 3500 million years. Name the two *natural* processes that have allowed this to happen. [2]

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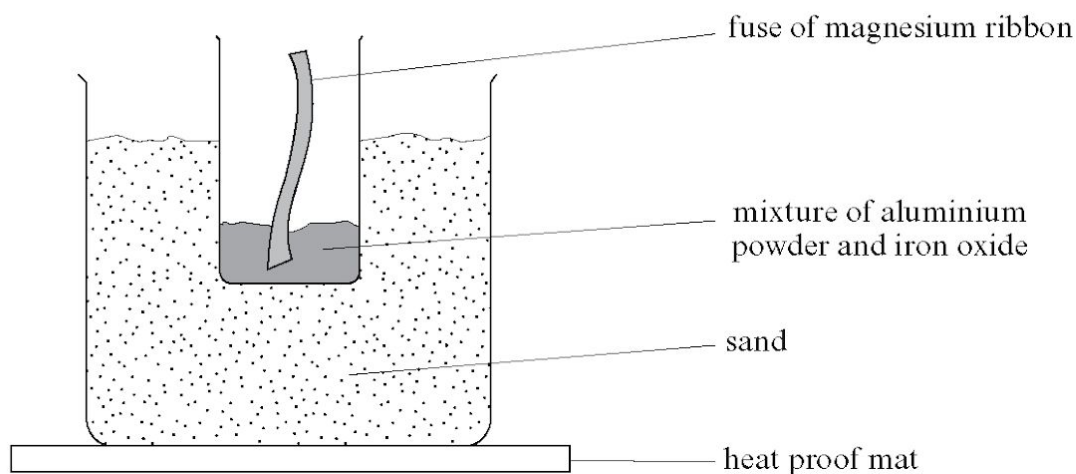
- (c) Human activity pollutes the atmosphere which leads to environmental problems. Name the gases responsible for the following problems. [2]

Global warming

Acid rain

6.

The Thermit reaction is a reaction between aluminium powder and iron oxide. It can be demonstrated in a chemistry laboratory using the apparatus shown in the diagram below.



(a) State why the magnesium ribbon fuse is able to start the reaction. [1]

(b) (i) Complete the **word** equation for the reaction that takes place between aluminium and iron oxide. [1]

aluminium + iron oxide \longrightarrow +

(ii) State which reactant is reduced and give a reason for your answer. [1]

(c) Titanium is extracted from titanium chloride by reacting it with sodium at 1000°C in a reactor. The only other substance in the reactor is argon gas.

(i) Balance the symbol equation for the reaction that takes place in the reactor. [1]



(ii) What does this reaction tell you about the reactivity of titanium? [1]

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(iii) Suggest a reason why the reactor contains argon and not air. [1]

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(iv) Suggest a reason why extracting titanium from titanium chloride is an expensive process. [1]

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7.

Describe the benefits of the use of nitrogenous fertilisers and the problems that arise when they are washed into rivers. [6 QWC]

A series of horizontal dashed lines.

8.

Sulfuric acid is produced in industry by the contact process.

(a) The contact process involves four stages. The first two are shown below.

Stage 1 sulfur + oxygen \longrightarrow sulfur dioxide

Stage 2 sulfur dioxide + oxygen \rightleftharpoons sulfur trioxide

(i) Name the **raw material** that provides oxygen in stage 1. [1]

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(ii) Describe the last two stages in the contact process (stages 3 and 4). [2]

Stage 3

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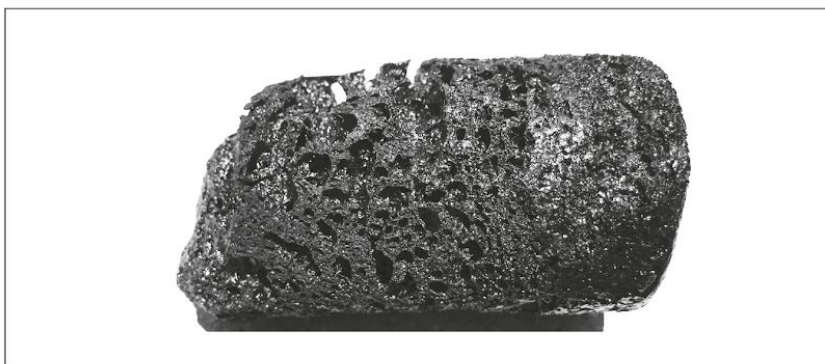
Stage 4

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(iii) Name the catalyst used in stage 2. [1]

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(b) When concentrated sulfuric acid is added to sugar a black solid is formed.



In terms of the elements present in sugar, describe what happens during this reaction. [2]

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9.

The table below shows the amount of soap solution required by different samples of water to form a permanent lather. In each case 25 cm³ of the water samples were used and the soap solution was added 1 cm³ at a time.

Sample	Volume of soap solution added (cm ³)				Mean
	Test 1	Test 2	Test 3	Test 4	
distilled water	2	2	2	2	2
A	8	8	9	7	8
B	11	18	12	13	
C	15	14	14	13	14
A after boiling	8	7	9	8	8
B after boiling	6	5	6	7	6
C after boiling	2	2	2	2	2

- (a) Two pupils, David and Haf, calculated the mean value for sample **B**. David calculated a value of 13.5 and Haf calculated a value of 12. Show how both values were obtained. State which is the better value to use and give a reason for your choice. [3]

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- (b) State which of water samples **A**, **B** and **C** is the least hard. [1]

Water sample

- (c) State which of water samples **A**, **B** and **C** contains both temporary and permanent hardness. Give the reason for your answer. [2]

Water sample

Reason

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- (d) Name an ion which causes hardness in water. [1]

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10.

Satellite images are used to show the area of Arctic sea ice.



Photograph: National Snow and Ice Data Centre,
Colorado.

- (a) The shrinking of the ice cap is interpreted by environmental groups as the result of global warming. State and explain the **main** cause of global warming. [2]

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- (b) Give **one** consequence of the reduction of Arctic sea ice. [1]

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- (c) Scientists are currently developing a process called **carbon capture and storage (CCS)** to reduce the problem of global warming. There are three main steps to CCS. Firstly, carbon dioxide is trapped and separated from other gases produced in coal-powered electricity plants. The captured carbon dioxide is transported to a storage location and finally stored far away from the atmosphere (underground or deep in the ocean).

Use this information to suggest **two** reasons why some scientists do not support the use of CCS. [2]

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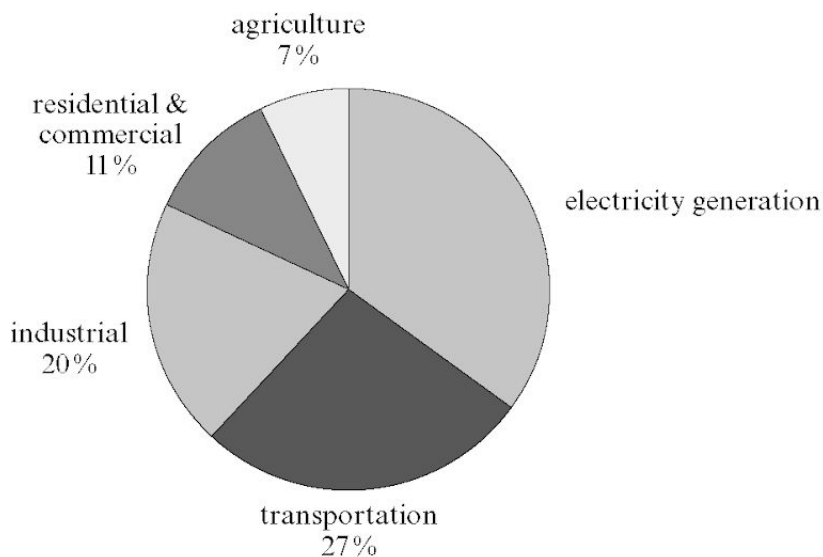
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11.

The following pie chart shows the sources of greenhouse gas emissions in the United States.



- (a) Calculate the percentage of emissions from electricity generation.

[2]

Percentage of emissions from electricity generation = %

- (b) Explain why scientists are concerned about the release of greenhouse gases such as carbon dioxide into the atmosphere.

[2]

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- (c) Suggest **one** way to reduce the amount of greenhouse gases released into the atmosphere due to electricity generation.

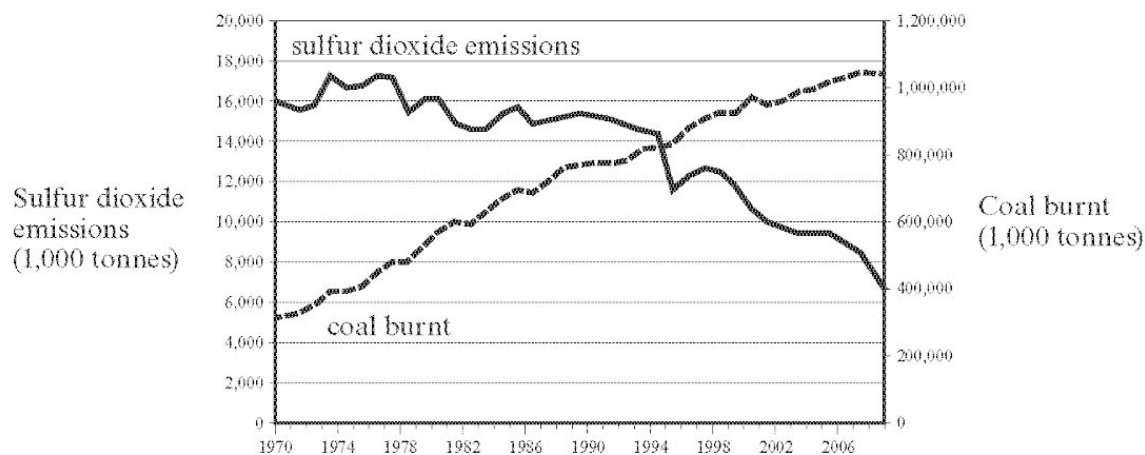
[1]

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12.

- (a) State how the burning of coal results in the production of sulfur dioxide and why this leads to environmental problems when released into the atmosphere. Include in your answer **one** example of the resulting environmental damage. [3]

- (b) The following graph shows the amount of coal burnt and sulfur dioxide emissions in the USA between 1970 and 2008.

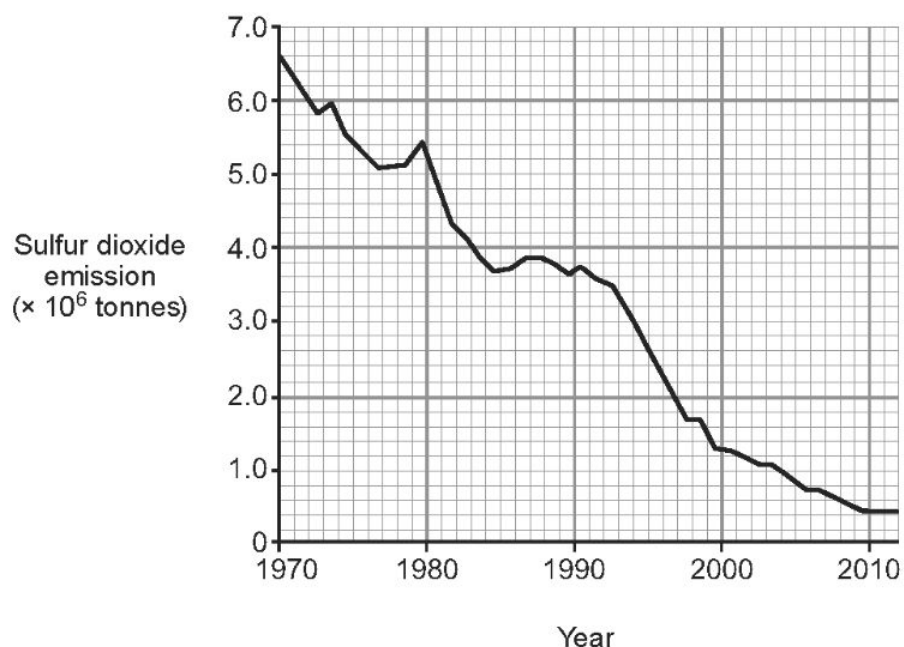


- (i) State why the data shown in this graph is not as expected. [2]

- (ii) Suggest a possible reason for the unexpected data. [1]

13.

- (a) The graph below shows the total sulfur dioxide emissions in the UK between 1970 and 2012.



- (i) Use the graph to calculate the decrease in sulfur dioxide emissions in **tonnes** between 1994 and 2004. [1]

Decrease in sulfur dioxide emissions = tonnes

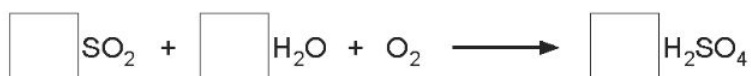
- (ii) Suggest and explain a possible reason for the trend shown in the graph. [2]

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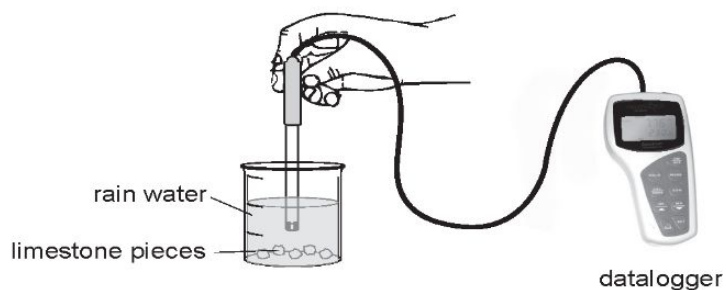
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- (iii) Balance the symbol equation below which shows a reaction that can lead to the formation of sulfuric acid in the atmosphere. [1]



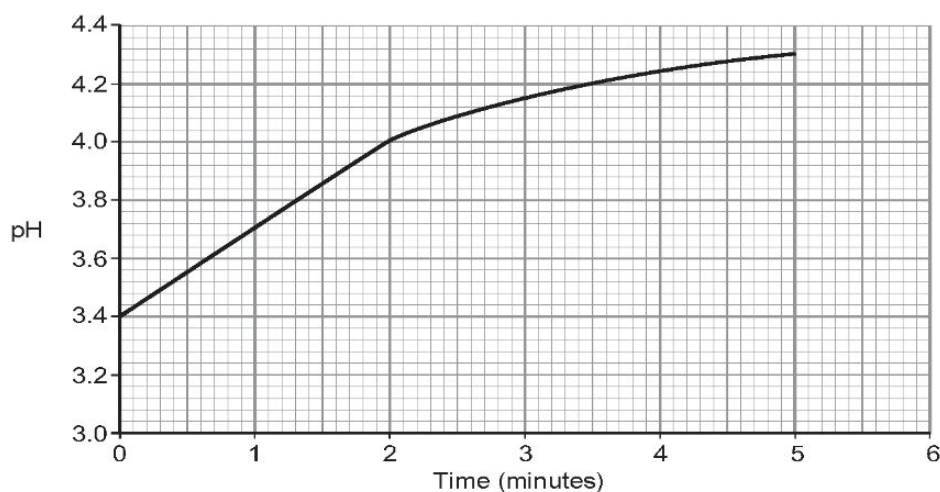
- (b) A group of pupils investigated the pH change which occurs when limestone reacts with acid rain. The group collected rain water during a rain shower.

They used the apparatus shown below.



They added limestone pieces to the rain water and recorded the pH of the mixture for 5 minutes. The data collected was then downloaded to a computer.

The graph below shows the results recorded.



- (i) Name the type of reaction taking place. [1]

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- (ii) Limestone affects the acidity of acid rain. Describe how the graph supports this statement. [2]

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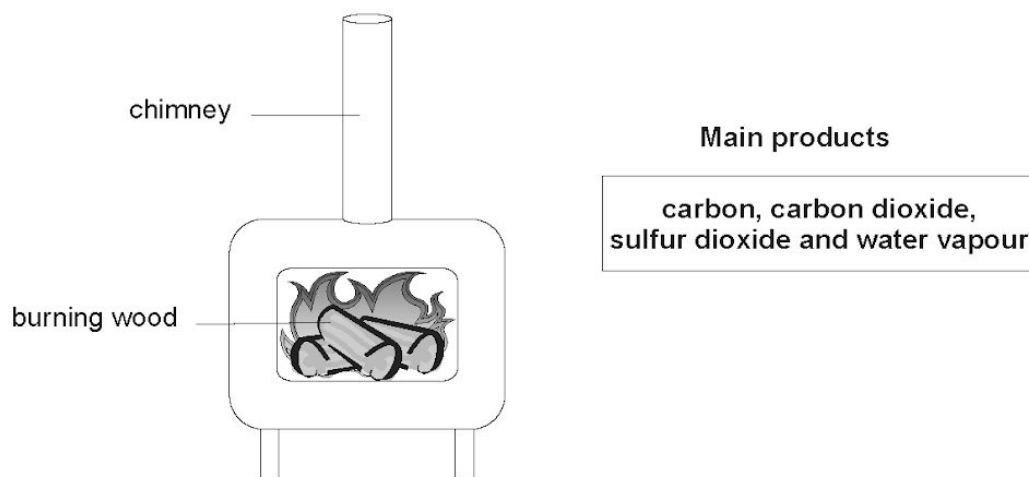
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- (iii) Apart from destroying limestone buildings and statues, give **one other** problem associated with acid rain. [1]

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14.

Wood burning stoves are a popular alternative to using oil or natural gas to heat homes. The diagram below shows the main products formed when wood burns.



(a) Name the gas in the air that is needed for wood to burn. [1]

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(b) Choose from the list of the main products formed when wood burns

- the substance which causes acid rain,
- an element.

[2]

(c) Most scientists believe that increasing carbon dioxide levels in the atmosphere causes global warming. Explain why using wood as a fuel is said to be carbon-neutral. [3]

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15.

Fossil fuels such as coal release sulfur dioxide into the atmosphere when burned. This causes acid rain. Describe how acid rain is formed and its effects on the environment. [6 QWC]

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