Carbon dioxide + Methane as Greenhouse

Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Chemistry
Exam Board	AQA
Topic	5.9 Chemistry of the Atmosphere
Sub-Topic	Carbon dioxide + Methane as Greenhouse
Difficulty Level	Bronze Level
Booklet	Question Paper 1

Time Allowed: **49 minutes**

Score: **/48**

Percentage: **/100**

Grade Boundaries:

Q1. This question is about gases in the Earth's atmosphere.

(a) The amount of carbon dioxide in the Earth's atmosphere decreased during the first billion years of the Earth's existence.

Complete the sentences. Use words from the box.

carbonates	**dissolved**	**evaporated**	**melted**	**nitrates**	**sulfates**

The amount of carbon dioxide in the Earth's atmosphere decreased because

the carbon dioxide..... in the oceans.

Sediments were formed when ..... were produced.

Algae and plants use carbon dioxide and water to produce oxygen.

(2)

(b) What is the name of this process?

Tick **one** box.

Carbon capture ☐

Combustion ☐

Photosynthesis ☐

Polymerisation ☐

(1)

(c) Complete the word equation for this process.

carbon dioxide + ... → glucose + ...

(1)

(d) Draw **one** line from each gas to the approximate percentage of the gas in the Earth's atmosphere today.

Gas	Approximate percentage of gas in the Earth's atmosphere today
Carbon dioxide	<1
Nitrogen	5
Oxygen	10
	20
	50
	80
	>90

(3)

(e) Carbon dioxide is a greenhouse gas.

Why does increasing the amount of carbon dioxide change the global climate?

.....

(1)

(f) How can countries reduce carbon dioxide emissions?

Tick **one** box.

only burn methane ☐

use renewable energy supplies ☐

use waste plastic bags as fuel ☐

(1)

(g) Give **one** reason why it is difficult for countries to reduce emissions of carbon dioxide.

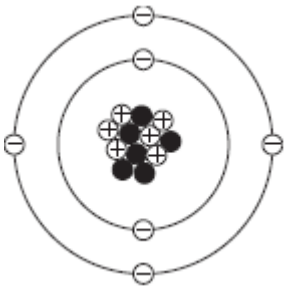
.....

.....

(1)
(Total 10 marks)

Q2. Fossil fuels contain carbon.

(a) The figure below represents a carbon atom.



Draw a ring around the correct answer to complete each sentence.

(i) The name of the particle with a positive charge is

an electron.
a neutron.
a proton.

(1)

(ii) The centre of the atom is called the

energy level.
molecule.

nucleus.

(1)

(iii) Use the Chemistry Data Sheet to help you to answer this question.

Use the correct number from the box to complete each sentence.

4	**6**	**8**	**10**	**12**

The mass number of this carbon atom is ☐

In the periodic table, carbon is in Group ☐

(b) Coal is a fossil fuel.

A piece of coal contains:

- 80% carbon
- 9% oxygen
- 1% sulfur
- 5% hydrogen.

The rest of the coal is other elements.

(i) What is the percentage of other elements in this piece of coal?

..... %

(1)

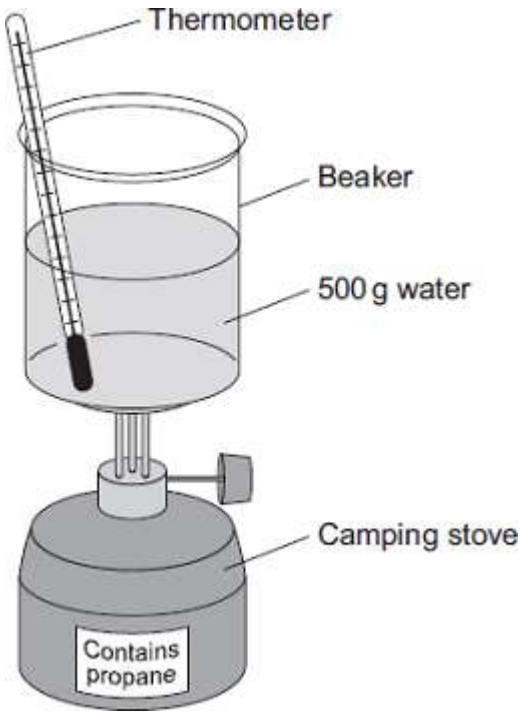
(ii) Coal burns in air to produce carbon dioxide, sulfur dioxide and water.

Draw **one** line from each product to the type of pollution caused by each product.

Product	Type of pollution
Carbon dioxide	Acid rain
Sulfur dioxide	Global dimming
Water	Global warming
	No pollution

(3)
(Total 8 marks)

Q3.A camping stove uses propane gas.



(a) A student did an experiment to find the energy released when propane is burned.

The student:

- put 500 g water into a beaker
- measured the temperature of the water

- heated the water by burning propane for 1 minute
- measured the temperature of the water again.

The student found the temperature change was 20 °C.

The student can calculate the energy released, in joules (J), using the equation:

energy released (J) = mass of water (g) × 4.2 × temperature change (°C)

(i) Use the student's result to calculate the energy released in joules (J).

.....

.....

Energy released = ... J

(2)

(ii) State **two** safety precautions that the student should take during the experiment.

1 .....

.....

2 .....

.....

(2)

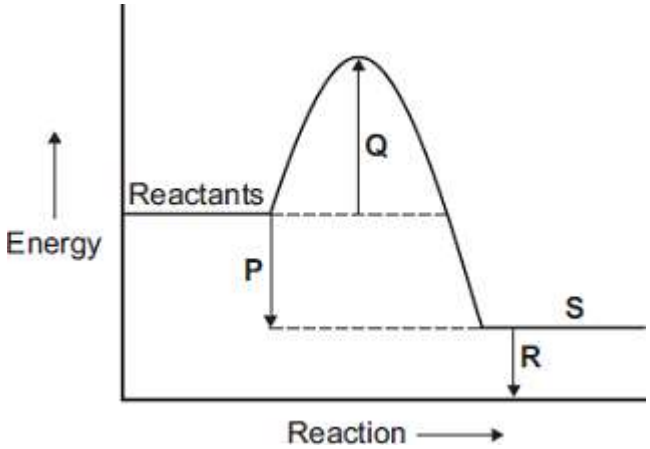
(iii) Tick (✓) **two** boxes which describe how the student could make his result more accurate.

	Tick (✓)
Stir the water before measuring the temperature.	
Heat the water until it boils.	
Place a lid on the beaker.	
Use a larger beaker for the water.	

(2)

(b) The change in energy when propane is burned can be shown in an energy level

diagram.



Draw **one** line from each description to the correct letter.

Description	Letter
products	P
activation energy	Q
energy released by the reaction	R
	S

(3)

(c) Propane and hydrogen are both used as fuels.

Some information about propane and hydrogen is given in the table.

Fuel	Resource	Products formed when fuel burned
propane	crude oil	carbon dioxide and water
hydrogen	water	water

Use the information in the table to suggest **two** disadvantages that propane has as a fuel compared to hydrogen.

1 .....

.....

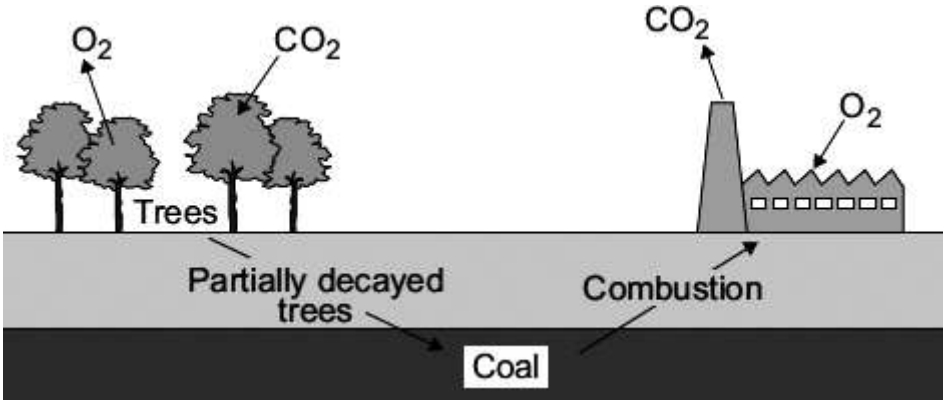
2 .....

.....

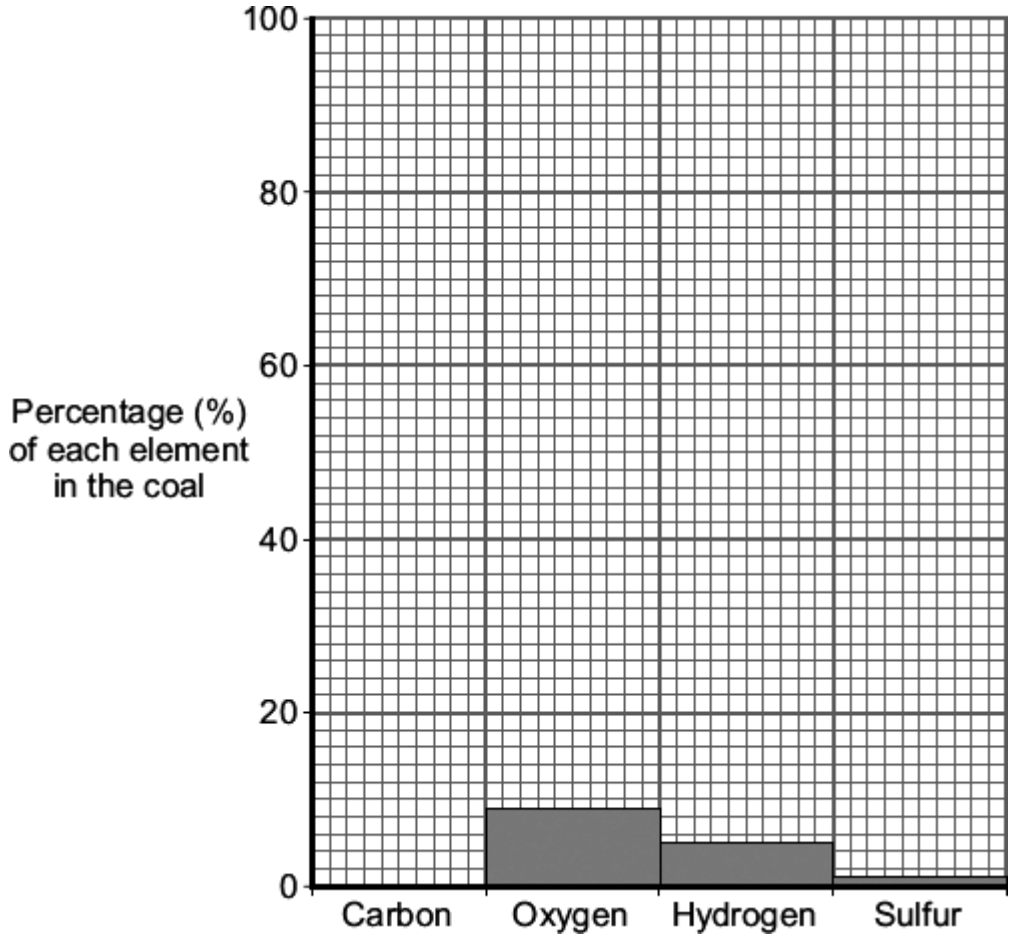
(2)
(Total 11 marks)

Q4. About 3000 million years ago carbon dioxide was one of the main gases in the Earth's early atmosphere.

About 400 million years ago plants and trees grew on most of the land. When the plants and trees died they were covered by sand and slowly decayed to form coal.	Today coal is burned in power stations to release the energy needed by industry.



(a) The bar chart shows the percentage of some of the elements in this coal.



(i) This coal contains 85 % carbon. Draw the bar for carbon on the chart.

(1)

(ii) Coal is burned in the atmosphere to release energy.
Two of the products of burning coal are shown.

Draw **one** line from each product to its environmental impact.

Product	**Environmental impact**
	Acid rain
Sulfur dioxide	
	Global dimming
Carbon particles	
	Global warming

(2)

(b) Use the information above and your knowledge and understanding to answer these questions.

(i) How did the formation of coal decrease the amount of carbon dioxide in the Earth's early atmosphere?

.....

.....

(1)

(ii) How does burning coal affect the amount of carbon dioxide in the Earth's atmosphere?
Explain your answer.

.....

.....

.....

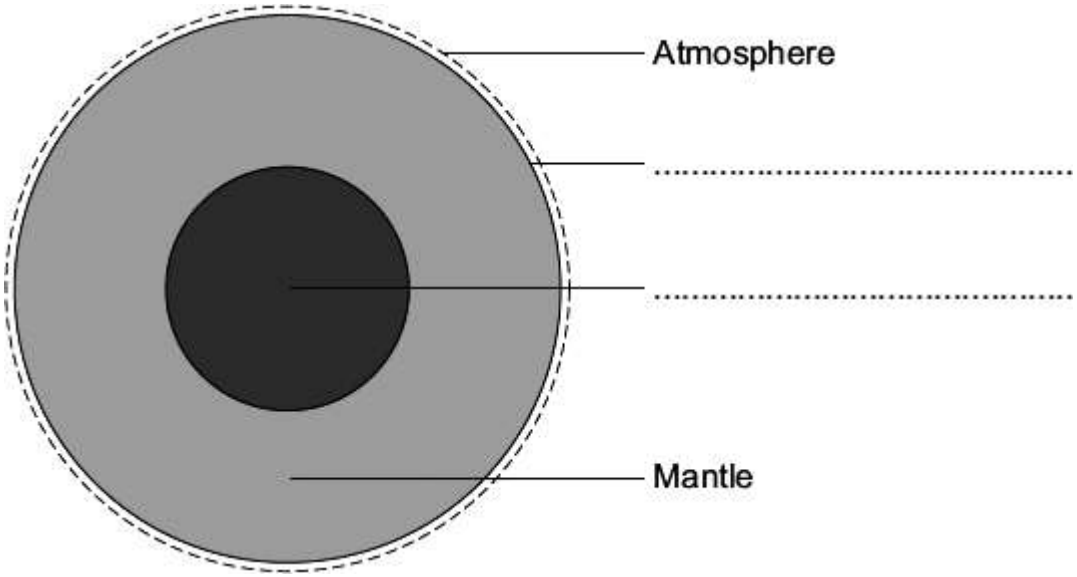
.....

(2)
(Total 6 marks)

Q5. The Earth has a layered structure and is surrounded by an atmosphere.

(a) The diagram shows the layers of the Earth.

Complete the labels on the diagram.

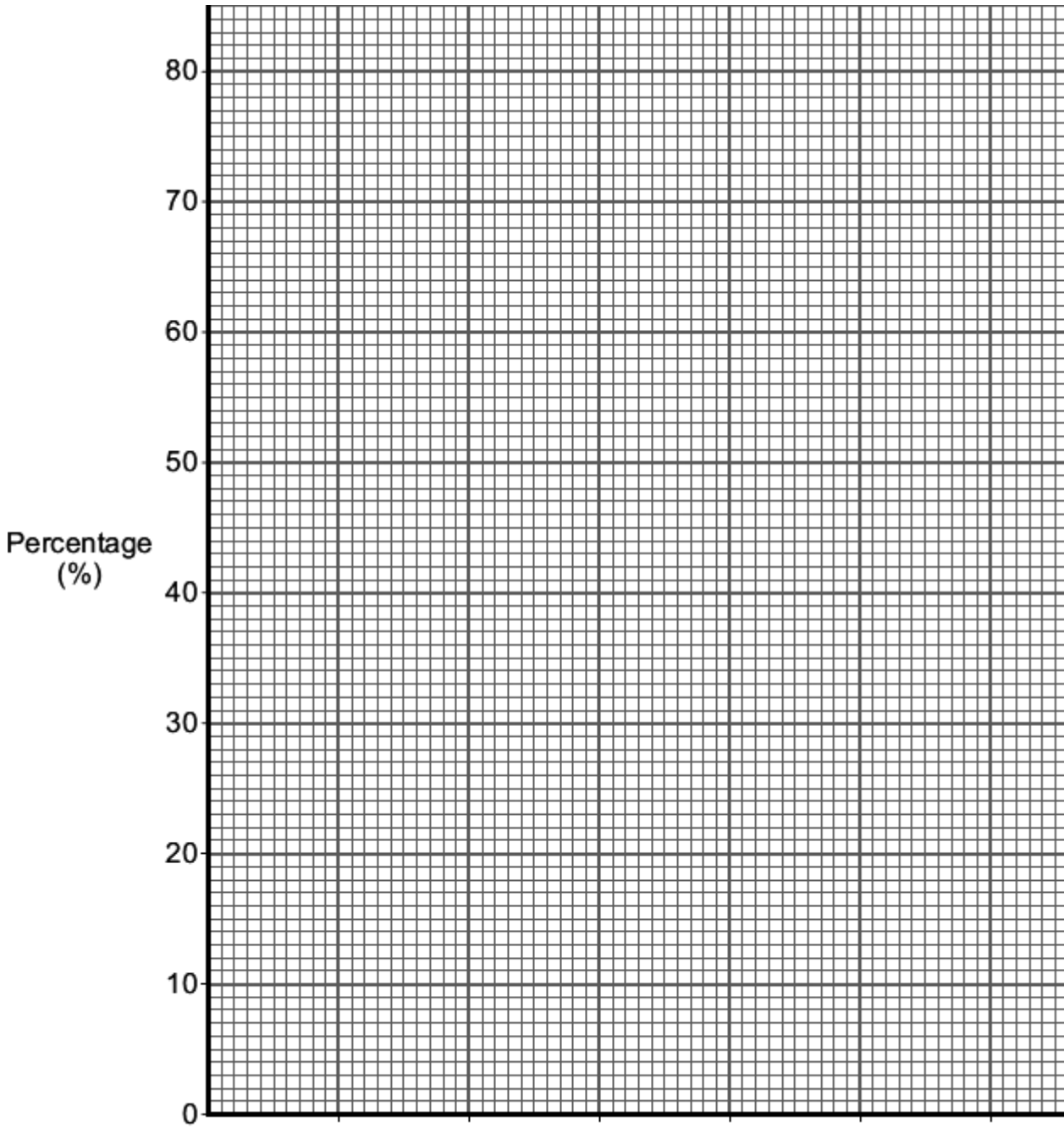


(2)

(b) The data in the table shows the percentages of the gases in the Earth's atmosphere.

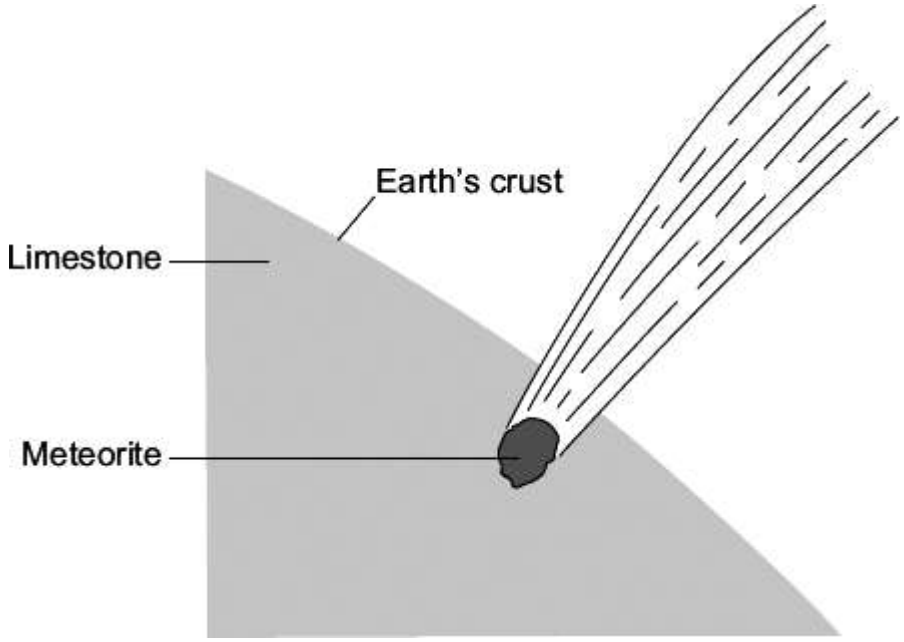
Name of gas	Percentage (%) of gas
Nitrogen	78
Oxygen	21
Other gases	1

Present the data in the table on the grid below.



(3)

(c) Millions of years ago a large meteorite hit the Earth.
The meteorite heated limestone in the Earth's crust to a very high temperature.
The heat caused calcium carbonate in the limestone to release large amounts of carbon dioxide.



Draw a ring round the correct answer to complete each sentence.

(i) Carbon dioxide was released because the calcium carbonate was

decomposed.
evaporated.
reduced.

(1)

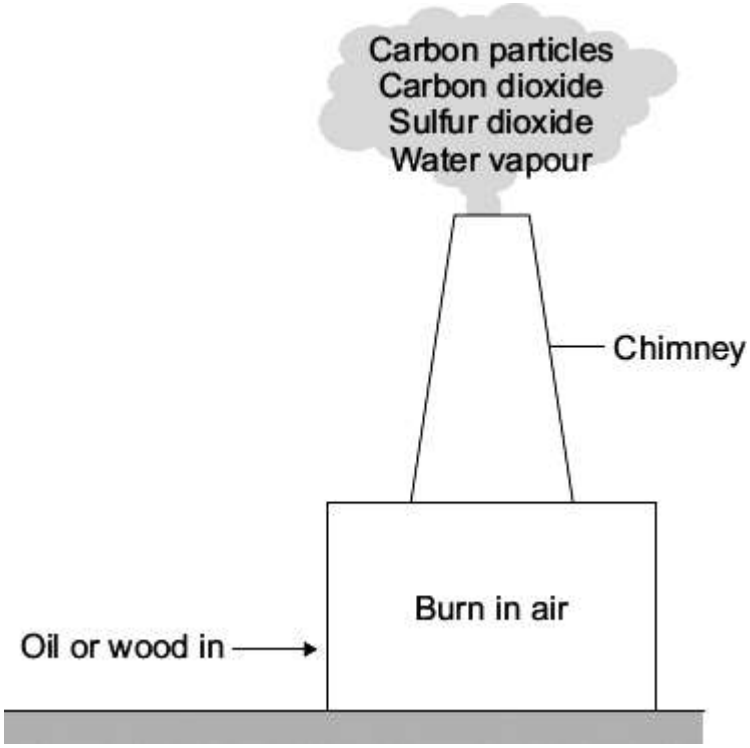
(ii) More carbon dioxide in the Earth's atmosphere causes

acid rain.
global dimming.
global warming.

(1)
(Total 7 marks)

Q6. In the future:

- there will be fewer oil burning power stations
- there may be more wood burning power stations.



(a) Which **one** of the emissions from the chimney can cause acid rain?

.....

(1)

(b) Draw a ring around the correct answer to complete the sentence.

Carbon particles in the Earth's atmosphere cause

acid rain.
global dimming.
global warming.

(1)

(c) Which gas in the air is needed for oil or wood to burn?

.....

(1)

(d) Suggest why there will be **fewer** power stations burning oil in the future.

.....

.....

(1)

(e) Some power stations burn wood.
The wood comes from trees grown in forests.

Suggest why burning wood in power stations is said to be 'carbon-neutral'.

.....

.....

.....

.....

(2)
(Total 6 marks)