

Common Atmospheric Pollutants + Sources

Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Chemistry
Exam Board	AQA
Topic	5.9 Chemistry of the Atmosphere
Sub-Topic	Common Atmospheric Pollutants + Sources
Difficulty Level	Bronze Level
Booklet	Question Paper 1

Time Allowed: 57 minutes

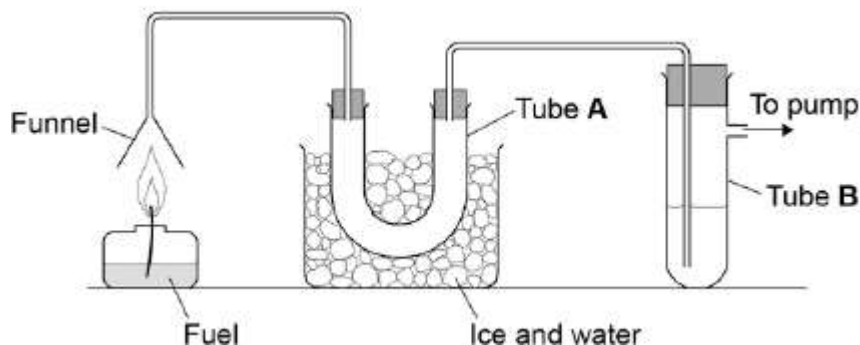
Score: /57

Percentage: /100

Grade Boundaries:

Q1. A student investigated the substances produced when fuels burn.

The figure below shows the apparatus the student used.



- (a) The complete combustion of a hydrocarbon produces carbon dioxide and one other substance.

Look at the figure above. What would the student see in tube **A**?

.....

.....

(1)

- (b) When the student burned the fuel she saw soot in the funnel.

Explain why soot forms.

.....

.....

.....

.....

(2)

- (c) The student burned another fuel which contained impurities.

The substance in tube **B** is water containing universal indicator.

The indicator turned red.

Which gas made the indicator turn red?

Tick **one** box.

Ammonia

Carbon monoxide

Nitrogen

Sulfur dioxide

(1)

(Total 4 marks)

Q2.Crude oil is a fossil fuel.

- (a) To make crude oil more useful it is separated into fractions.

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

boiling	compound	decomposition	distillation
filtration		mixture	molecule

- (i) Crude oil is a of different substances.

(1)

- (ii) The substances in crude oil have different
..... points.

(1)

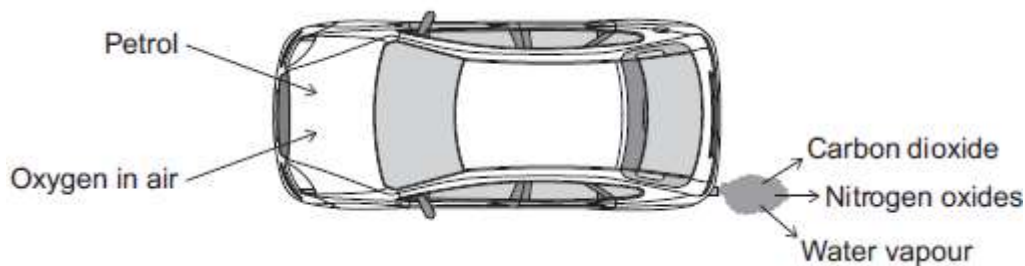
- (iii) Crude oil is separated by fractional

(1)

- (b) Petrol is one of the fractions produced from crude oil.

Car engines use a mixture of petrol and air.

The diagram shows some of the gases produced.



- (i) What type of reaction happens to petrol in a car engine?

Tick (✓) **one** box.

combustion

☐

decomposition

☐

neutralisation

☐

(1)

- (ii) Petrol contains octane (C_8H_{18}).

Complete the word equation for the reaction of octane with oxygen.

octane + \longrightarrow +

(2)

- (iii) Cars use sulfur-free petrol as a fuel.

Describe why sulfur should be removed from petrol.

.....

.....

.....

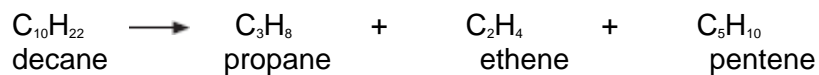
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(2)

- (c) Some fractions from crude oil contain large hydrocarbon molecules.

These molecules can be cracked to produce smaller, more useful molecules.

An equation for cracking decane is:



(i) Why is propane useful?

Tick (✓) **one** box.

Propane is a polymer.

☐

Propane is an alloy.

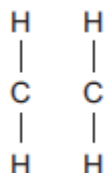
☐

Propane is a fuel.

☐

(1)

(ii) Draw bonds to complete the displayed structure of ethene.



(1)

(iii) What is the colour change when bromine water reacts with ethene?

Tick (✓) **one** box.

Orange to colourless

☐

Orange to green

☐

Orange to red

☐

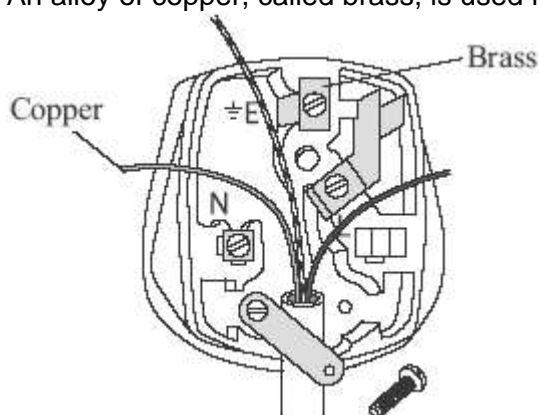
(1)

- (iv) Complete the sentence.

Pentene is useful because many pentene molecules can join together
to form

(1)
(Total 12 marks)

- Q3.** Copper metal is used for electric wires.
An alloy of copper, called brass, is used for pins and terminals of electric plugs.



- (a) Copper metal is relatively soft and flexible.

Give another reason why copper is used for electric wires.

.....
.....

(1)

- (b) Brass is an *alloy*.

What is an *alloy*?

.....
.....

(1)

- (c) Open-cast mining of copper ore makes a very large hole.



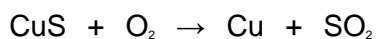
- (i) Suggest **one** environmental problem that is caused by open-cast mining of copper ore.

.....
.....

(1)

- (ii) Some copper ores contain copper sulfide, CuS.

Copper sulfide is heated in air to produce copper and sulfur dioxide.



Suggest **one** environmental problem caused by heating copper sulfide in air.

.....
.....

(1)

- (d) The amount of copper-rich ores is estimated to last only a few more years. New houses need several kilometres of copper wire.

- (i) Explain why the need to use so much copper will cause a problem in the future.

.....

(1)

(ii) Suggest **two** ways in which society could overcome this problem.

1

.....

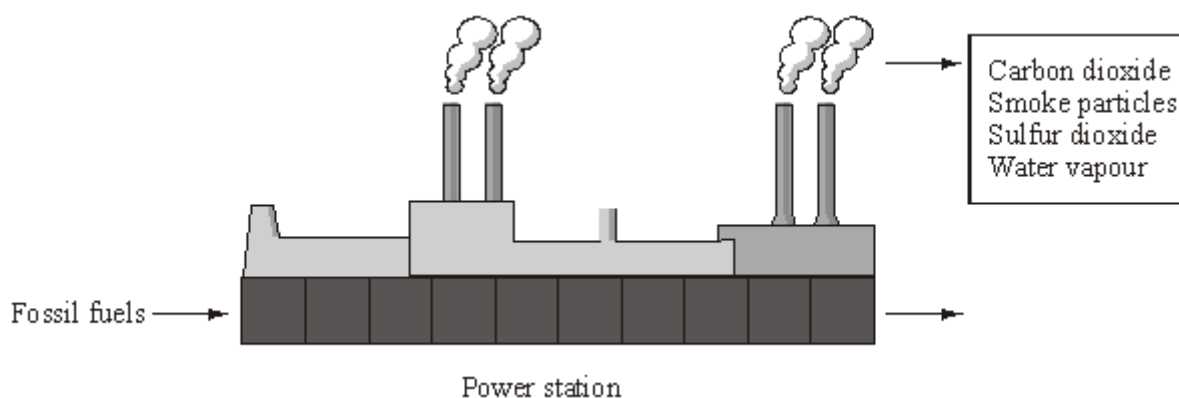
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.....

(2)

(Total 7 marks)

Q4. Most electricity in the UK is generated in power stations that burn fossil fuels. The diagram lists some of the substances released into the air when fossil fuels are burned.



(a) (i) Which **one** of the substances released into the air causes acid rain?

.....

(1)

(ii) In the sentence below, draw a ring around the correct answer.

The type of environmental pollution caused by

smoke particle is	global dimming
	global warming
	rising sea levels

(1)

(iii) Suggest how the burning of fossil fuels may cause climate change.

.....

.....

.....

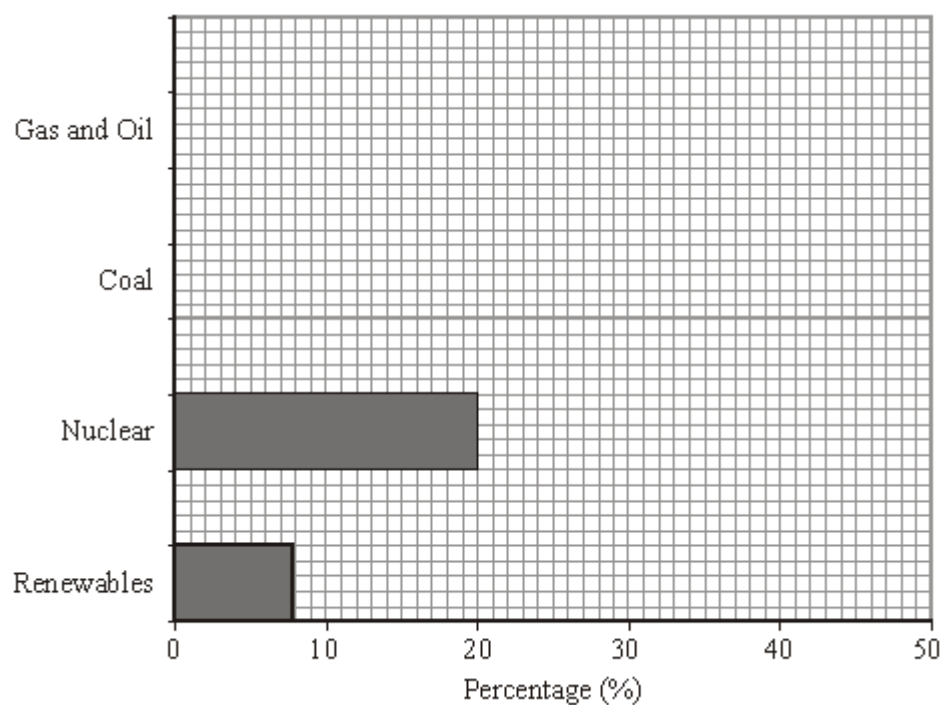
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(2)

(b) The table shows the percentage of electricity generated by different energy sources.

Energy sources	Renewables	Nuclear	Coal	Gas and Oil
Percentage (%)	8	20	32	40

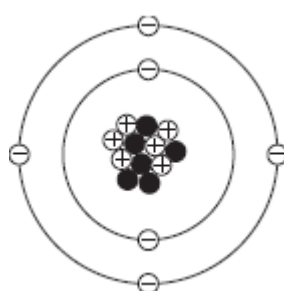
Complete the bar chart to show the percentage of electricity generated by coal and by gas and oil.



(2)
(Total 6 marks)

Q5. 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.

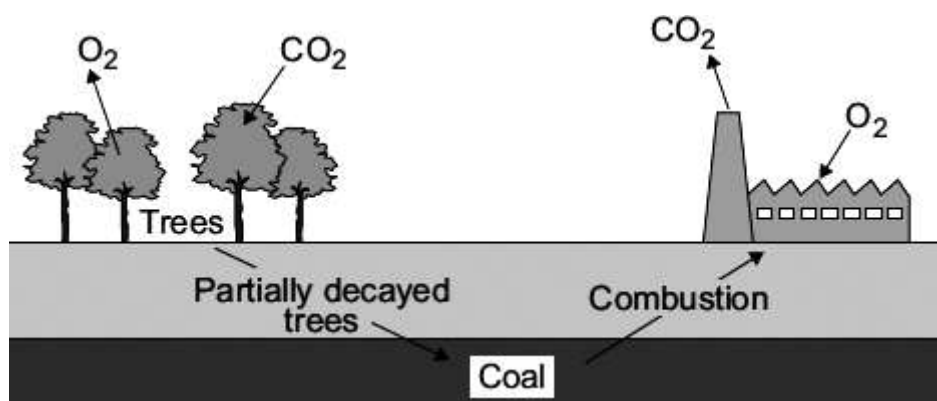
Product	Type of pollution
Carbon dioxide	Acid rain
Sulfur dioxide	Global dimming
Water	Global warming
	No pollution

(3)
(Total 8 marks)

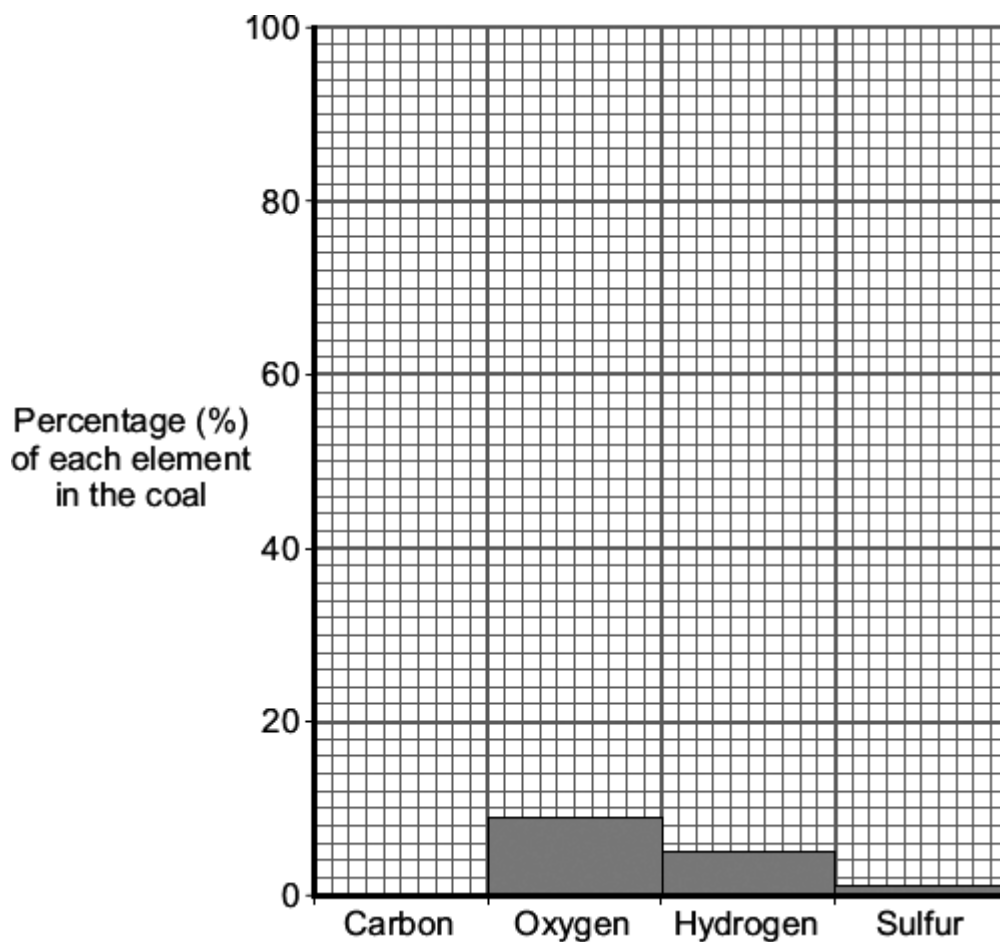
- Q6.** About 3000 million years ago carbon dioxide was one of the main gases in the Earth's early atmosphere.

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
Sulfur dioxide	Acid rain
Carbon particles	Global dimming
	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.

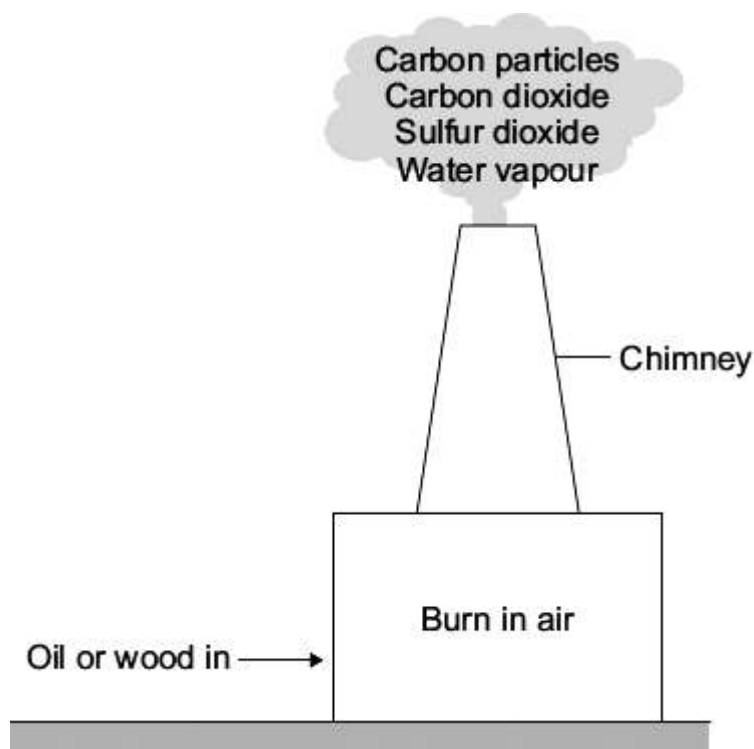
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.....
.....
.....

(2)

(Total 6 marks)

Q7. 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)

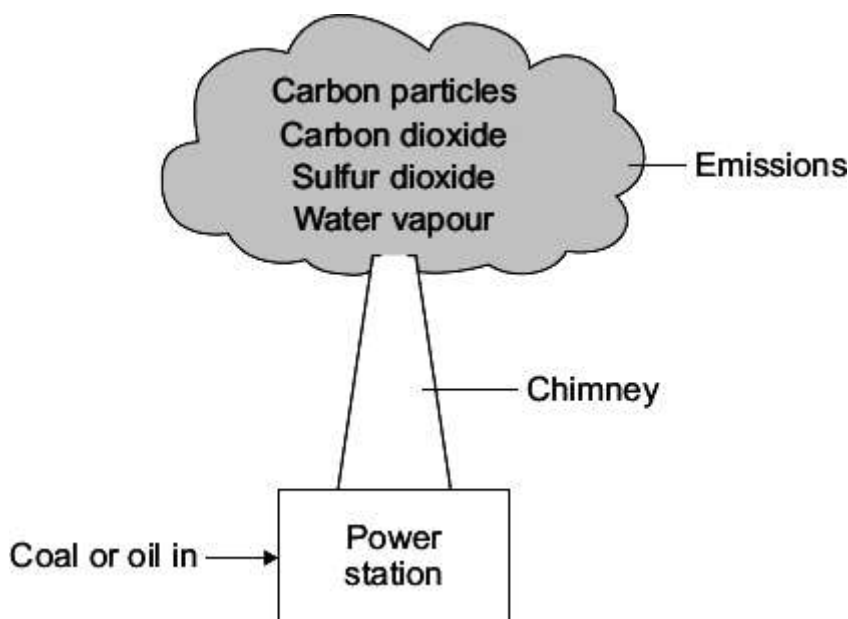
- (e) Some power stations burn wood.
The wood comes from trees grown in forests.

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

(2)

(Total 6 marks)

- Q8.** In the future more coal-fired and fewer oil-fired power stations will be used to generate electricity.
When coal and oil are burned they produce the same types of emissions which can cause environmental problems.



- (a) Emissions from the chimney can cause acid rain, global dimming and global warming. Draw **one** straight line from each possible environmental problem to the emission that causes it.

Possible environmental problem

Emission that causes it

acid rain	carbon particles
global warming	carbon dioxide
global dimming	sulfur dioxide
	water vapour

.....

(3)

(b) Draw a ring around the correct word in the box to complete each sentence.

(i) Incomplete combustion of coal or oil is caused by too little

carbon dioxide.
nitrogen.
oxygen.

(1)

(ii) A gas formed by the incomplete combustion of coal or oil is

carbon monoxide.
hydrogen.
oxygen.

(1)

(c) The table shows the world production for both coal and oil in 2000.

The world production figures after 2000 are predicted.

Year	World production of coal (billions of tonnes per year)	World production of oil (billions of barrels per year)
2000	3.5	12.5
2050	4.5	5.6
2100	5.0	1.7
2150	5.5	0.5
2200	6.0	0.0

- (i) How is the world production of oil predicted to change from 2000 to 2200?

.....

(1)

- (ii) Suggest **two** reasons why the world production of coal is predicted to increase.

1

 2

(2)

(Total 8 marks)