AQA GCSE CHEMISTRY (HIGHER) · 8462

CHEMISTRY



EXAM QUESTION PACK

4.9.3 COMMON ATMOSPHERIC POLLUTANTS AND THEIR SOURCES (PACK 2)

SCORE	PERCENTAGE
/68	%

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Q1.

Copper is a widely used metal. The main ore of copper contains copper sulfide. Copper can be extracted from copper sulfide in a three stage process.

$$Cu_2S + ____O_2 \rightarrow _____CuO + SO_2$$

(1)

(ii) Explain why there would be an environmental problem if the gas from this reaction were allowed to escape into the atmosphere.

_____

_____

_____

_____

(2)

(b) In the second stage copper oxide, CuO, is reduced using carbon.

Describe and explain what happens during this reaction.

_____

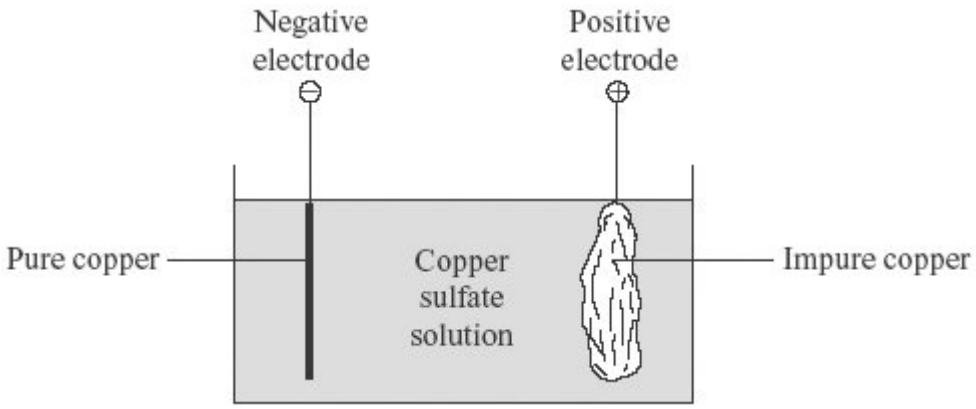
_____

_____

_____

(2)

(c) During the third stage the copper can be purified as shown in the diagram.



(i) What is the name of the type of process used for this purification?

_____

(1)

(ii) Give **one** use of purified copper.

_____

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(1)

(d) Copper-rich ores are running out.

New ways of extracting copper from low grade ores are being researched.

Recycling of copper may be better than extracting copper from its ores.

Explain why.

_____

_____

_____

_____

_____

_____

(3)

(Total 10 marks)

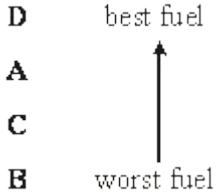
Q2.

The table gives some data about four fuels, **A**, **B**, **C** and **D**.

Fuel	Cost in pence per 100 g	Energy in kJ per 100 g	Energy per penny in kJ	Gas (✓) formed on burning		
				Carbon dioxide	Sulphur dioxide	Water vapour
A	6.0	4 800	800	✓		✓
B	4.0	1 200	300	✓		✓
C	3.5	2 800	800	✓	✓	✓
D	18.0	14 400	800			✓

A student was asked to use the data in the table to compare these four fuels, and then place the fuels in an order.

The order that the student chose was:



Use the information in the table to suggest reasons why the student chose this order.

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To gain full marks in this question you should write down your ideas in good English. Put them into a sensible order and use the correct scientific words.

_____

_____

_____

_____

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_____

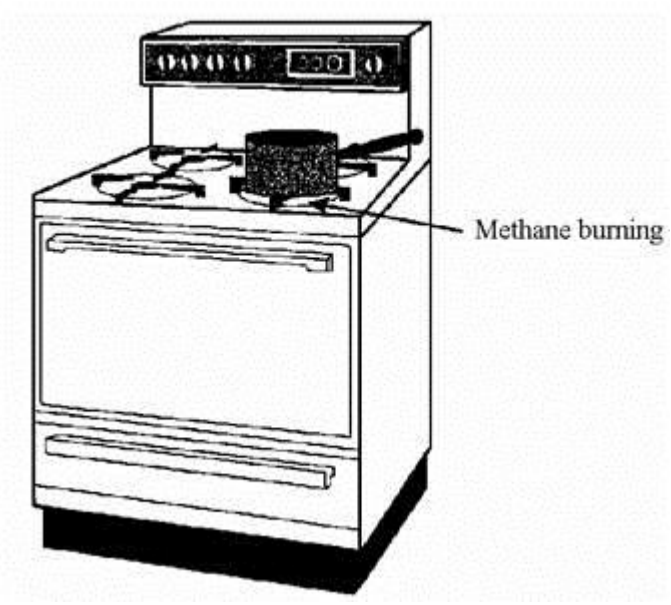
_____

_____

(Total 4 marks)

Q3.

Some gas cookers burn natural gas, methane. Methane, CH_4, is a *hydrocarbon.*



(a) What is meant by *hydrocarbon?*

_____

_____

(2)

(b) When methane burns there must be a good supply of air.

(i) Complete the word equation by choosing the correct **two** chemicals from the box.

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carbon dioxide	hydrogen	oxygen	water

methane + oxygen → _____ + _____

(2)

(ii) Without a good supply of air, carbon monoxide is formed. Why is carbon monoxide a dangerous gas?

_____

_____

(1)

(Total 5 marks)

Q4.

This question is about hydrocarbons.

(a) Use **two** of the words in the box to complete the sentence.

air	finite	organic	renewable	sediment	water

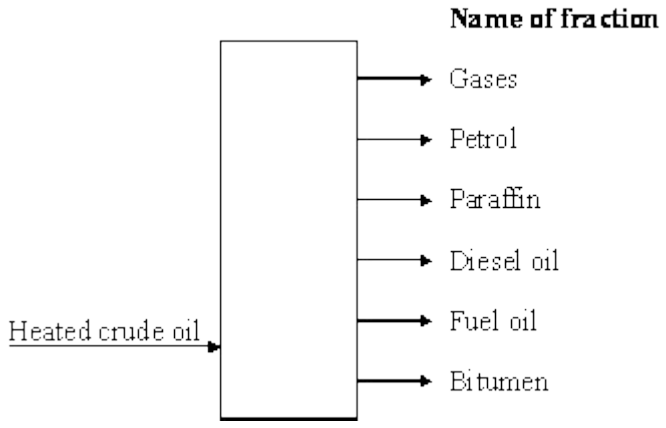
Crude oil is a mixture of hydrocarbons. It was formed from

_____ materials that were trapped in

_____ over a very long period of time.

(2)

(b) Petrol is separated from crude oil by fractional distillation.



(i) Which fraction has the lowest boiling point?

_____

(1)

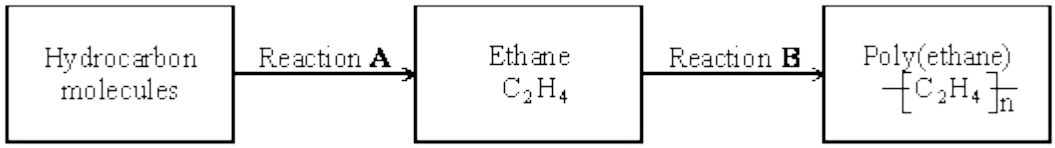
(ii) Which fraction has the highest density?

_____

(1)

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(c) Some of the fractions containing larger hydrocarbon molecules are used to make plastics, such as poly(ethene).



(i) What type of chemical change is Reaction **A**?

_____

(1)

(ii) Explain what happens in Reaction **B**.

_____

_____

_____

_____

(2)

(d) Natural gas contains the hydrocarbon called methane. Some water heaters use methane as a fuel. People could die from breathing the fumes produced by heaters that have not been checked and serviced. Explain how these fumes are produced and why they are dangerous.

_____

_____

_____

_____

_____

_____

_____

(3)

(Total 10 marks)

Q5.

(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.

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_____

(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_2O	SULPHUR DIOXIDE SO_2
A	✓	✓	✗
B	✗	✓	✗
C	✓	✗	✗
D	✓	✓	✓

Which fuel, **A** to **D**, is hydrogen, H_2? _____

(1)

(Total 2 marks)

Q6.

Crude oil and natural gas are mixtures of hydrocarbons. They are obtained from wells drilled into rocks where they are trapped.

(a) (i) What is the name of the process used to separate the different hydrocarbons in crude oil?

_____

(1)

(ii) Methane is one of the gases obtained when crude oil is separated.

Give the name of another hydrocarbon gas obtained from this process.

_____

(1)

(b) A fuel used in gas cookers is natural gas. It is mainly methane, CH_4.

(i) Complete the word equation for the complete combustion of methane.

methane + oxygen → _____ + _____

(2)

(ii) What different gas is produced by the incomplete combustion of methane?

_____

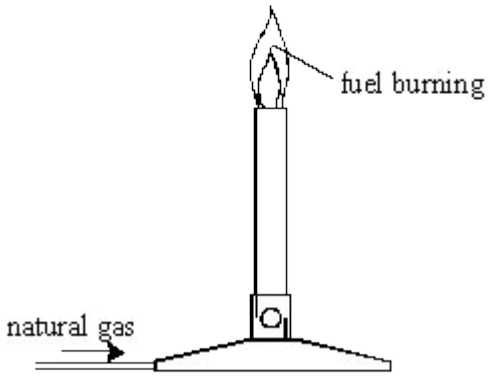
(1)

(Total 5 marks)

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Q7.

Natural gas is a fuel.



(a) Complete these sentences.

When the fuel burns completely, we cannot see the new substances produced because

they are mainly colourless _____ .

The energy of the fuel is released as _____ .

(3)

(b) Choose words from this list to complete the sentence below.

carbon	carbon dioxide	hydrogen	nitrogen
oxygen	sulphur dioxide	water vapour	

Three gases which can be produced when fuels burn are:

1. _____

2. _____

3. _____

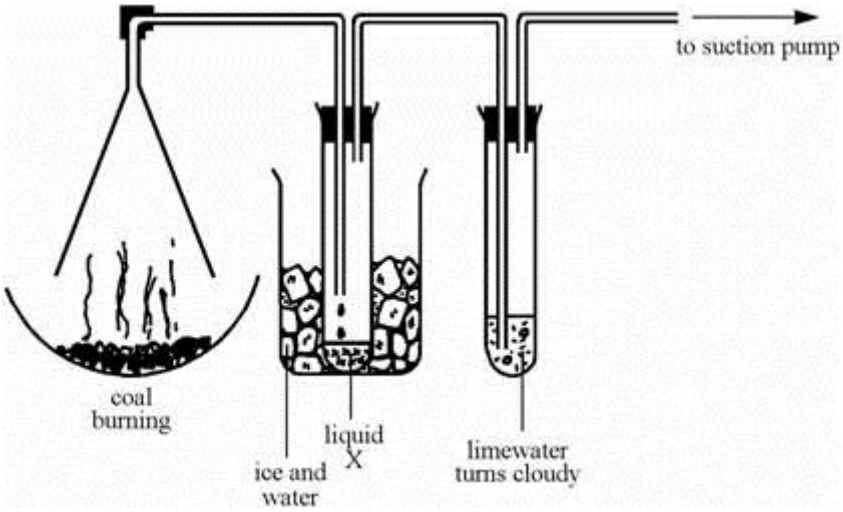
(3)

(Total 6 marks)

Q8.

The gases produced when coal burns are cooled by ice and then bubbled through limewater.

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(a) Complete these sentences.

(i) The coal is reacting with _____ when it burns.

(ii) During burning, elements in the coal are converted to compounds called _____.

(2)

(b) Choose words from this list to complete the sentences.

carbon **carbon dioxide** **sulphur** **sulphur dioxide** **sodium** **water**

(i) Liquid X is a compound made from hydrogen and oxygen.

It is called _____

(ii) Sulphur dioxide is an acidic gas. It is given off when coal burns, because coal contains the element _____

(iii) Most fuels are compounds of hydrogen and _____

(3)

(c) Burning coal is an exothermic reaction.

Explain what "exothermic" means.

_____

_____

(1)

(d) (i) Which gas turns limewater cloudy?

_____

(ii) Which element in the coal is oxidised to form this gas?

_____

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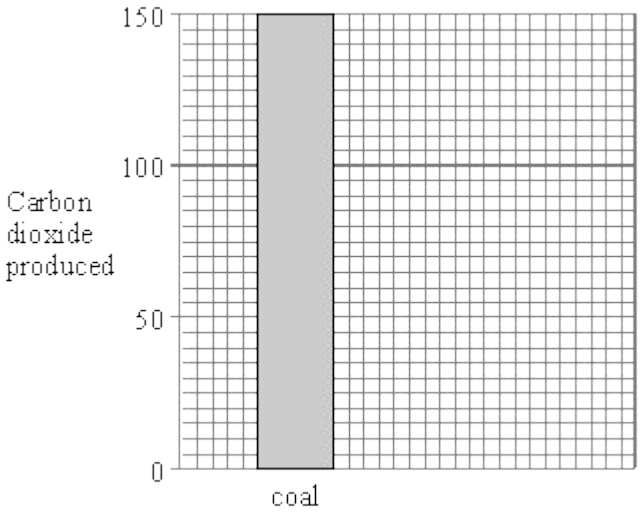
(2)

(Total 8 marks)

Q9.

The table shows how much carbon dioxide is produced when you transfer the same amount of energy by burning coal, gas and oil.

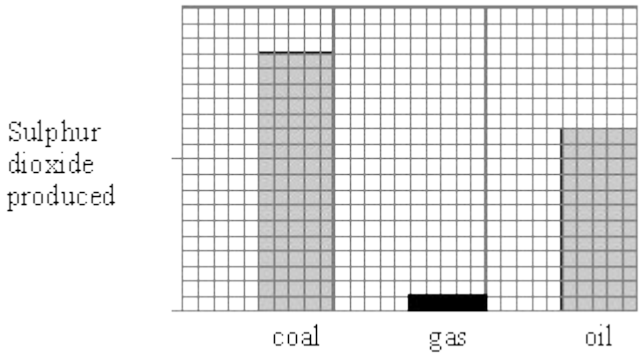
	Carbon dioxide (based on oil = 100)
coal	150
gas	75
oil	100



(a) Use the information from the table to complete the bar-chart.

(3)

(b) The second bar-chart shows how much sulphur dioxide is produced by burning the same three fuels.



Compare the amount of sulphur produced by burning gas with the amount produced by burning coal.

_____

_____

(2)

(c) (i) Coal and oil produce carbon dioxide and sulphur dioxide when they burn. What elements must they contain?

_____

_____

(2)

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(ii) Burning fuels also produce nitrogen oxides, even though the fuels contain no nitrogen. Explain why this happens.

_____

_____

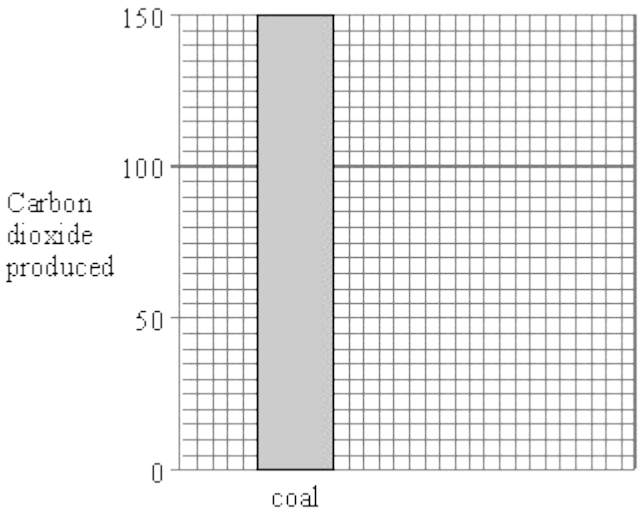
(2)

(Total 9 marks)

Q10.

The table shows how much carbon dioxide is produced when you transfer the same amount of energy by burning coal, gas and oil.

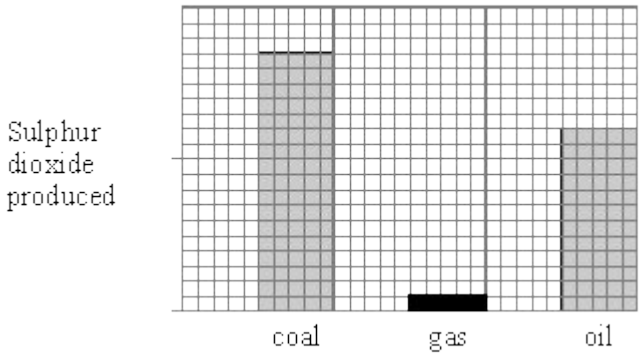
	Carbon dioxide (based on oil = 100)
coal	150
gas	75
oil	100



(a) Use the information from the table to complete the bar-chart.

(2)

(b) The second bar-chart shows how much sulphur dioxide is produced by burning the same three fuels.



Compare the amount of sulphur produced by burning gas with the amount produced by burning coal.

_____

_____

(1)

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(c) Burning fuels also produces nitrogen oxides, even though the fuels contain no nitrogen. Explain why this happens.

_____

_____

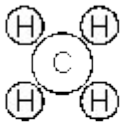
(2)

(d) When you release the same amount of energy from coal, gas and oil, different amounts of carbon dioxide are produced.
Use the information below to explain why.

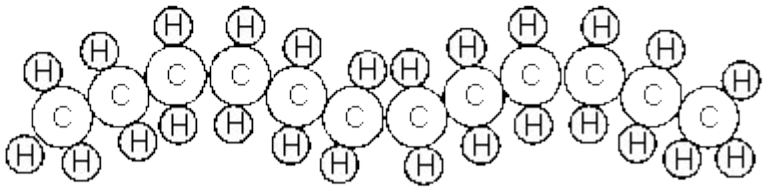
Coal is mainly carbon



North Sea gas is mainly methane



Oil is made from molecules similar to the one shown



(3)

(e) What other element do coal and oil usually contain?

_____

(1)

(Total 9 marks)

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