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Student number

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Name _____

Date _____

Attempt/Time taken _____

GCSE CHEMISTRY

Topic Paper: 7.1 Carbon compounds as fuels and feedstock
Part 1

Time allowed: 35 minutes

Materials

For this paper you must have:

- the Periodic Table/Data Sheet, provided as an insert (enclosed)
- a ruler with millimetre measurements
- a calculator, which you are expected to use where appropriate.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The Periodic Table/Data Sheet is provided as in insert.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering questions you need to make sure that your answer:
 - is clear, logical, sensibly structured
 - fully meets the requirements of the question
 - shows that each separate point or step supports the overall answer.



33 Marks



Q1. This question is about oil reserves.

(a) Diesel is separated from crude oil by fractional distillation.

Describe the steps involved in the fractional distillation of crude oil.

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(3)

(b) Diesel is a mixture of lots of different *alkanes*.

What are *alkanes*?

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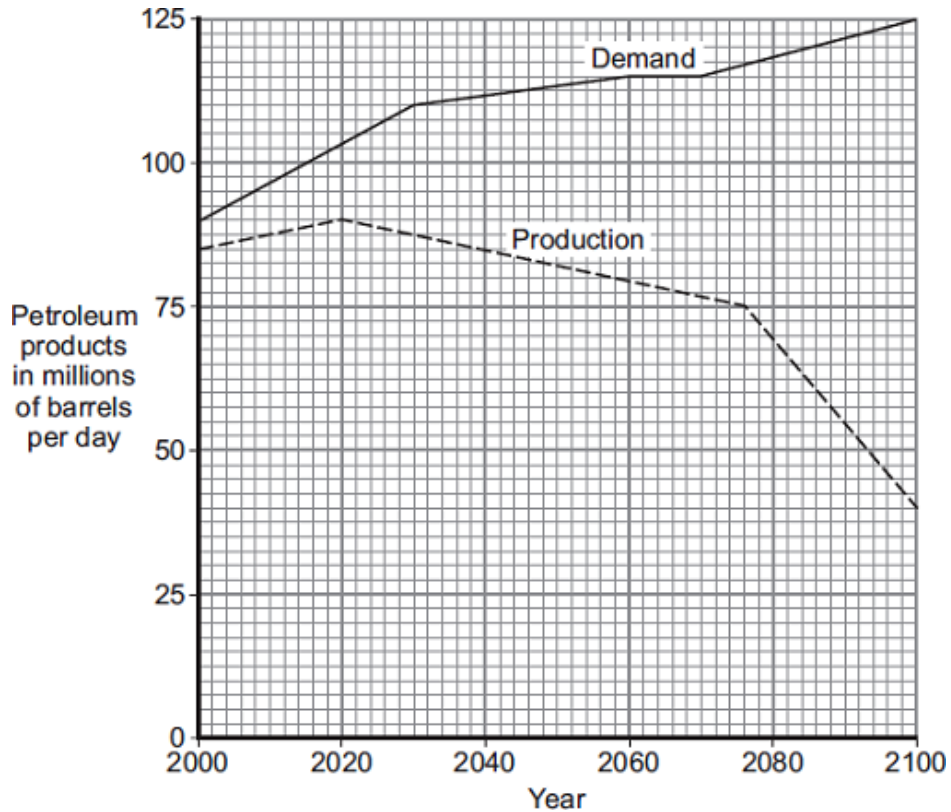
(2)



- (c) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Petroleum products, such as petrol, are produced from crude oil.

The graph shows the possible future production of petroleum products from crude oil and the expected demand for petroleum products.



Canada's oil sands hold about 20% of the world's known crude oil reserves.

The oil sands contain between 10 to 15% of crude oil. This crude oil is mainly bitumen.

In Canada the oil sands are found in the ground underneath a very large area of forest. The trees are removed. Then large diggers and trucks remove 30 metres depth of soil and rock to reach the oil sands. The oil sands are quarried. Boiling water is mixed with the quarried oil sands to separate the bitumen from the sand. Methane (natural gas) is burned to heat the water.

The mixture can be separated because bitumen floats on water and the sand sinks to the bottom of the water. The bitumen is cracked and the products are separated by fractional distillation.



- (ii) Fuels react with oxygen to produce carbon dioxide.
The reaction of a fuel with oxygen can produce a different oxide of carbon.

Name this different oxide of carbon and explain why it is produced.

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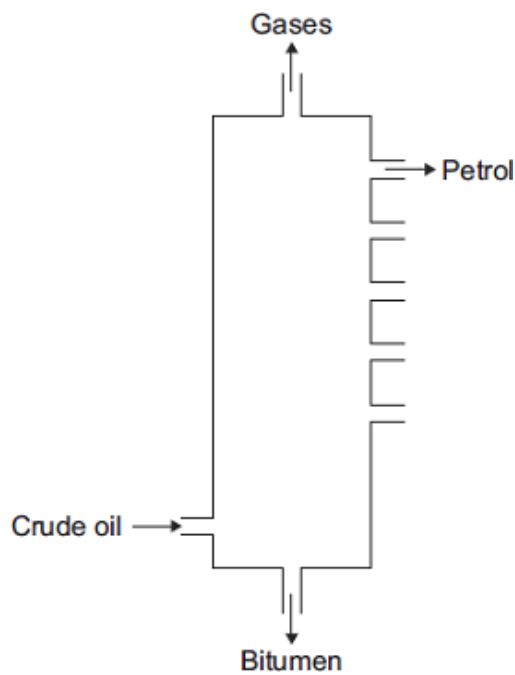
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(2)

- (b) Most of the compounds in crude oil are hydrocarbons.
Hydrocarbons with the smallest molecules are very volatile.



In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Describe and explain how **petrol** is separated from the mixture of hydrocarbons in crude oil.



Use the diagram and your knowledge to answer this question.

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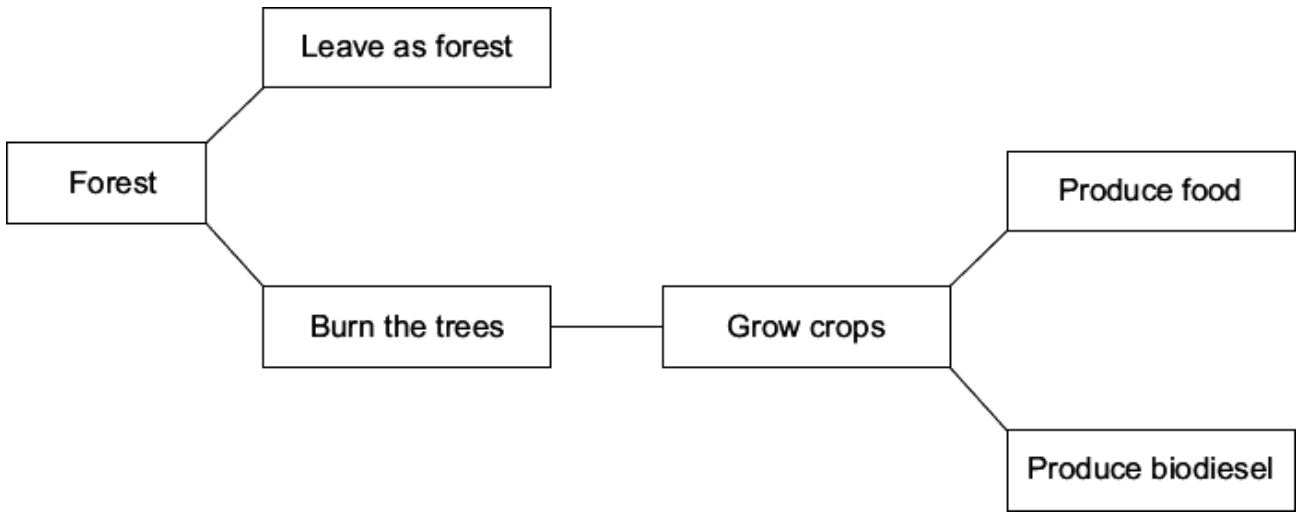
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(6)
(Total 9 marks)



Q3. Petroleum diesel is a fuel made from crude oil.
 Biodiesel is a fuel made from vegetable oils.
 To make biodiesel, large areas of land are needed to grow crops from which the vegetable oils are extracted.
 Large areas of forest are cleared by burning the trees to provide more land for growing these crops.



- (a) Use this information and your knowledge and understanding to answer these questions.
- (i) Carbon neutral means that there is no increase in the amount of carbon dioxide in the atmosphere.

Suggest why adverts claim that using biodiesel is carbon neutral.

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(2)

- (ii) Explain why clearing large areas of forest has an environmental impact on the atmosphere.

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(2)



(b) Why is there an increasing demand for biodiesel?

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(1)

(c) Suggest why producing biodiesel from crops:

(i) causes ethical concerns

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(1)

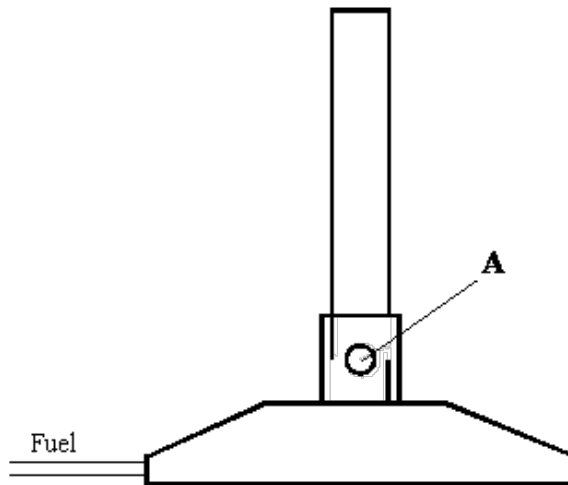
(ii) causes economic concerns.

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(1)

(Total 7 marks)

Q4. The diagram below shows a bunsen burner.



Use words from the list to complete the passage about the Bunsen burner. You may use each word once, more than once or not at all.

- | | |
|-------------------|-------------------|
| air | methane |
| argon | mechanical energy |
| carbon dioxide | nitrogen |
| chemical | physical |
| electrical energy | potential energy |
| heat | oxygen |
| kinetic energy | water vapour |



In the Bunsen burner the fuel is mixed with
which enters through the hole labelled A.

When the fuel burns it reacts with the gas called
and energy is given out as

The fuel used in the Bunsen burner contains carbon and hydrogen which are changed
during burning into and

Burning is an example of a change because new
substances are formed.

(Total 6 marks)