

Name:

Date:

C7 - Test 3  
ORGANIC CHEMISTRY  
Intermediate

**GCSE**

**CHEMISTRY**

**AQA - Triple Science**

Mark

Grade

---

### Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

### Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

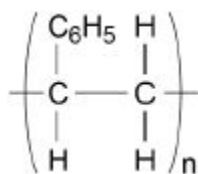
### Information

- The marks for the questions are shown in brackets

1.

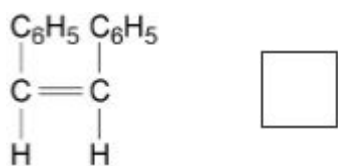
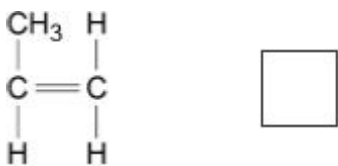
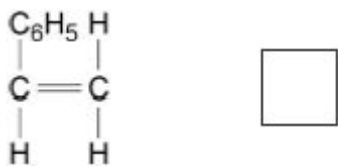
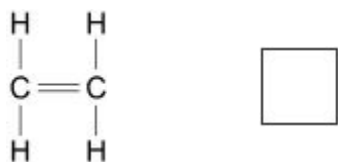
Disposable cups are made from coated paper or poly(styrene).

The diagram below represents the structure of poly(styrene).



(a) Which small molecule is used to produce poly(styrene)?

Tick **one** box.



(1)

(b) Which process is used to make poly(styrene) from small molecules?

Tick **one** box.

Cracking

Distillation

Fermentation

Polymerisation

(1)

(c) Complete the sentences.

Choose answers from the box.

<b>ceramics</b>	<b>composites</b>	<b>four</b>	<b>many</b>
<b>monomers</b>	<b>polymers</b>	<b>two</b>	

Poly(styrene) is produced from small molecules called \_\_\_\_\_

When poly(styrene) is made, \_\_\_\_\_ styrene molecules join to form large molecules.

These large molecules are called \_\_\_\_\_ .

(3)

(d) The table below gives some information about disposable cups.

	<b>Coated paper cups</b>	<b>Polystyrene cups</b>
Source of raw materials	Wood	Crude oil
Energy to make 1 cup in arbitrary units	550	200
Biodegradable	Yes	No
Recyclable	No	Yes

Compare the advantages and disadvantages of using coated paper and poly(styrene) to make disposable cups.

Use the table above and your knowledge and understanding of life cycle assessments (LCAs).

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

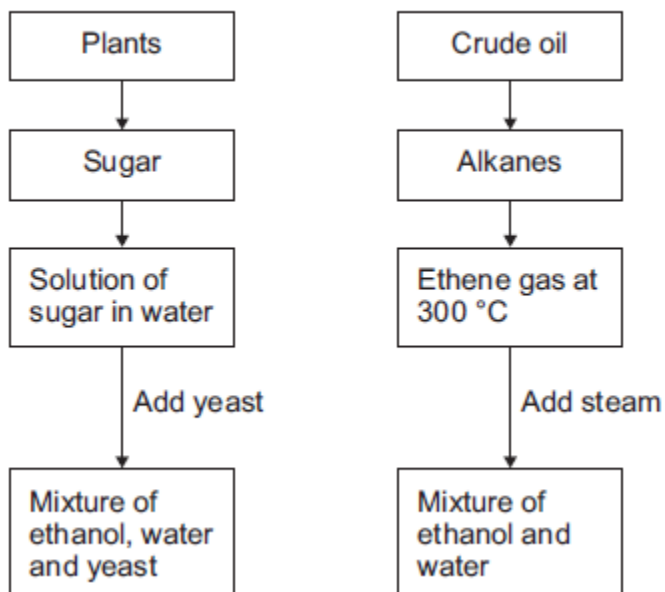
---

**(4)**  
**(Total 9 marks)**

2.

Figure 1 shows how ethanol is made from plants and from crude oil.

Figure 1



(a) What is the name of the reaction to produce ethanol from sugar?

Tick (✓) **one** box.

fermentation

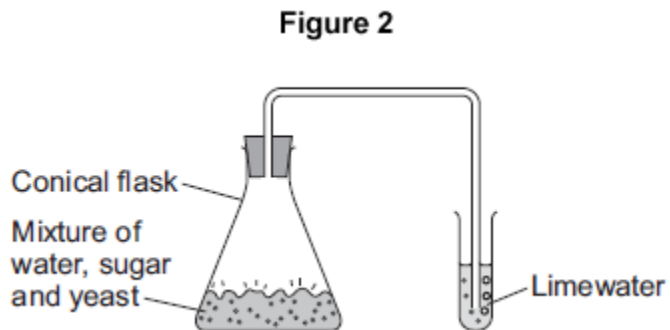
polymerisation

reduction

(1)

(b) A student made ethanol from sugar.

**Figure 2** shows the apparatus used.



(i) What change is seen in the limewater?

Give a reason for your answer.

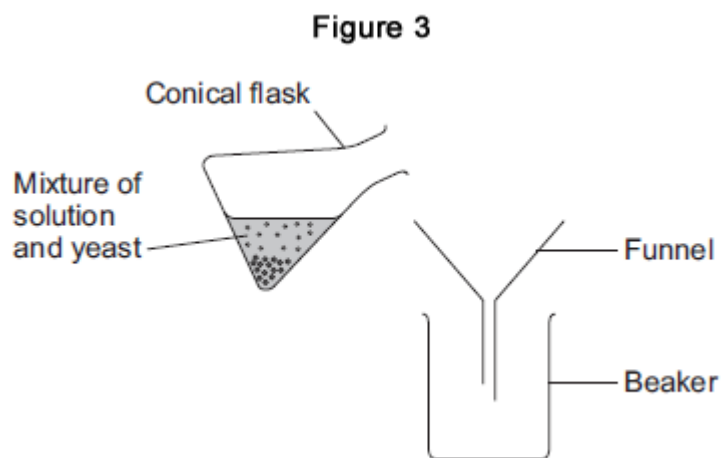
---

---

(2)

(ii) The student wanted to separate the solid yeast from the solution.

**Figure 3** shows the apparatus used.



What is missing from the apparatus in **Figure 3**?

---

---

(1)

(Total 4 marks)

**3.**

This question is about hydrocarbons.

The table gives information about four hydrocarbons.

The hydrocarbons are four successive members of a homologous series.

Hydrocarbon	Formula	Boiling point in °C
A	C <sub>4</sub> H <sub>10</sub>	0
B		36
C	C <sub>6</sub> H <sub>14</sub>	69
D	C <sub>7</sub> H <sub>16</sub>	98

(a) What is the formula of hydrocarbon **B**?

Tick (✓) **one** box.

C<sub>4</sub>H<sub>12</sub>

C<sub>5</sub>H<sub>12</sub>

C<sub>5</sub>H<sub>12</sub>

C<sub>6</sub>H<sub>12</sub>

(1)

(b) What is the simplest ratio of carbon : hydrogen atoms in a molecule of hydrocarbon **A**?

Ratio = 2 : \_\_\_\_\_

(1)

(c) Which hydrocarbon is a gas at room temperature (25 °C)?

Tick (✓) **one** box.

A

B

C

D

(1)

(d) Which hydrocarbon is most flammable?

Tick (✓) **one** box.

A       B       C       D

(1)

(e) Which **two** substances are produced when a hydrocarbon **completely** combusts in air?

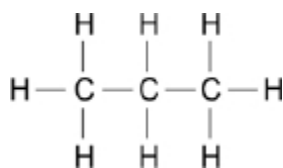
Tick (✓) **two** boxes.

Carbon	<input type="checkbox"/>
Carbon dioxide	<input type="checkbox"/>
Hydrogen	<input type="checkbox"/>
Sulfur dioxide	<input type="checkbox"/>
Water	<input type="checkbox"/>

(2)



The diagram shows the displayed structure of a hydrocarbon molecule.



(f) What is the name of the hydrocarbon in the diagram above?

Tick (✓) **one** box.

Butane

Ethane

Methane

Propane

(1)

(g) Calculate the relative formula mass ( $M_r$ ) of the hydrocarbon in the diagram above.

Relative atomic masses ( $A_r$ ): H = 1 C = 12

---

---

Relative formula mass ( $M_r$ ) = \_\_\_\_\_

(2)

(Total 9 marks)

4.

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)

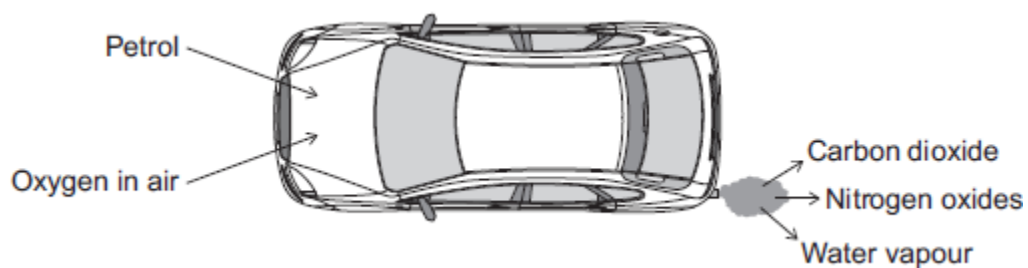
(iii) Crude oil is separated by fractional \_\_\_\_\_.

(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<sub>8</sub>H<sub>18</sub>).

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

octane + \_\_\_\_\_ → \_\_\_\_\_ + \_\_\_\_\_

(2)

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

Describe why sulfur should be removed from petrol.

---

---

---

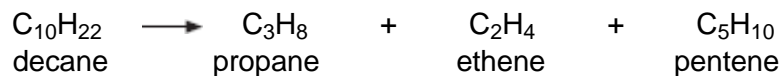
---

(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.

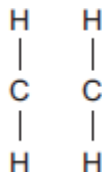
Propane is a polymer.

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)

**5.**

This question is about organic compounds.

(a) Ethanol burns in air.

Use the correct answer from the box to complete the word equation for the reaction.

**carbon**

**hydrogen**

**oxygen**

ethanol + \_\_\_\_\_ → carbon dioxide + water

(1)

(b) Use the correct answer from the box to complete the sentence.

**milk**

**hard water**

**vinegar**

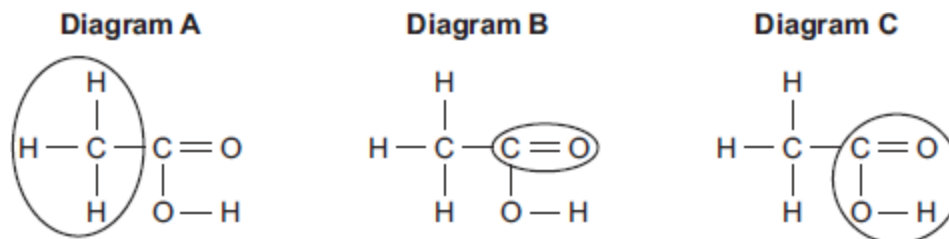
Ethanoic acid is in \_\_\_\_\_.

(1)

(c) Ethanoic acid is a carboxylic acid.

Which diagram, **A**, **B** or **C**, has a ring around the functional group of a carboxylic acid?

Write your answer in the box.



Diagram

(1)

(d) Ethyl propanoate is produced by reacting ethanol with propanoic acid.

What type of organic compound is ethyl propanoate?

Tick (✓) **one** box.

Alcohol

Carboxylic acid

Ester

(1)

(e) Organic compounds such as ethyl propanoate are used in perfumes.

Give **two** properties of these compounds that make them suitable for use in perfumes.

---

---

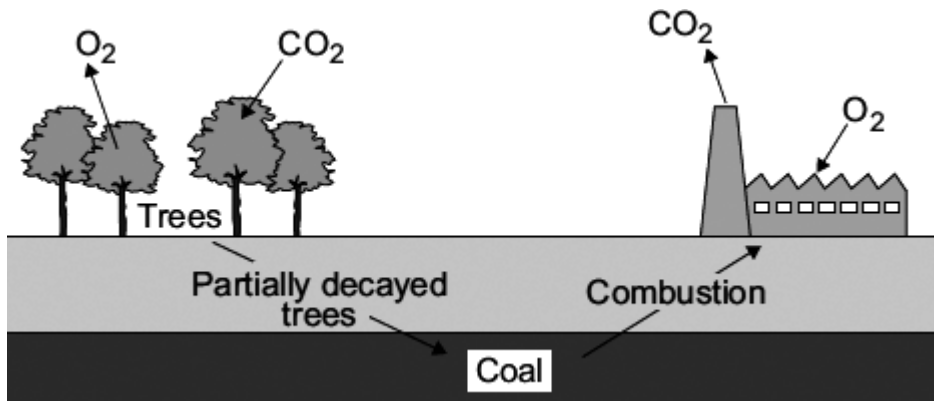
(2)

(Total 6 marks)

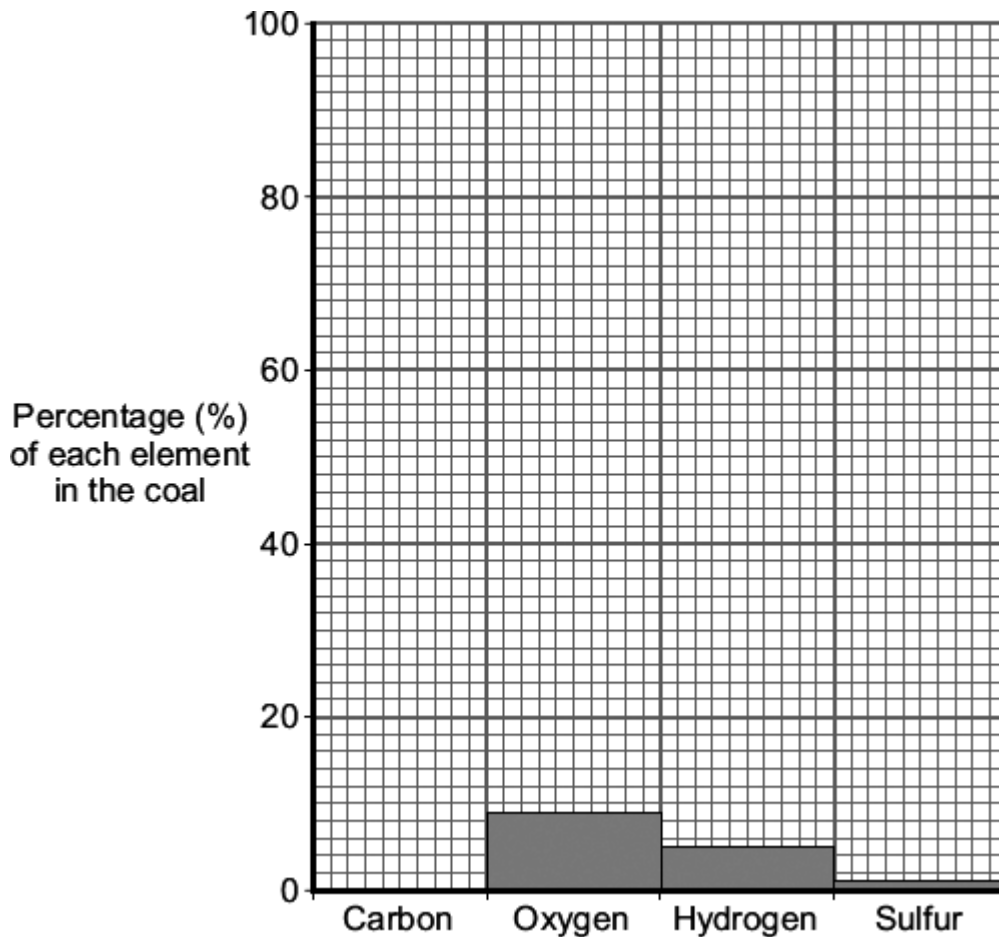
6. About 3000 million years ago carbon dioxide was one of the main gases in the Earth's early atmosphere.

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.

---

---

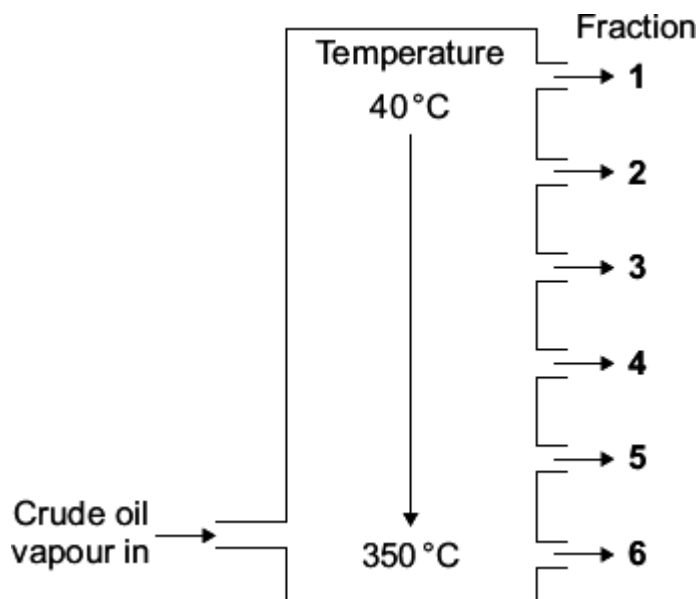
---

---

(2)

(Total 6 marks)

7. Crude oil is a mixture of hydrocarbons.  
Crude oil can be separated into fractions.



- (a) (i) Complete the sentence.

The process used to separate the crude oil into fractions is called fractional \_\_\_\_\_.

(1)

- (ii) Why do the fractions separate at different temperatures?

---



---

(1)

- (b) Tick (✓) **two** properties of fraction 6.

Property	Tick (✓)
contains hydrocarbons	
has a small number of carbon atoms in each molecule	
is easy to ignite	
has a high boiling point	

(2)



- (c) Fraction 1 contains hydrocarbons called alkanes.  
The general formula of an alkane is:  $C_nH_{2n+2}$

What is the formula of the alkane that has 5 carbon atoms in each molecule?

Draw a ring around the correct answer.



(1)

(Total 5 marks)

8.

Crude oil is a natural resource from which useful fuels can be separated.

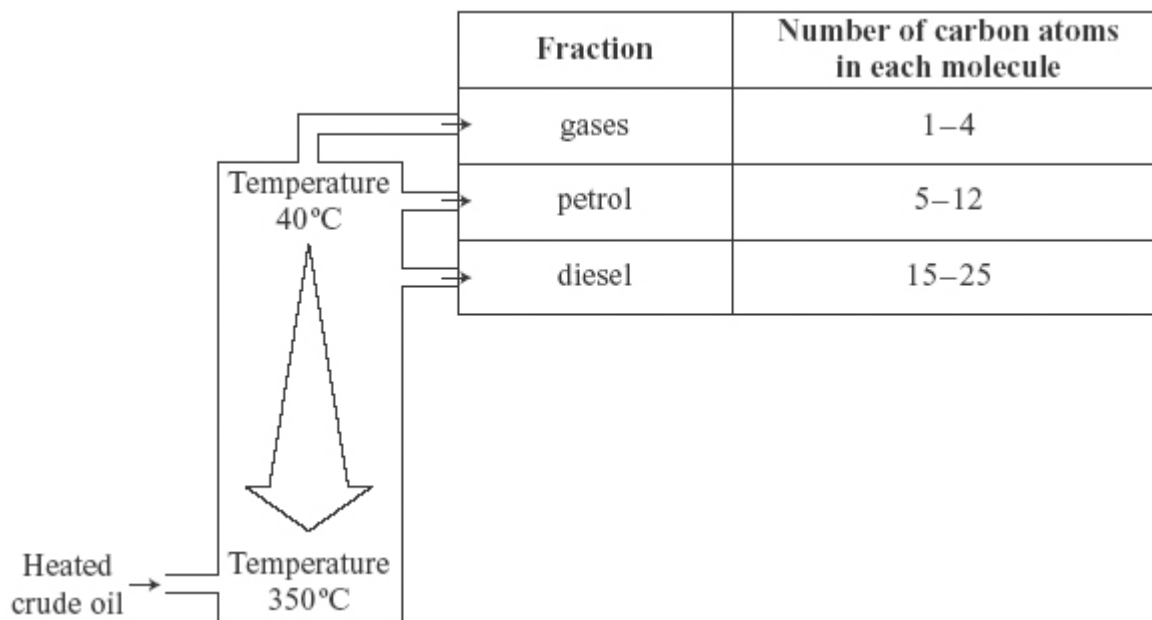
- (a) Crude oil is a mixture of hydrocarbons.

Complete the sentence about a hydrocarbon molecule.

A hydrocarbon molecule is made up of \_\_\_\_\_ and carbon atoms only.

(1)

- (b) Many fuels come from crude oil. Some of these fuels are shown in the diagram.



Suggest **two** properties of these fuels that allow them to be separated from crude oil.

---



---



---



---

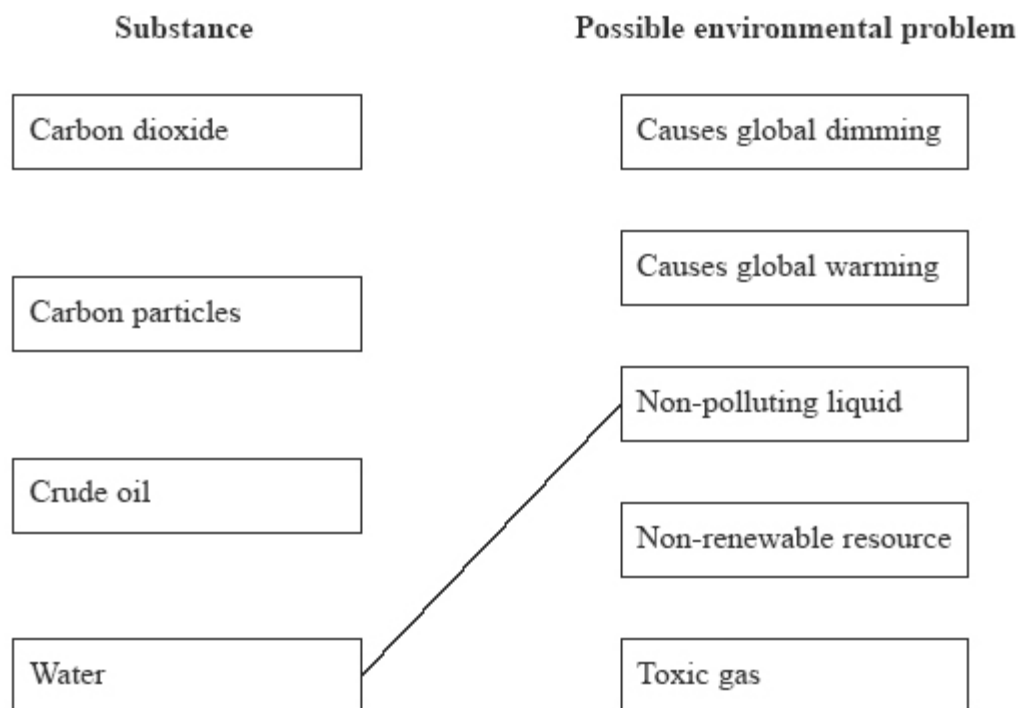
(2)

(c) Fuels from crude oil burn to provide heat energy.

When a fuel burns, it combines with oxygen in the air and produces carbon dioxide and water. When there is not enough oxygen, the fuel burns and also produces carbon monoxide and carbon particles.

Draw a straight line from each substance that links it to a possible environmental problem.

One has been done for you.



(3)

(Total 6 marks)

**9.** 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<sub>4</sub>.

(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)**