

**Petroleum Distillation, Alkanes and Alkenes Past Paper Questions AQA**  
**Chemistry GCSE -Higher**

1.

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 marks)

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

What are *alkanes*?

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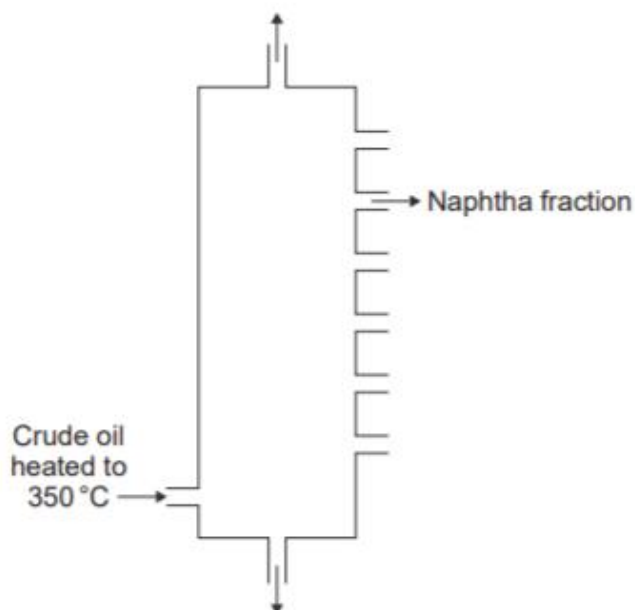
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(2 marks)

2.

(a) Fractional distillation is used to separate crude oil into fractions.



(a) (i) Write a number, **2**, **3**, **4** or **5**, next to each stage so that the description of fractional distillation is in the correct order. Numbers **1** and **6** have been done for you.

Number	Stage
<b>1</b>	The crude oil is heated to 350 °C.
	When a fraction in the vapours cools to its boiling point, the fraction condenses.
	Any liquids flow down to the bottom of the column and the hot vapours rise up the column.
<b>6</b>	The condensed fraction is separated and flows out through a pipe.
	When the hot vapours rise up the column, the vapours cool.
	Most of the compounds in the crude oil evaporate.

(2 marks)

(a) (ii) The naphtha fraction is cracked to produce ethene ( $C_2H_4$ ). Ethene is used to make the polymer called poly(ethene).

Name **two** substances produced when poly(ethene) burns in air.

1 .....

2 .....

(2 marks)

3.

Methylated spirit is a useful product made from a mixture of substances.

**Table 1** shows the mass of the substances in a sample of methylated spirit.

**Table 1**

Substance	Mass in grams
Ethanol	265.5
Methanol	23.3
Pyridine	3.0
Methyl violet	1.5

1 What name is given to a useful product such as methylated spirit?

[1 mark]

\_\_\_\_\_

2 Calculate the percentage by mass of methanol in methylated spirit.

Use **Table 1**.

[2 marks]

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Percentage = \_\_\_\_\_ %

Methylated spirit contains ethanol and is available cheaply.

Methylated spirit also contains:

- pyridine which has a very unpleasant smell
- methyl violet which makes the mixture purple.

- 3 Suggest why pyridine and methyl violet are added to ethanol to make methylated spirit.

[1 mark]

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- 4 Suggest **one** use of methylated spirit.

[1 mark]

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- 5 Describe how ethanol is produced from sugar solution.

Give the name of this process.

[3 marks]

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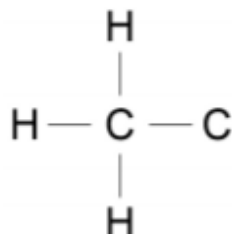
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]. **6** **Figure 2** shows part of the displayed formula for ethanol.

Complete **Figure 2**.

[1 mark]

**Figure 2**



]. **7** Name the gas produced when sodium is added to ethanol.

[1 mark]

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]. **8** Methanol is used to produce methanoic acid.

What type of substance reacts with methanol to produce methanoic acid?

[1 mark]

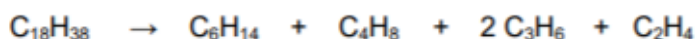
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4.

This question is about organic compounds.

Hydrocarbons can be cracked to produce smaller molecules.

The equation shows the reaction for a hydrocarbon,  $C_{18}H_{38}$



1. Which product of the reaction shown is an alkane?

[1 mark]

Tick **one** box.

$C_2H_4$

$C_3H_6$

$C_4H_8$

$C_6H_{14}$

2. Table 1 shows the boiling point, flammability and viscosity of  $C_{18}H_{38}$  compared with the other hydrocarbons shown in the equation.

Table 1

	Boiling point	Flammability	Viscosity
A	highest	lowest	highest
B	highest	lowest	lowest
C	lowest	highest	highest
D	lowest	highest	lowest

Which letter, **A**, **B**, **C** or **D**, shows how the properties of  $C_{18}H_{38}$  compare with the properties of  $C_2H_4$ ,  $C_3H_6$ ,  $C_4H_8$  and  $C_6H_{14}$ ?

[1 mark]

Tick **one** box.

**A**

**B**

**C**

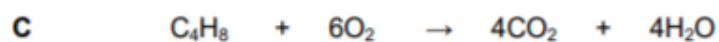
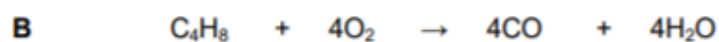
**D**

**3** The hydrocarbon  $C_4H_8$  was burnt in air.

Incomplete combustion occurred.

Which equation, **A**, **B**, **C** or **D**, correctly represents the incomplete combustion reaction?

[1 mark]



Tick **one** box.

**A**

**B**

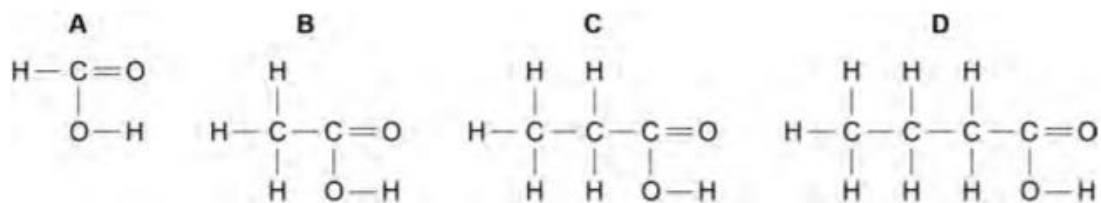
**C**

**D**

011 . 4 Propanoic acid is a carboxylic acid.

Which structure, **A**, **B**, **C** or **D**, shows propanoic acid?

[1 mark]



Tick **one** box.

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|----------|--------------------------|
| <b>A</b> | <input type="checkbox"/> |
| <b>B</b> | <input type="checkbox"/> |
| <b>C</b> | <input type="checkbox"/> |
| <b>D</b> | <input type="checkbox"/> |

011 . 5 Propanoic acid is formed by the oxidation of which organic compound?

[1 mark]

Tick **one** box.

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| Propane   | <input type="checkbox"/> |
| Propene   | <input type="checkbox"/> |
| Propanol  | <input type="checkbox"/> |
| Polyester | <input type="checkbox"/> |



5.

Crude oil is a mixture of many different chemical compounds.

(a) Fuels, such as petrol (gasoline), can be produced from crude oil.

(a) (i) Fuels react with oxygen to release energy.

Name the type of reaction that releases energy from a fuel.

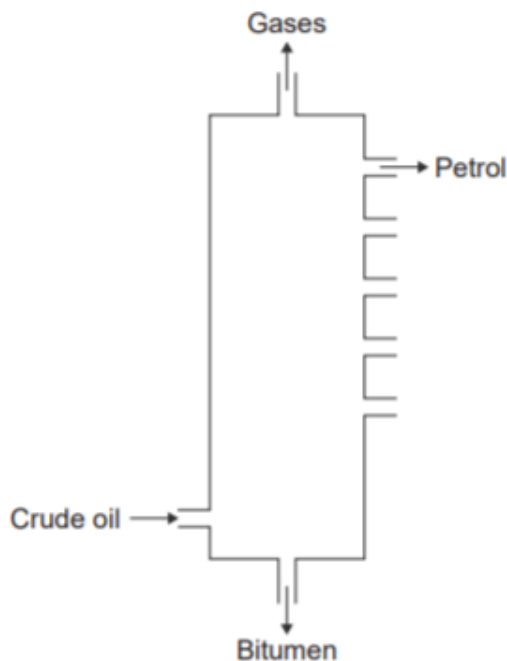
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(1 mark)

(a) (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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(2 marks)

(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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**(6 marks)**