AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.7.1.2

Fractional distillation and petrochemicals

Past-paper questions

Tier	**Higher**
Question groups	**2**
Available paper years	**2018–2020**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

5.7.1.2 Fractional distillation and petrochemicals

Question 01

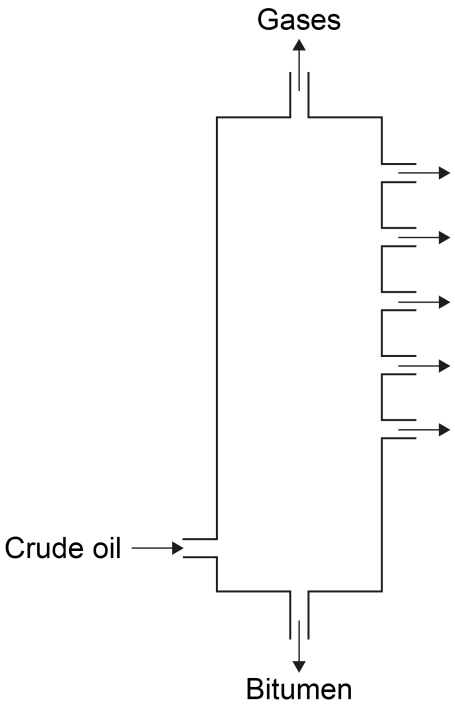
June 2018 | 8464/C/2H | Original Q1

0 1 Crude oil is a mixture of hydrocarbons.

0 1 . 1 The hydrocarbons in crude oil are separated into fractions by fractional distillation.

Figure 1 shows a fractional distillation column.

Figure 1



Crude oil vapour passes up the column.

Complete the sentence.

Choose the answer from the box.

[1 mark]

condenses	**dissolves**	**freezes**	**melts**

Each fraction _____ at a different level.

5.7.1.2 Fractional distillation and petrochemicals

Question 01 · continued

0 1 . 2 Why do the fractions separate?

[1 mark]

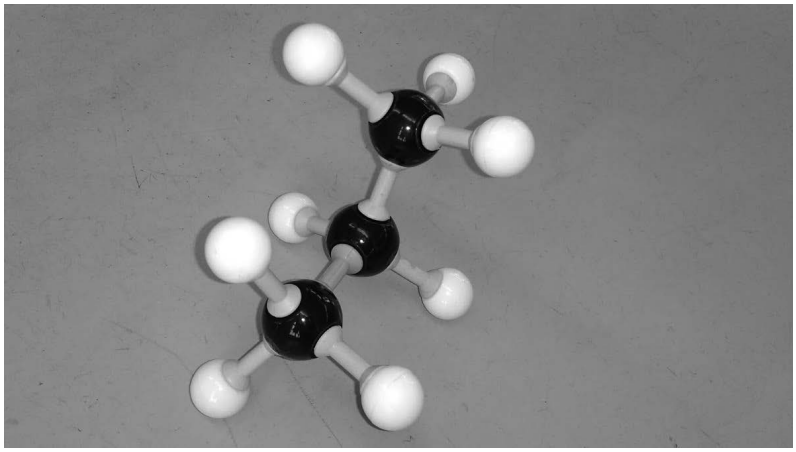
Tick **one** box.

- The fractions have different boiling points. ☐
- The fractions have different flammability. ☐
- The fractions have different melting points. ☐
- The fractions have different viscosity. ☐

Most of the hydrocarbons in crude oil are alkanes.

0 1 . 3 **Figure 2** represents an alkane molecule.

Figure 2



Name the alkane.

[1 mark]

_____

Question 1 continues on the next page

5.7.1.2 Fractional distillation and petrochemicals

Question 01 · continued

0 1 . 4 Methane (CH_4) is an alkane.

What is the general formula for alkanes?

[1 mark]

Tick **one** box.

- C_nH_n ☐
- C_nH_{2n} ☐
- C_nH_{2n-2} ☐
- C_nH_{2n+2} ☐

0 1 . 5 Alkanes burn in oxygen.

Balance the equation for methane burning.

[1 mark]

$$____ CH_4 + ____ O_2 \rightarrow ____ CO_2 + ____ H_2O$$

0 1 . 6 Ethene is an alkene.

Which reagent is used to test for alkenes?

[1 mark]

Tick **one** box.

- Anhydrous copper sulfate ☐
- Bromine water ☐
- Damp litmus paper ☐
- Limewater ☐

5.7.1.2 Fractional distillation and petrochemicals

Question 01 · continued

Table 1 shows data from a life cycle assessment (LCA) for the disposal of 10 000 biodegradable plastic bags.

Table 1

	Burning and using the energy to generate electricity	Landfill
Mass of carbon dioxide produced in kg	25	15
Mass of solid residue in kg	0.050	0.070
Mass of sulfur dioxide produced in kg	0.20	0.30

0 1 . 7 Why are life cycle assessments (LCA) done?

[1 mark]

0 1 . 8 Compare the **two** methods for the disposal of biodegradable plastic bags.

Use information from **Table 1**

[4 marks]

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5.7.1.2 Fractional distillation and petrochemicals

Question 02

November 2020 | 8464/C/2H | Original Q5

0 5 This question is about crude oil and alkanes.

0 5 . 1 Describe how crude oil is formed.

[3 marks]

0 5 . 2 Describe how crude oil is separated into fractions by fractional distillation.

[4 marks]

5.7.1.2 Fractional distillation and petrochemicals

Question 02 · continued

Table 2 shows the boiling points of three alkanes.

Table 2

Alkanes	Boiling point in °C
C_5H_{12}	36
$C_{10}H_{22}$	174
$C_{15}H_{32}$	271

0 5 . 3 What is the general formula for alkanes?

[1 mark]

0 5 . 4 Explain the trend in the boiling points of the alkanes.

[3 marks]

Question 5 continues on the next page

5.7.1.2 Fractional distillation and petrochemicals

Question 02 · continued

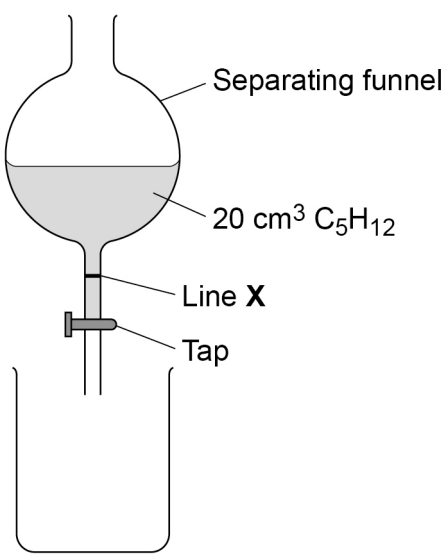
0 5 . 5 A student investigated one property of the alkanes C_5H_{12}, $C_{10}H_{22}$ and $C_{15}H_{32}$

This is the method used.

1. Pour 20 cm^3 of C_5H_{12} into a separating funnel.
2. Open the tap of the separating funnel and start a timer.
3. Stop the timer when the level of C_5H_{12} reaches line **X**.
4. Repeat steps 1 to 3 with $C_{10}H_{22}$ and $C_{15}H_{32}$

Figure 5 shows the apparatus used.

Figure 5



The level of C_5H_{12} takes 6.4 seconds to reach line **X**.

Predict the trend in times for the other two alkanes.

Give **one** reason for your answer.

[2 marks]

Trend _____

_____

Reason _____

_____

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