AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.7.1.4

Cracking and alkenes

Past-paper questions

Tier	**Foundation**
Question groups	**6**
Available paper years	**2019–2025**

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.

5.7.1.4 Cracking and alkenes

Question 01

June 2019 | 8464/C/2F | Original Q4

0 4 Large hydrocarbon molecules can be cracked to produce smaller, more useful molecules.

Alkanes and alkenes are produced when hydrocarbons are cracked.

0 4 . 1 Give **two** conditions used for cracking.

[2 marks]

1 _____

2 _____

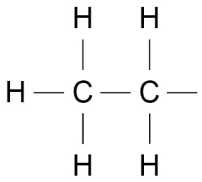
0 4 . 2 Butane (C_4H_{10}) is an alkane.

Figure 5 shows part of the displayed structural formula of butane.

Complete the displayed structural formula of butane in **Figure 5**.

[1 mark]

Figure 5



0 4 . 3 Butane burns in oxygen.

Complete the word equation for the complete combustion of butane.

[2 marks]

butane + oxygen → _____ + _____

Question 4 continues on the next page

5.7.1.4 Cracking and alkenes

Question 01 · continued

0 4 . 4 Ethene is an alkene.

Give a test for alkenes.

Give the result of the test if an alkene is present.

[2 marks]

Test _____

Result _____

_____

0 4 . 5 Each year many tonnes of crude oil are extracted from the Earth.

It took millions of years for the crude oil to be formed.

What do we call development that meets the needs of current generations without compromising the resources for future generations?

[1 mark]

Tick (✓) **one** box.

Finite development ☐

Global development ☐

Natural development ☐

Sustainable development ☐

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5.7.1.4 Cracking and alkenes

Question 02

November 2020 | 8464/C/2F | Original Q6

0 6 This question is about the Earth's resources.

When most fuels burn carbon dioxide is produced.

Propane (C_3H_8) is a fuel.

0 6 . 1 Balance the equation for the combustion of propane.

[1 mark]

$$C_3H_8 + ____ O_2 \rightarrow 3\,CO_2 + 4\,H_2O$$

0 6 . 2 Describe the test for carbon dioxide.

Give the result of the test.

[2 marks]

Test _____

Result _____

_____

0 6 . 3 Propane can be cracked to produce propene and hydrogen.

Complete the symbol equation for the reaction.

[1 mark]

$$\underset{\text{propane}}{C_3H_8} \rightarrow \underset{\text{propene}}{_____} + \underset{\text{hydrogen}}{H_2}$$

5.7.1.4 Cracking and alkenes

Question 02 · continued

0 6 . 4 Describe the test for hydrogen.

Give the result of the test.

[2 marks]

Test _____

Result _____

_____

0 6 . 5 Propene is an alkene.

Describe the test for alkenes.

Give the colour change in the test.

[3 marks]

Test _____

Colour change _____ to _____

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5.7.1.4 Cracking and alkenes

Question 03

November 2021 | 8464/C/2F | Original Q7

0 7 Crude oil is a resource found in rocks.

Most of the compounds in crude oil are hydrocarbons.

0 7 . 1 Complete the sentence.

[1 mark]

Crude oil is formed by the decomposition of _____.

0 7 . 2 Alkanes are hydrocarbons.

Give the name of the alkane molecule that has three carbon atoms.

[1 mark]

_____

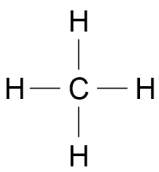
Question 7 continues on the next page

Question 03 · continued

0 7 . 3 **Figure 7** shows two alkane molecules.

Figure 7

Methane



Hexane

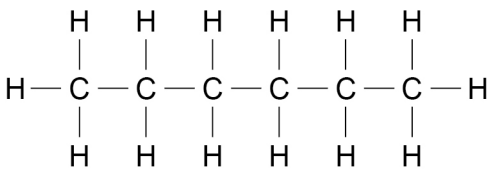


Table 4 shows the melting points and boiling points of methane and hexane.

Table 4

	Melting point in °C	Boiling point in °C
Methane	−183	−162
Hexane	−95	69

Compare the structure and properties of methane and hexane.

[6 marks]

5.7.1.4 Cracking and alkenes

Question 03 · continued

Hydrocarbons are cracked to produce more useful alkanes and alkenes.

0 7 . 4 Decane ($C_{10}H_{22}$) is cracked to produce **two** products.

Complete the equation for the reaction.

[1 mark]

$$C_{10}H_{22} \rightarrow _____ + C_2H_4$$

0 7 . 5 C_2H_4 is an alkene.

What is the test for alkenes?

Give the result of the test if an alkene is present.

[2 marks]

Test _____

_____

Result _____

_____

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5.7.1.4 Cracking and alkenes

Question 04

June 2023 | 8464/C/2F | Original Q1

0 1 Crude oil contains a large number of hydrocarbons.

0 1 . 1 Crude oil is a finite resource.

What is a finite resource?

[1 mark]

Tick (✓) **one** box.

- A limited resource ☐
- A renewable resource ☐
- A sustainable resource ☐

0 1 . 2 What is crude oil formed from?

[1 mark]

Tick (✓) **one** box.

- Plankton ☐
- Volcanoes ☐
- Water ☐

5.7.1.4 Cracking and alkenes

Question 04 · continued

0 1 . 3 What type of substance is crude oil?

[1 mark]

Tick (✓) **one** box.

Compound ☐

Element ☐

Mixture ☐

0 1 . 4 The hydrocarbons in crude oil are separated into fractions using fractional distillation.

Complete the sentences.

Choose answers from the box.

[2 marks]

condense	**evaporate**	**freeze**	**melt**

In fractional distillation the crude oil is heated so

the hydrocarbons _____ .

The fractions collect as the hydrocarbons cool and _____ .

Question 1 continues on the next page

Hydrocarbons can be cracked to produce more useful molecules.

0 1 . 5 Complete the sentence.

Choose the answer from the box.

[1 mark]

alloys	**fertilisers**	**fuels**

Some products of cracking are useful as _____ .

0 1 . 6 Hydrogen gas is a product of cracking.

What is used in the test for hydrogen gas?

[1 mark]

Tick (✓) **one** box.

Burning splint ☐

Glowing splint ☐

Limewater ☐

5.7.1.4 Cracking and alkenes

Question 04 · continued

0 1 . 7 5.20 kg of crude oil contains 1.53 kg of LPG (Liquefied Petroleum Gas).

Calculate the percentage (%) of LPG in 5.20 kg of crude oil.

Give your answer to 3 significant figures.

[3 marks]

Percentage (3 significant figures) = _____ %

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Turn over for the next question

5.7.1.4 Cracking and alkenes

Question 05

June 2024 | 8464/C/2F | Original Q6

0 6 Alkanes and alkenes are hydrocarbons.

0 6 . 1 Define the term 'hydrocarbon'.

[1 mark]

0 6 . 2 The general formula for alkanes is C_nH_{2n+2}

Determine the formula of the alkane with 10 carbon atoms.

[1 mark]

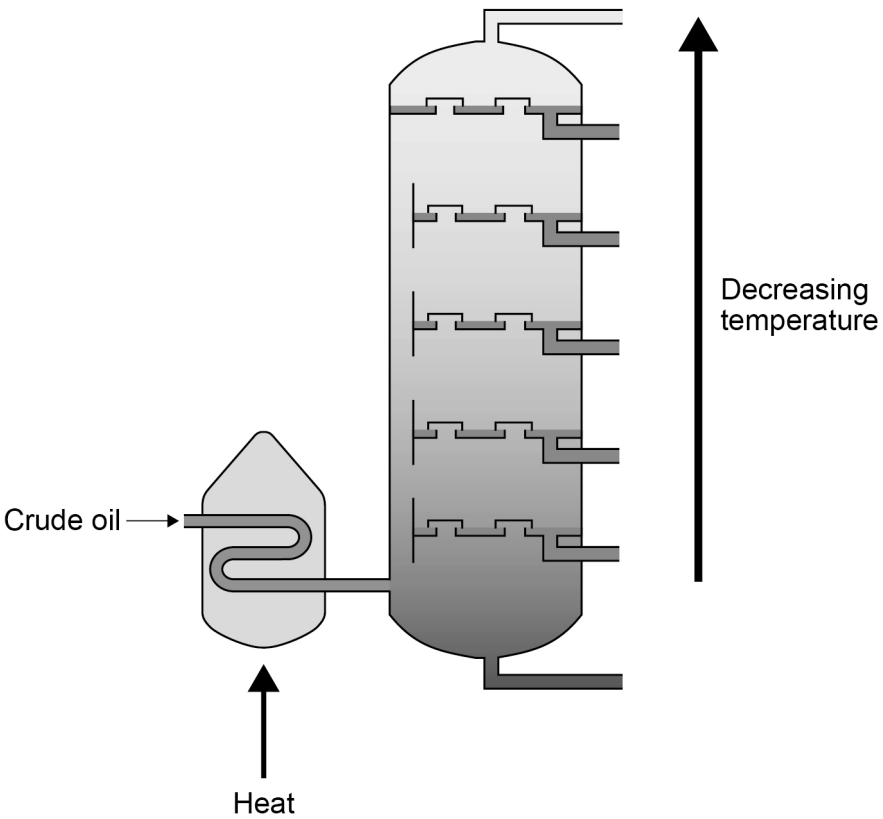
Formula = _____

Question 6 continues on the next page

0 6 . 3 Crude oil is a mixture of hydrocarbons.

Figure 4 represents industrial equipment used to separate crude oil into fractions.

Figure 4



Explain how crude oil is separated into fractions.

Use **Figure 4**.

[4 marks]

5.7.1.4 Cracking and alkenes

Question 05 · continued

0 6 . 4 The alkane molecule $C_{14}H_{30}$ can be cracked to produce smaller molecules.

Balance the equation for the reaction.

[1 mark]

$$C_{14}H_{30} \rightarrow C_8H_{18} + ____ C_3H_6$$

Question 6 continues on the next page

Question 05 · continued

Propene (C_3H_6) is an alkene.

0 6 . 5 Describe the test for alkenes.

Give the result.

[2 marks]

Test _____

_____

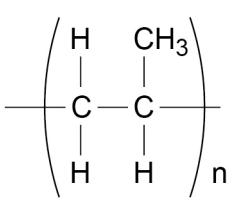
Result _____

_____

0 6 . 6 Poly(propene) is made from propene.

Figure 5 represents the repeating unit of poly(propene).

Figure 5



What type of substance is poly(propene)?

[1 mark]

_____

10

5.7.1.4 Cracking and alkenes

Question 06

June 2025 | 8464/C/2F | Original Q4

0 4 Humans use many different resources.

Water is an important natural resource.

0 4 . 1 What is meant by 'potable water'?

[1 mark]

Tick (✓) **one** box.

- Water from the ground ☐
- Water that is pure ☐
- Water that is safe to drink ☐

0 4 . 2 Waste water needs treatment before the water is put back into rivers and the sea.

The first stage of waste water treatment is to pass the waste water through metal grids.

Why is the waste water passed through metal grids?

[1 mark]

Tick (✓) **one** box.

- To remove dissolved salts ☐
- To remove large solid objects ☐
- To remove microbes ☐
- To remove oxygen gas ☐

Question 06 · continued

Clothes can be made from different materials.

Some clothes are made from wool and some clothes are made from poly(propene).

0 4 . 3 One sheep produces 4.5 kg of wool.

50 g of wool is needed to make a hat.

Calculate the number of hats that can be made from the wool of one sheep.

1 kg = 1000 g

[3 marks]

Number of hats = _____

0 4 . 4 **Table 4** gives information about poly(propene) and wool.

Table 4

	Poly(propene)	Wool
Source of material	Crude oil	Sheep
Level of insulation	High	Medium
Cost	Low	High
Durability	High	Medium

Explain the advantages of using poly(propene) and of using wool for clothing.

[4 marks]

Extra space

Question 4 continues on the next page

0 4 . 5 After being used, clothes can be:

- given to other people to wear
- used to make insulation blocks for buildings.

Complete the sentences.

Choose answers from the box.

[2 marks]

recycled	**reduced**	**released**	**reused**	**reversed**

When clothes are given to other people to wear,

the clothes are _____.

When clothes are used to make insulation blocks for buildings,

the clothes are _____.

5.7.1.4 Cracking and alkenes

Question 06 · continued

Poly(propene) is made from an alkene.

Alkenes are produced by cracking alkanes.

0 4 . 6 A high temperature is used for cracking alkanes.

Which **two** of the following can also be used to crack alkanes?

[2 marks]

Tick (✓) **two** boxes.

- A catalyst ☐
- A solvent ☐
- Carbon dioxide ☐
- Steam ☐
- Sulfuric acid ☐

0 4 . 7 Which chemical is used to test for alkenes?

[1 mark]

Tick (✓) **one** box.

- Ammonia ☐
- Bromine water ☐
- Copper sulfate ☐
- Nitrogen ☐

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