AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.10.2.1

Life cycle assessment

Past-paper questions

Tier	**Foundation**
Question groups	**3**
Available paper years	**2018–2024**

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.

5.10.2.1 Life cycle assessment

Question 01

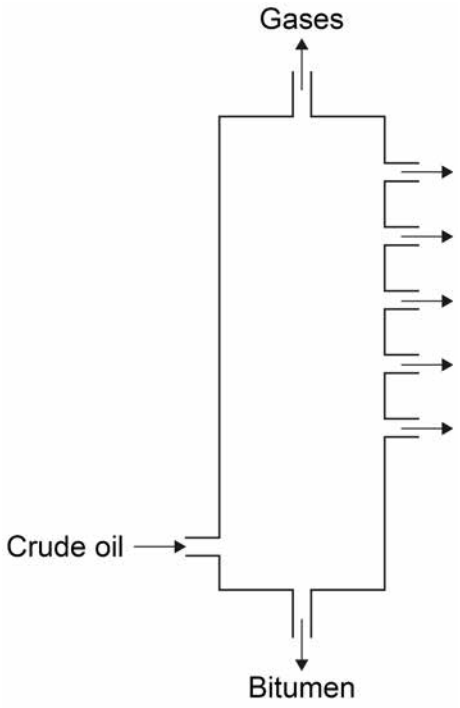
June 2018 | 8464/C/2F | Original Q6

0 6 Crude oil is a mixture of hydrocarbons.

0 6 . 1 The hydrocarbons in crude oil are separated into fractions by fractional distillation.

Figure 13 shows a fractional distillation column.

Figure 13



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.

5.10.2.1 Life cycle assessment

Question 01 · continued

0 6 . 2 Why do the fractions separate?

[1 mark]

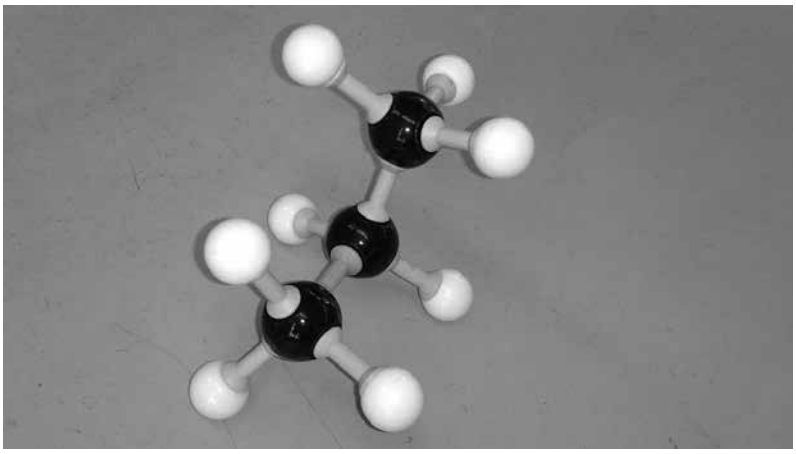
Tick **one** box.

- 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 6 . 3 **Figure 14** represents an alkane molecule.

Figure 14



Name the alkane.

[1 mark]

5.10.2.1 Life cycle assessment

Question 01 · continued

0 6 . 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 6 . 5 Alkanes burn in oxygen.

Balance the equation for methane burning.

[1 mark]

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

0 6 . 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 ☐

5.10.2.1 Life cycle assessment

Question 01 · continued

Table 6 shows data from a life cycle assessment (LCA) for the disposal of 10 000 biodegradable plastic bags.

Table 6

	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 6 . 7 Why are life cycle assessments (LCA) done?

[1 mark]

0 6 . 8 Compare the **two** methods for the disposal of biodegradable plastic bags.

Use information from **Table 6**

[4 marks]

11

5.10.2.1 Life cycle assessment

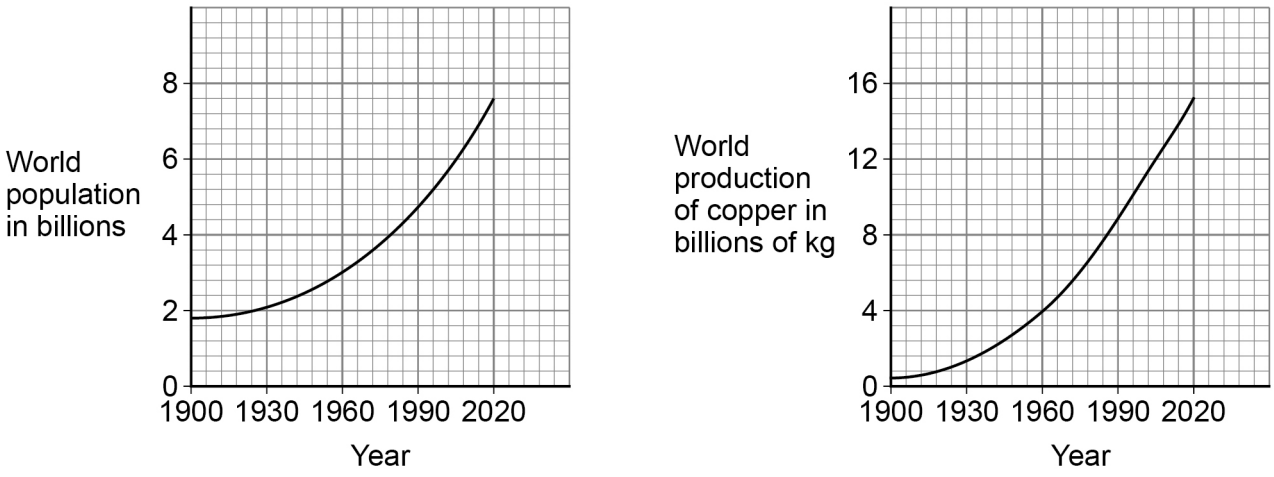
Question 02

November 2021 | 8464/C/2F | Original Q5

0 5 Industries use the Earth's resources to produce useful products.

0 5 . 1 **Figure 4** shows the world population and the world production of copper between 1900 and 2020.

Figure 4



How does the change in the world population compare with the world production of copper?

[1 mark]

Tick (✓) **one** box.

As population decreased, copper production increased. ☐

As population increased, copper production decreased. ☐

As population increased, copper production increased. ☐

5.10.2.1 Life cycle assessment

Question 02 · continued

Copper is produced from copper ore and from recycling waste copper.

0 5 . 2 The energy needed to produce 1 kg of copper from copper ore is 70 MJ.

The energy needed to produce 1 kg of recycled copper is 27 MJ.

Calculate the energy saved if 100 kg of copper is produced from recycled copper and **not** from copper ore.

[3 marks]

Energy saved = _____ MJ

0 5 . 3 Producing copper from recycling waste copper reduces emissions of sulfur dioxide.

Why is reducing emissions of sulfur dioxide important?

[1 mark]

0 5 . 4 Copper is used to make coins.

A coin of mass 8 g contains 75% copper.

Calculate the mass of copper in the coin.

[2 marks]

Mass of copper = _____ g

5.10.2.1 Life cycle assessment

Question 02 · continued

0 5 . 5 Iron and glass are both produced from the Earth's resources.

Some processes can reduce the use of limited resources.

Draw **one** line from the description of the process to the name of the process.

[2 marks]

Description of process	Name of process
Scrap steel is added to iron from a blast furnace	Extraction
A glass bottle is refilled	Quarrying
	Reacting
	Recycling
	Reusing

5.10.2.1 Life cycle assessment

Question 02 · continued

0 5 . 6 Life cycle assessments are used to assess the environmental impact of producing iron nails and glass bottles.

There are four stages, **A**, **B**, **C** and **D**, in a life cycle assessment.

The stages are **not** in the correct order.

Stage **A** Disposal

Stage **B** Extracting and processing raw materials

Stage **C** Manufacturing and packaging

Stage **D** Use and operation

What is the correct order of stages **A**, **B**, **C**, and **D**?

[1 mark]

Tick (✓) **one** box.

C, **D**, **B**, **A** ☐

D, **B**, **C**, **A** ☐

B, **C**, **D**, **A** ☐

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5.10.2.1 Life cycle assessment

Question 03

0 5 Life cycle assessments (LCAs) are used to assess the environmental impact of different products.

0 5 . 1 212 million kilograms of aluminium is used for packaging in the UK each year.

68.0% of aluminium packaging is recycled.

Calculate the mass of aluminium packaging that is recycled in the UK each year.

[2 marks]

Mass of aluminium recycled = _____ million kg

5.10.2.1 Life cycle assessment

Question 03 · continued

0 5 . 2 Drinks cans are made from aluminium.



An aluminium can has a mass of 15.8 g.

1000 g = 1 kg

Calculate the **whole number** of aluminium cans that can be made from 4.00 kg of aluminium.

[4 marks]

Whole number of cans = _____

Question 5 continues on the next page

5.10.2.1 Life cycle assessment

Question 03 · continued

0 5 . 3 **Table 5** shows three methods used to dispose of wood and steel after use.

Table 5

	Percentage (%) of material disposed of by each method		
	As waste	**Recycled**	**Burnt**
Wood	58	36	6
Steel	15	85	0

Evaluate the sustainability of the disposal of wood and steel.

[4 marks]

10