

GCSE Combined Science: Trilogy

Worksheet: Crude oil, hydrocarbons and alkanes

TIME 30 min	TOTAL 30 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Crude oil, hydrocarbons and alkanes

NAME _____

CLASS _____

DATE _____

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Crude oil is described as a finite (non-renewable) resource.

0 1 . 1

Explain what is meant by a finite resource.

.....

.....

[1 mark]

0 1 . 2

Suggest **one** consequence for the future of crude oil being a finite resource.

.....

.....

[1 mark]

0 2

0 2 . 1

Give the molecular formula of butane.

.....

.....

.....

[1 mark]

0 2 . 2

Explain why butane is described as a hydrocarbon.

.....

.....

[1 mark]

0 3

Crude oil is a finite resource found in rocks.

0 3 . 1

What is meant by a finite resource?

.....

.....

[1 mark]

0 3 . 2

Crude oil is the remains of an ancient biomass.

What did this biomass mainly consist of?

Tick (✓) **one** box.

Plankton

☐

Dinosaurs

☐

Trees

☐

Volcanic ash

☐

[1 mark]

0 3 . 3

Most of the compounds in crude oil are hydrocarbons.

What is a hydrocarbon?

.....

.....

.....

.....

[2 marks]

0 3 . 4

Name the alkane with the formula C_3H_8 .

.....

.....

.....

.....

[1 mark]

0 4

0 4 . 1

Name the alkane with the molecular formula C_3H_8 .

.....

.....

.....

.....

[1 mark]

0 4 . 2

Alkanes are described as saturated hydrocarbons.
What does saturated mean?

.....

.....

[1 mark]

0 5

The general formula of the alkanes is C_nH_{2n+2} .

0 5 . 1

Which of these is the formula of an alkane?

Tick (✓) **one** box.

C_4H_8

C_5H_{12}

C_6H_6

C_2H_4

☐

☐

☐

☐

[1 mark]

0 5 . 2

Give the formula of the alkane with 7 carbon atoms.

.....

.....

.....

.....

[1 mark]

0 5 . 3

Name the alkane with 4 carbon atoms.

.....

.....

.....

.....

[1 mark]

0 5 . 4

Draw the displayed formula of ethane, C_2H_6 .

.....

.....

.....

.....

[1 mark]

0 6

Hexane is an alkane with the formula C_6H_{14} .

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

0 6 . 1

Show that hexane fits the general formula of the alkanes, C_nH_{2n+2} .

.....

.....

[1 mark]

0 6 . 2

Calculate the percentage by mass of hydrogen in hexane.
Give your answer to 3 significant figures.

.....

.....

.....

.....

Percentage of hydrogen = %

[2 marks]

0 7

A technician tests an unknown colourless liquid taken from crude oil processing.

- A few drops of the liquid are added to bromine water: the bromine water stays orange.
- A small sample is burned: it burns with a clean, non-smoky blue flame.

0 7 . 1

What does the bromine water result show about the liquid?

.....

.....

[1 mark]

0 7 . 2

Suggest what type of hydrocarbon this liquid is, and suggest whether it has a small or large number of carbon atoms.
Give a reason for your suggestion about chain length.

.....

.....

.....

.....

[2 marks]

0 8

0 8 . 1

An alkane has 7 carbon atoms in each molecule.
Give its molecular formula.

.....

.....

.....

.....

[1 mark]

0 8 . 2

Which of these is the formula of an alkane?
Tick (✓) **one** box.

C_8H_{18}

C_8H_{14}

C_8H_8

C_8H_{16}

☐

☐

☐

☐

[1 mark]

0 8 . 3

An alkane has 26 hydrogen atoms in each molecule.
Give its molecular formula.

.....

.....

.....

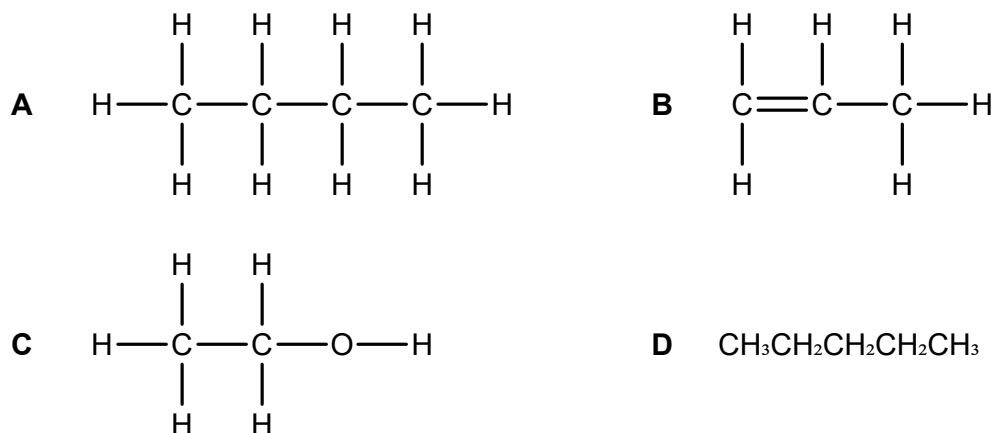
.....

[1 mark]

0 9

Figure 1 shows four substances, A, B, C and D.

Figure 1



0 9 . 1

Which **two** substances are alkanes?

Tick (✓) **two** boxes.

A

☐

B

☐

C

☐

D

☐

[2 marks]

0 9 . 2

Explain why substance C is **not** a hydrocarbon.

.....

.....

[1 mark]

0 9 . 3

Give the molecular formula of substance D.

.....

.....

.....

[1 mark]

0 9 . 4

The alkanes form a homologous series.
Give **two** features of a homologous series.

.....

.....

.....

.....

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Crude oil, hydrocarbons and alkanes · 30 marks

Question 1 (2 marks)

01.1 [1 mark]

Answer: A resource that is being used up faster than it can be replaced (or is not replaced at all).

- a resource that is being used up faster than it can be replaced / is not being replaced (on a human timescale) (1)

01.2 [1 mark]

Answer: Crude oil (and products made from it) will eventually run out or become much more expensive.

- crude oil will eventually run out / become much more expensive to extract (1)
- alternative sources of fuels and chemicals will need to be found (1)

Any 1 of the points above.

Question 2 (2 marks)

02.1 [1 mark]

Answer: C₄H₁₀

- C₄H₁₀ (1)

02.2 [1 mark]

Answer: Its molecules contain hydrogen and carbon atoms only.

- it contains hydrogen and carbon (atoms) only (1)

Notes: 'Only' (or an equivalent) is needed.

Question 3 (5 marks)

03.1 [1 mark]

Answer: A resource that will run out because it is not being replaced.

- it will run out / it is not being made (or replaced) as fast as it is used (1)

03.2 [1 mark]

Correct: Plankton

03.3 [2 marks]

Answer: A compound made of hydrogen and carbon atoms only.

- a compound / molecule containing hydrogen and carbon (atoms) (1)
- only (1)

Notes: Do not accept 'a mixture of hydrogen and carbon'. The second mark is for the idea of 'only'.

03.4 [1 mark]

Answer: Propane

- propane (1)

Question 4 (2 marks)

04.1 [1 mark]

Answer: Propane

- propane (1)

04.2 [1 mark]

Answer: The molecules contain only single bonds (no C=C double bonds).

- the molecules contain only single bonds / there are no C=C double bonds (1)
-

Question 5 (4 marks)

05.1 [1 mark]

Correct: C_5H_{12}

05.2 [1 mark]

Answer: C_7H_{16}

- C_7H_{16} (1)
-

05.3 [1 mark]

Answer: Butane

- butane (1)
-

05.4 [1 mark]

Answer: Two carbon atoms joined by a single bond, each bonded to three hydrogen atoms.

- two C atoms joined by a single bond, each with three H atoms, with every bond shown (1)
-

Question 6 (3 marks)

06.1 [1 mark]

Answer: $n = 6$: $2(6) + 2 = 14$, which matches the number of hydrogen atoms.

- for $n = 6$, $2n + 2 = 14$, which matches the 14 hydrogen atoms in C_6H_{14} (1)
-

06.2 [2 marks]

Answer: 16.3%

- M_r of $C_6H_{14} = (6 \times 12) + (14 \times 1) = 86$ (1)
 - $14 \div 86 \times 100 = 16.3$ (%) (1)
-

Question 7 (3 marks)

07.1 [1 mark]

Answer: It is saturated (it does not contain a carbon–carbon double bond).

- the liquid is saturated / does not contain a C=C double bond (it is not an alkene) (1)

07.2 [2 marks]

Answer: An alkane, probably with a small number of carbon atoms: a clean, non-smoky flame suggests complete combustion, which is typical of shorter-chain hydrocarbons.

- an alkane (a saturated hydrocarbon) (1)
- a small number of carbon atoms (short chain), because it burns with a clean, non-smoky flame (long-chain hydrocarbons burn with smokier flames) (1)

Question 8 (3 marks)

08.1 [1 mark]

Answer: C_7H_{16}

- C_7H_{16} (1)

08.2 [1 mark]

Correct: C_8H_{18}

08.3 [1 mark]

Answer: $C_{12}H_{26}$

- $C_{12}H_{26}$ (1)
-

Question 9 (6 marks)

09.1 [2 marks]

Correct: A; D

09.2 [1 mark]

Answer: It contains oxygen.

- it contains oxygen (atoms) / it is not made of hydrogen and carbon only (1)
-

09.3 [1 mark]

Answer: C_5H_{12}

- C_5H_{12} (1)
-

09.4 [2 marks]

Answer: Same general formula; each member differs from the next by CH_2 .

- the same general formula (1)
- each member differs from the next by CH_2 (1)
- similar chemical reactions (1)
- a gradual trend in physical properties such as boiling point (1)

Any 2 of the points above.
