

(Alkanes (general formula, structures, combustion))

Q1. (2018)

What type of carbon compound is octane, C_8H_{18} ?

[1 mark]

Tick **one** box.

Alcohol

☐

Alkane

☐

Carboxylic acid

☐

Ester

☐

Q2.(2020)

This question is about hydrocarbons.

Hexane and hexene are hydrocarbons containing six carbon atoms in each molecule.

Hexane is an alkane and hexene is an alkene.

Draw **one** line from each hydrocarbon to the formula of that hydrocarbon.

[2 marks]

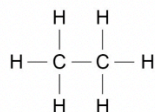
Hydrocarbon	Formula
	<input type="text" value="C<sub>6</sub>H<sub>8</sub>"/>
<input type="text" value="Hexane"/>	<input type="text" value="C<sub>6</sub>H<sub>10</sub>"/>
	<input type="text" value="C<sub>6</sub>H<sub>12</sub>"/>
<input type="text" value="Hexene"/>	<input type="text" value="C<sub>6</sub>H<sub>14</sub>"/>
	<input type="text" value="C<sub>6</sub>H<sub>16</sub>"/>

Q3.(2020)

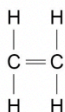
Ethane is an alkane and ethene is an alkene.

Figure 8 shows the displayed structural formulae of ethane and of ethene.

Figure 8



Ethane



Ethene

Compare ethane with ethene.

You should refer to:

- their structure and bonding
- their reactions.

[6 marks]

Q4.(2021)

This question is about organic compounds.

Butane is an alkane with small molecules.

Complete the sentence.

Choose the answer from the box.

[1 mark]

fertiliser	formulation	fuel
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Butane can be used as a _____.

Q5.a)(2021)

This question is about alkanes.

Table 6 shows information about some alkanes.

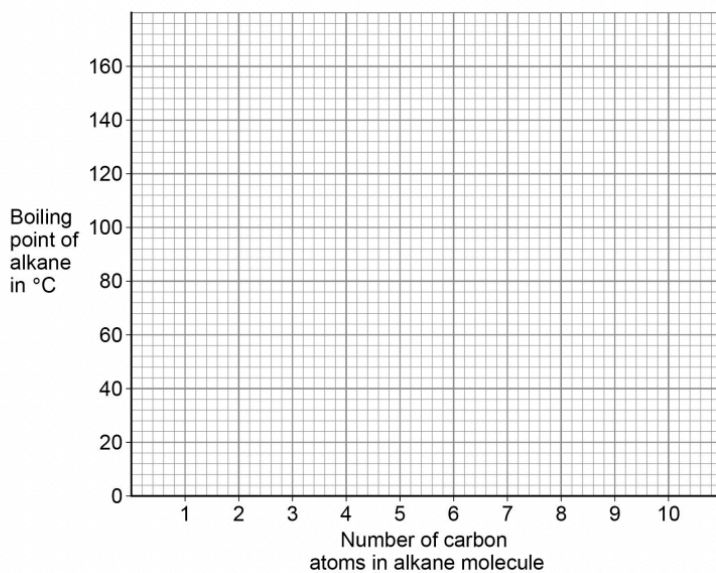
Table 6

Number of carbon atoms in alkane molecule	Boiling point of alkane in °C
4	0
5	36
6	69
7	X
8	126
9	151

Plot the data from **Table 6** on **Figure 7**.

[2 marks]

Figure 7



Q5.b)(2021)

Predict the boiling point **X** of the alkane with seven carbon atoms in a molecule.

Use **Table 6** and **Figure 7**.

[1 mark]

X = _____ °C

Q5.c)(2021)

Figure 7 is **not** suitable to show the boiling point of the alkane with three carbon atoms in a molecule.

Suggest **one** reason why.

[1 mark]

Q5.d)(2021)

What is the state at 20 °C of the alkane with four carbon atoms in a molecule?

Use **Table 6**.

[1 mark]

Q5.e)(2021)

Table 6 is repeated below.

Table 6

Number of carbon atoms in alkane molecule	Boiling point of alkane in °C
4	0
5	36
6	69
7	X
8	126
9	151

The alkane with nine carbon atoms in a molecule is called nonane.

Complete the formula of nonane.

[1 mark]

C₉H ____

Q5.f)(2021)

Nonane will condense lower in a fractionating column during fractional distillation than the other alkanes in **Table 6**.

Explain why.

You should refer to the temperature gradient in the fractionating column.

[2 marks]

Q6.a)(2022)

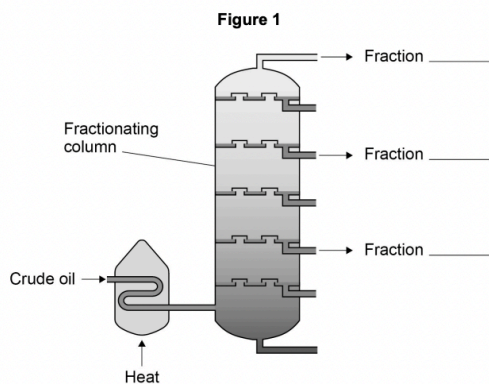
This question is about hydrocarbons in crude oil.

Table 2 shows information about three fractions obtained from crude oil.

Table 2

Fraction	Boiling point range in °C
A	200–300
B	100–150
C	Below 30

Figure 1 shows the fractionating column used to separate fractions **A**, **B** and **C**.



The temperature of the fractionating column is:

- 30 °C at the top
- 400 °C at the bottom.

Complete **Figure 1** to show where fractions **A**, **B** and **C** are collected.

[1 mark]

Q6.b)(2022)

Table 3 shows information about three fractions obtained from crude oil.

Table 3

Fraction	Range of number of carbon atoms in each molecule
Petrol	5–12
Diesel oil	15–19
Heavy fuel oil	20–40

Complete the sentences.

Choose answers from the box.

[2 marks]

lower	the same	higher
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Compared to petrol, the viscosity of heavy fuel oil is _____.

Compared to petrol, the flammability of diesel oil is _____.

Q6.c)(2022)

Table 4 shows the percentage of two fractions obtained from two different sources of crude oil.

Table 4

Source	Percentage (%) of fraction	
	Kerosene	Heavy fuel oil
J	13	30
K	4	44

Complete **Figure 2**.

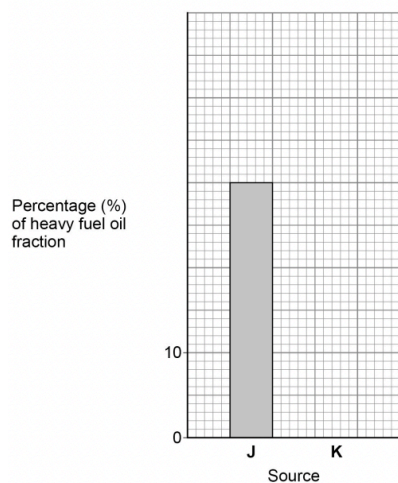
You should:

- complete the y-axis scale
- plot the percentage of the heavy fuel oil fraction obtained from source **K**.

Use **Table 4**.

[2 marks]

Figure 2



Q6.d)(2022)

Kerosene is in higher demand than heavy fuel oil.

Suggest why crude oil from source **J** is in higher demand than crude oil from source **K**.

Use **Table 4**.

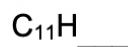
[1 mark]

Q7.(2022)

Alkanes have the general formula C_nH_{2n+2}

Complete the formula of the alkane molecule containing 11 carbon atoms.

[1 mark]



Q8.(2022)

C_2H_6 is an alkane.

Which type of bond is found in a C_2H_6 molecule?

[1 mark]

Tick (✓) **one** box.

A double bond between two carbon atoms.

☐

A double bond between two hydrogen atoms.

☐

A single bond between two carbon atoms.

☐

A single bond between two hydrogen atoms.

☐

Q9.(2022)

Which **two** substances are produced when alkanes completely combust?

[2 marks]

Tick (✓) **two** boxes.

Carbon

☐

Carbon dioxide

☐

Carbon monoxide

☐

Hydrogen

☐

Water

☐

Q10.(2024)

This question is about hydrocarbons.

A hydrocarbon has the formula C_6H_{14}

Name the **two** elements in a hydrocarbon.

[2 marks]

1 _____

2 _____

Q11.(2024)

How many atoms are there in one molecule of C_6H_{14} ?

[1 mark]

Tick (✓) **one** box.

2

☐

6

☐

14

☐

20

☐

Q12.a)(2024)

C_6H_{14} is a member of a homologous series.

What is the general formula for the homologous series that contains C_6H_{14} ?

[1 mark]

Tick (✓) **one** box.

C_nH_{2n-2}

☐

C_nH_{2n}

☐

C_nH_{2n+2}

☐

Q12.b)(2024)

Which homologous series has C_6H_{14} as a member?

[1 mark]

Tick (✓) **one** box.

Alcohols

☐

Alkanes

☐

Alkenes

☐

Carboxylic acids

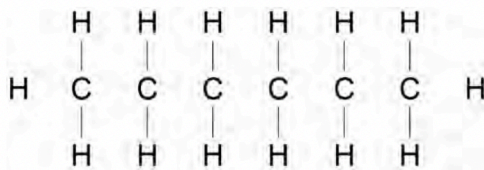
☐

Q12.c)(2024)

Complete **Figure 1** to show the displayed structural formula of C_6H_{14}

[1 mark]

Figure 1



Q12.d)(2024)

Petrol contains C_6H_{14}

Petrol is burned in car engines.

What general name is used to describe petrol when petrol is burned to release energy?

[1 mark]

Q12.e)(2024)

Atmospheric pollutants are formed when C_6H_{14} undergoes incomplete combustion.

Complete the sentences.

Choose answers from the box.

[2 marks]

ammonia	carbon monoxide	coal
soot	sulfur	sulfur dioxide

The solid atmospheric pollutant formed during incomplete combustion of C_6H_{14} is

_____.

The gaseous atmospheric pollutant formed during incomplete combustion of C_6H_{14} is

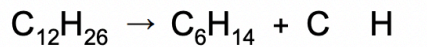
_____.

Q12.f)(2024)

A different organic compound ($C_{12}H_{26}$) can be broken down to produce C_6H_{14} and one other compound.

Complete the equation for the reaction.

[1 mark]



Q12.g)(2024)

The percentage by mass of each element in C_6H_{14} is:

- 84% C
- 16% H

Complete **Figure 2**.

You should:

- label each element on the x-axis
- plot the percentage by mass of C in C_6H_{14}

[2 marks]

