

Monitoring chemical reactions – 2021/20 GCSE Gateway Chemistry Combined Science A**1. Nov/2021/Paper_J250/04/No.7**

Octane, C_8H_{18} , is a compound in petrol.

Which statement about octane is correct?

- A** It is a hydrocarbon with a relative molecular mass of 66.
- B** It is a hydrocarbon with the empirical formula C_4H_9 .
- C** It is extracted from crude oil by filtration.
- D** It is in the bitumen fraction of crude oil.

Your answer

[1]

2. Nov/2021/Paper_J250/04/No.13

Crude oil is a mixture of different chemicals called fractions.

- (a) What is the name of the process used to separate crude oil into fractions?

..... [1]

- (b) **Table 13.1** shows the stages in the separation of crude oil into fractions.

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

Stages in the separation of crude oil into fractions	
W	The vapours are piped into the bottom of the fractionating column.
X	The vapours cool and the fractions condense at different temperatures.
Y	Crude oil is heated and vaporised.
Z	The vapours rise up the column.

Table 13.1

Write **W**, **X**, **Y** and **Z** in the boxes to show the correct order of the stages.

[1]

- (c) **Table 13.2** shows information about the different gases in the LPG (liquefied petroleum gas) fraction separated from crude oil.

Gas in the LPG fraction	Formula	Boiling point (°C)
Methane	CH ₄	-162
Ethane	C ₂ H ₆	-89
Propane	C ₃ H ₈	-42
Butane	C ₄ H ₁₀	

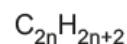
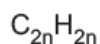
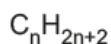
Table 13.2

- (i) Write the name of the homologous series of the gases in the LPG fraction.

..... [1]

- (ii) What is the correct general formula for this homologous series?

Put a ring around the correct answer.

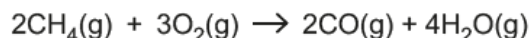


[1]

- (iii) Use the data in **Table 13.2** to estimate the boiling point of butane.

Estimated boiling point = °C [1]

- (d) The equation shows the reaction for methane burning in a limited amount of oxygen.



- (i) Write down the name of the hazardous gas formed in this reaction.

..... [1]

- (ii) State why the gas identified in (d)(i) is hazardous to humans.

..... [1]

3. Nov/2020/Paper_J250/04/No.2

Crude oil is a **finite** resource.

What does this mean?

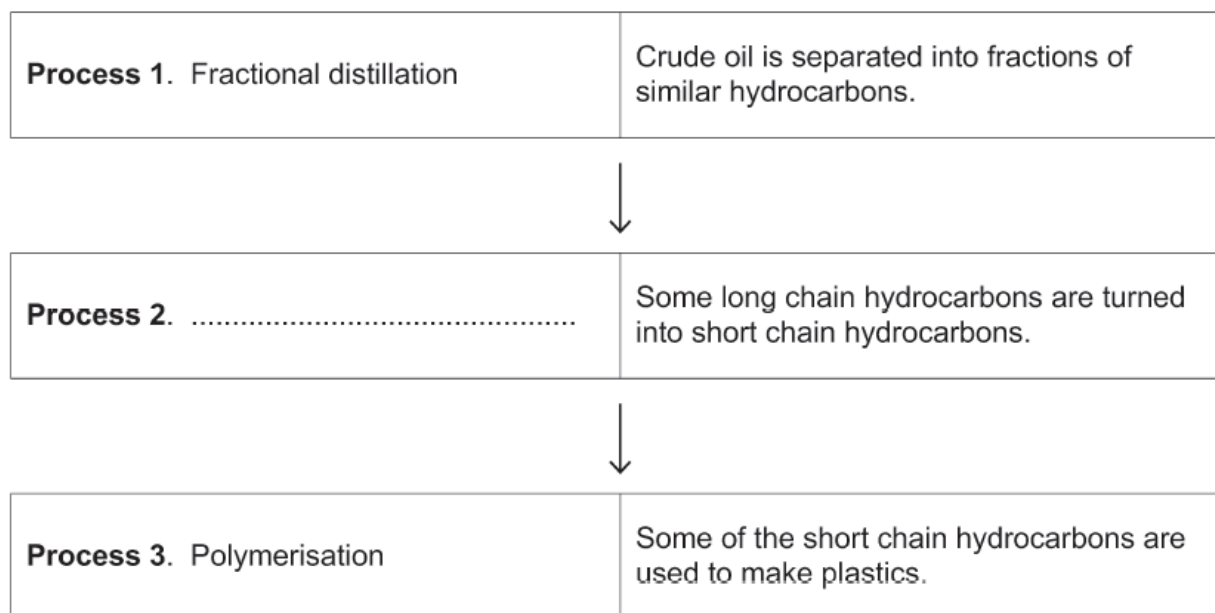
- A** Crude oil is a mixture of hydrocarbons.
- B** Crude oil is expensive to produce.
- C** Crude oil is renewable.
- D** Crude oil will run out.

Your answer

[1]

4. Nov/2020/Paper_J250/04/No.17

Look at the flowchart. It shows how crude oil is changed into useful substances.



(a) Complete the flowchart with the name of **Process 2**.

[1]

(b) **Table 17.1** shows the supply and demand of two fractions of crude oil.

Fraction	Millions of barrels per day	
	Supply	Demand
Petrol	26	39
Fuel oil	19	11

Table 17.1

Explain the importance of **Process 2**.

Use information from **Table 17.1** in your answer.

.....

.....

.....

..... [2]

- (c) The hydrocarbon fractions from **Process 1** contain different alkanes.

Table 17.2 shows the boiling point of different alkanes produced in **Process 1**.

Number of carbon atoms in a molecule of the alkane	Boiling point (°C)
1	-162
2	-89
3
4	-1
5	36

Table 17.2

- (i) Complete **Table 17.2** with an estimate of the missing boiling point for an alkane molecule with **3 carbon atoms**. [1]
- (ii) Write the formula for an alkane with **7 carbon atoms**.

..... [1]