

# Fuels

## Question Paper 1

Level	IGCSE
Subject	Chemistry (0620/0971)
Exam Board	Cambridge International Examinations (CIE)
Topic	Organic chemistry
Sub-Topic	Fuels
Booklet	Question Paper 1

**Time Allowed:** 38 minutes

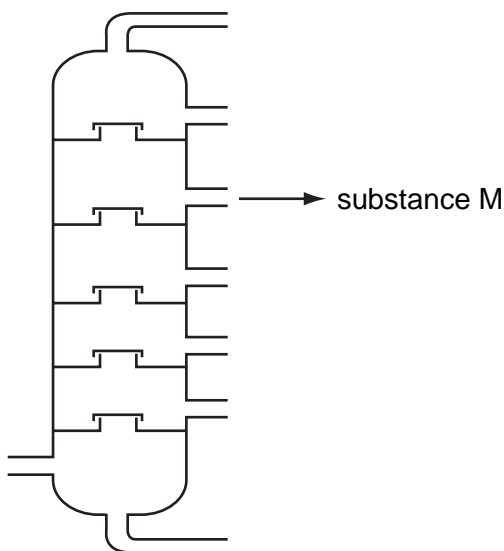
**Score:** /31

**Percentage:** /100

### Grade Boundaries:

9	8	7	6	5	4	3	2	1
>85%	75%	68%	60%	53%	48%	40%	33%	<25%

- 1 Which statement about petroleum is **not** correct?
- A It can be separated into useful substances by fractional distillation.
  - B It consists mainly of hydrocarbons.
  - C It is found underground in many parts of the world.
  - D Its main use is for making lubricants and polishes.
- 2 The diagram shows an industrial process. Substance M is one of the substances produced by this process and is used as aircraft fuel.

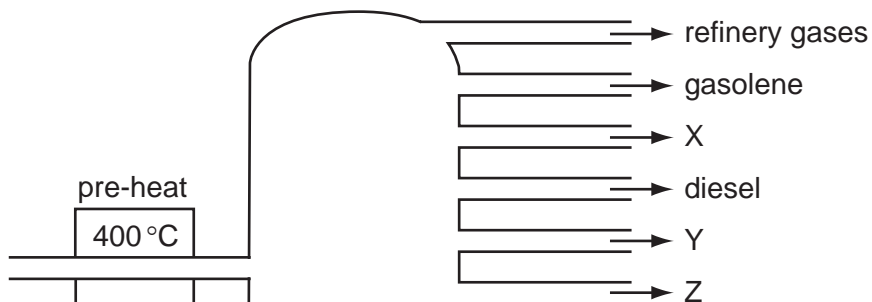


What is this process and what is substance M?

	process	substance M
<b>A</b>	fractional distillation	paraffin
<b>B</b>	fractional distillation	petrol
<b>C</b>	thermal decomposition	paraffin
<b>D</b>	thermal decomposition	petrol

3 In an oil refinery, crude oil is separated into useful fractions.

The diagram shows some of these fractions.



What are fractions X, Y and Z?

	X	Y	Z
<b>A</b>	fuel oil	bitumen	paraffin (kerosene)
<b>B</b>	fuel oil	paraffin (kerosene)	bitumen
<b>C</b>	paraffin (kerosene)	bitumen	fuel oil
<b>D</b>	paraffin (kerosene)	fuel oil	bitumen

4 Diesel, petrol and bitumen are all

- A** fuels.
- B** hydrocarbons.
- C** lubricants.
- D** waxes.

5 Petroleum is a very important raw material that is separated into more useful products.

Which terms describe petroleum and the method used to separate it?

	petroleum is a	method used to separate petroleum
<b>A</b>	compound	cracking
<b>B</b>	compound	fractional distillation
<b>C</b>	mixture	cracking
<b>D</b>	mixture	fractional distillation

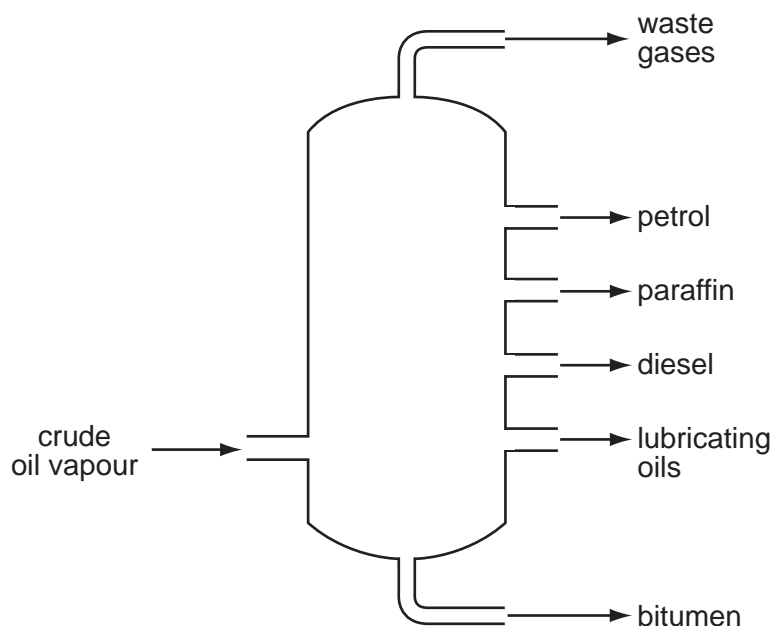
6 The table shows the composition of four different types of petroleum (crude oil).

fraction	Arabian Heavy /%	Arabian Light /%	Iranian Heavy /%	North Sea /%
gasoline	18	21	21	23
kerosene	11.5	13	13	15
diesel	18	20	20	24
fuel oil	52.5	46	46	38

Which type of petroleum is best for the motor vehicle industry?

- A** Arabian Heavy
- B** Arabian Light
- C** Iranian Heavy
- D** North Sea

7 Which industrial process is shown in the diagram?



- A cracking
- B fermentation
- C fractional distillation
- D polymerisation

8 Which properties of the different compounds in petroleum enable its separation into fractions?

- 1 boiling point
- 2 chain length
- 3 chemical reactivity
- 4 solubility in water

- A 1 and 2
- B 1 and 3
- C 2 and 4
- D 3 and 4

9 Bitumen is a substance obtained from the fractional distillation of petroleum.

Which row describes its boiling point and the size of its molecules?

	boiling point	size of molecules
<b>A</b>	high	large
<b>B</b>	high	small
<b>C</b>	low	large
<b>D</b>	low	small

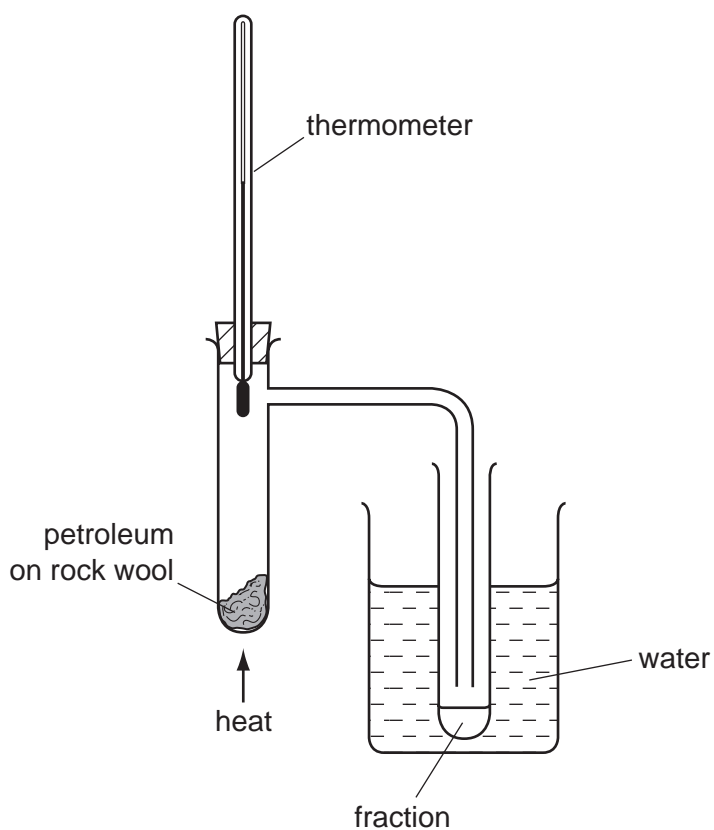
10 Which method is used to obtain petrol from petroleum?

- A crystallisation
- B diffusion
- C filtration
- D fractional distillation

11 Which fraction from the fractional distillation of petroleum does **not** match its correct use?

	fraction	use
<b>A</b>	fuel oil	domestic heating
<b>B</b>	kerosene	jet fuel
<b>C</b>	naphtha	making roads
<b>D</b>	refinery gas	for heating and cooking

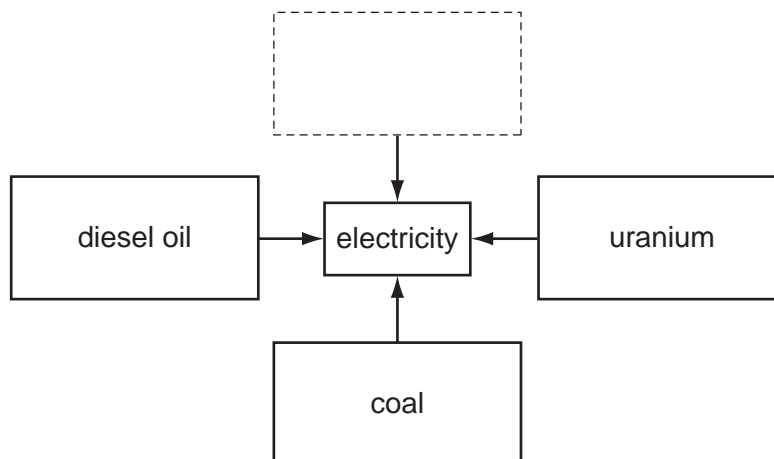
12 The diagram shows apparatus used to separate petroleum into four fractions.



Which fraction contains the smallest hydrocarbon molecules?

fraction	boiling point range / °C
<b>A</b>	up to 70
<b>B</b>	70 to 120
<b>C</b>	120 to 170
<b>D</b>	over 170

13 The diagram shows different fuels from which electricity can be generated.



Which box completes the diagram?

- |  |  |  |  |
|--|--|--|--|
| <b>A</b>   | <b>B</b>   | <b>C</b>   | <b>D</b>   |
| <div style="border: 1px solid black; padding: 5px; width: 100px; height: 40px; display: flex; align-items: center; justify-content: center;">ammonia</div> | <div style="border: 1px solid black; padding: 5px; width: 100px; height: 40px; display: flex; align-items: center; justify-content: center;">bitumen</div> | <div style="border: 1px solid black; padding: 5px; width: 100px; height: 40px; display: flex; align-items: center; justify-content: center;">natural gas</div> | <div style="border: 1px solid black; padding: 5px; width: 100px; height: 40px; display: flex; align-items: center; justify-content: center;">steam</div> |

14 Petroleum is a mixture of hydrocarbons which can be separated into fractions using fractional distillation.

Which fraction is used as fuel in jet engines?

- A** bitumen
- B** gasoline
- C** kerosene
- D** naphtha



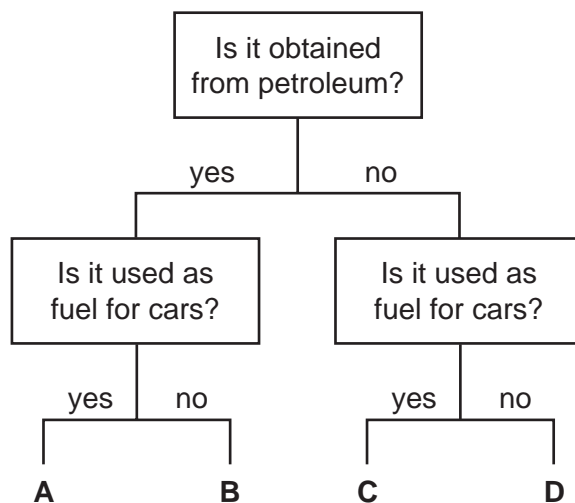
- 15 The table shows some fractions that are obtained from petroleum by fractional distillation, together with some of their uses.

fraction	use
refinery gas	cooking
gasoline	fuel for cars
1	making chemicals
2	jet fuel
3	fuel for ships
bitumen	making roads

Which row correctly identifies fractions 1, 2 and 3?

	1	2	3
<b>A</b>	diesel oil	fuel oil	lubricating fraction
<b>B</b>	fuel oil	diesel oil	kerosene
<b>C</b>	kerosene	naphtha	diesel oil
<b>D</b>	naphtha	kerosene	fuel oil

- 16 In the flow chart, which fuel could be gasoline?



17 Which process does **not** involve oxidation?

- A burning a fossil fuel
- B conversion of iron from the blast furnace into steel
- C distillation of crude oil
- D rusting of iron

18 What is **not** the correct use for the fraction named?

	name of fraction	use
<b>A</b>	fuel oil	making waxes
<b>B</b>	gas oil	diesel engines
<b>C</b>	kerosene	fuel
<b>D</b>	naphtha fraction	making chemicals

19 Which row shows the correct use of a fraction obtained by the fractional distillation of petroleum?

	fraction	use
<b>A</b>	bitumen	making waxes and polishes
<b>B</b>	fuel oil	aircraft fuel
<b>C</b>	kerosene	fuel for ships
<b>D</b>	naphtha	making chemicals

20 Petroleum is separated into useful fractions by fractional distillation.

Separation occurs in a fractionating column.

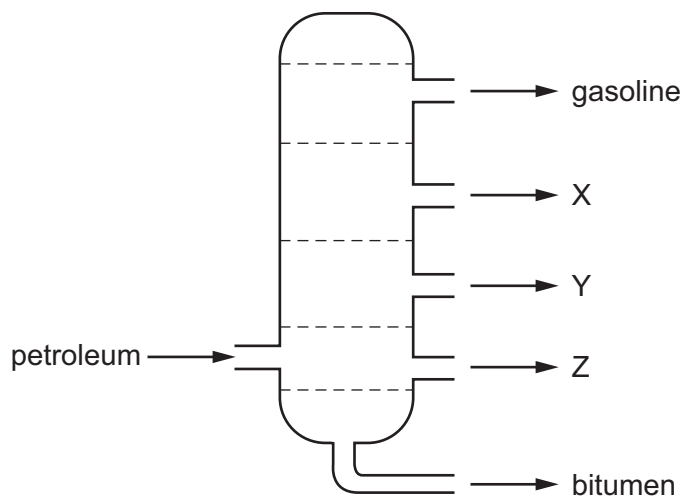
Some properties of three of these fractions are shown.

fraction	boiling point range / °C	number of carbon atoms in the molecules
1		5–10
2	320–350	16–24
3	120–210	

Which statement is correct?

- A** Fraction 1 has a higher boiling point range than fraction 2.
- B** Fraction 2 is removed from a higher point in the fractioning tower than fraction 1.
- C** Molecules in fraction 3 have shorter chains than those in fraction 2.
- D** None of the fractions is liquid at room temperature.

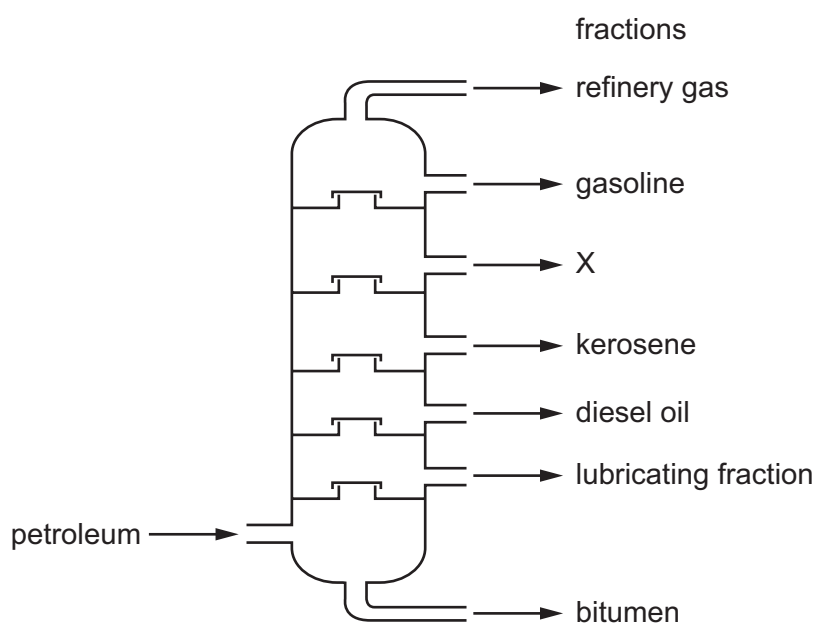
21 The diagram shows the separation of petroleum into fractions.



What could X, Y and Z represent?

	X	Y	Z
<b>A</b>	diesel oil	lubricating fraction	paraffin
<b>B</b>	lubricating fraction	diesel oil	paraffin
<b>C</b>	paraffin	lubricating fraction	diesel oil
<b>D</b>	paraffin	diesel oil	lubricating fraction

22 What is the name of fraction X?



- A alcohol
- B fuel oil
- C naphtha
- D paraffin

**23** Some of the fractions obtained from the fractional distillation of petroleum are used as fuels for vehicles.

Which two fractions are used as fuels for vehicles?

- A** bitumen fraction and gasoline fraction
- B** bitumen fraction and naphtha fraction
- C** gasoline fraction and kerosene fraction
- D** kerosene fraction and lubricating fraction

**24** Burning fossil fuels releases heat

energy. Which substance is **not** a fossil fuel?

- A** coal
- B** hydrogen
- C** natural gas
- D** petroleum

**25** Which statement is **not** correct?

- A** Petroleum is a mixture of hydrocarbons.
- B** The main constituent of natural gas is ethane.
- C** The naphtha fraction of petroleum is used for making chemicals.
- D** When natural gas burns in air, carbon dioxide and water are formed.

**26** Fuel oil and naphtha are two fractions obtained from petroleum.

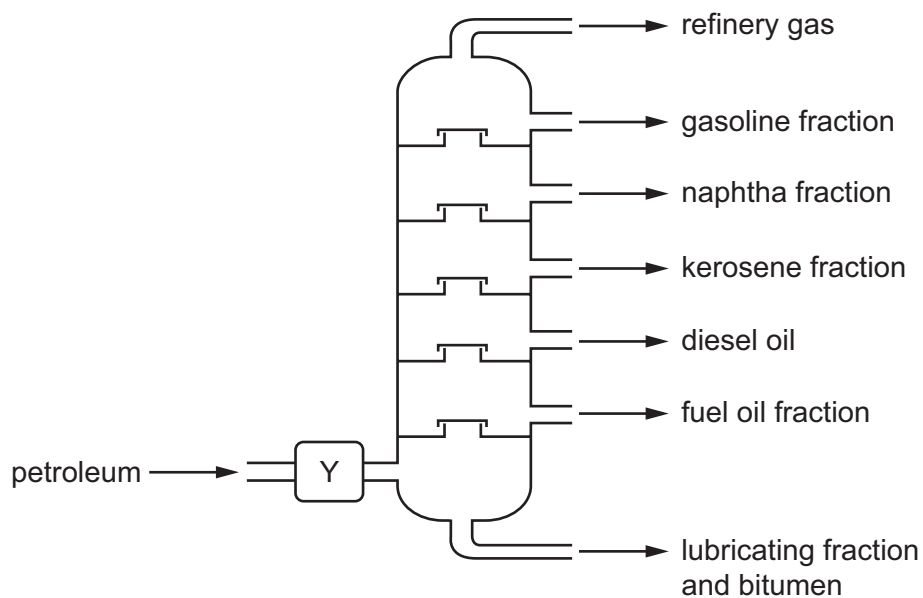
What are the major uses of these fractions?

	fuel oil	naphtha
<b>A</b>	jet fuel	making chemicals
<b>B</b>	jet fuel	making roads
<b>C</b>	ship fuel	making chemicals
<b>D</b>	ship fuel	making roads

27 Which fraction of petroleum is **not** matched to its correct use?

	fraction	use
<b>A</b>	bitumen	making roads
<b>B</b>	gasoline	fuel for cars
<b>C</b>	kerosene	fuel for ships
<b>D</b>	naphtha	chemical industry

28 The industrial fractional distillation of petroleum is shown.



Which process happens at Y?

- A** burning
- B** condensation
- C** cracking
- D** evaporation

- 29 Fuel oil, gasoline, kerosene and naphtha are four fractions obtained from the fractional distillation of petroleum.

What is the order of the boiling points of these fractions?

	highest boiling point → lowest boiling point
<b>A</b>	fuel oil → kerosene → gasoline → naphtha
<b>B</b>	fuel oil → kerosene → naphtha → gasoline
<b>C</b>	gasoline → naphtha → kerosene → fuel oil
<b>D</b>	naphtha → gasoline → kerosene → fuel oil

- 30 Which substance has a main constituent that contains **only one** carbon atom per molecule?

- A bitumen
- B gasoline
- C natural gas
- D petroleum

- 31 Which equation represents the complete combustion of butane,  $C_4H_{10}$ ?

- A  $2C_4H_{10} + 5O_2 \rightarrow 8C + 10H_2O$
- B  $2C_4H_{10} + 9O_2 \rightarrow 8CO + 10H_2O$
- C  $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$
- D  $C_4H_{10} + 4O_2 \rightarrow 4CO_2 + 5H_2$