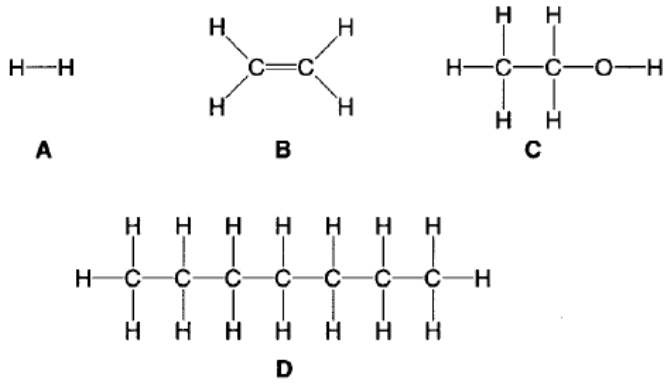
Organic 1

CORE questions

Core 1

Petroleum is a mixture of many different hydrocarbons.

(a) Which **two** of the structures **A**, **B**, **C** and **D** are hydrocarbons?



A **B** **C**

D

structure 1 .....

structure 2 .....

[1]

(b) The mixture of hydrocarbons in petroleum is separated into different fractions.

(i) What is meant by the term *fraction*?

.....

.....[1]

(ii) What is the name of the process used to separate these fractions?

.....[1]

(iii) During this process, the mixture of hydrocarbons is vaporised and then condensed. Explain what is meant by

vaporised, ...

condensed. .....

[2]

(iv) The separation of the fractions depends on one physical property of the hydrocarbons.

State this property.

.....[1]

Core 1

(c) Octane is a hydrocarbon which can be cracked to produce two different hydrocarbons, hexane and ethene.

$$\underset{\text{octane}}{C_8H_{18}} \rightarrow \underset{\text{hexane}}{C_6H_{14}} + \underset{\text{ethene}}{C_2H_4}$$

(i) State two conditions which are used to crack octane.

1. .....

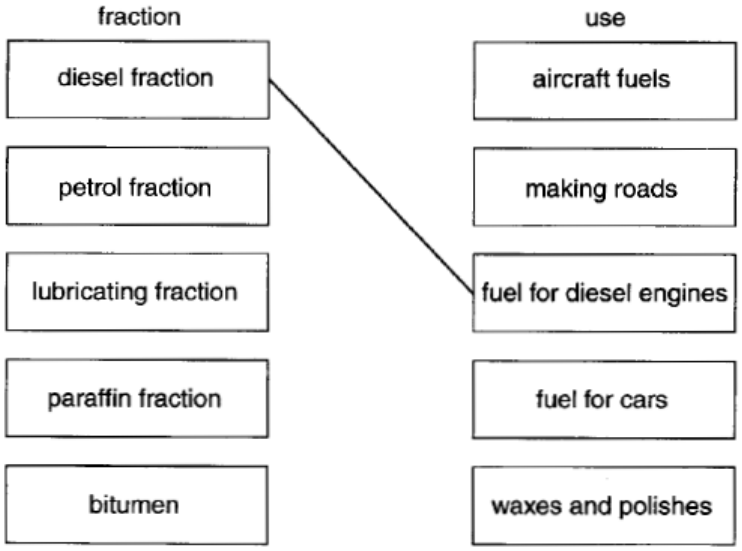
2. .....

[2]

(ii) Which of the three hydrocarbons in the equation above is used to make a polymer?

.....[1]

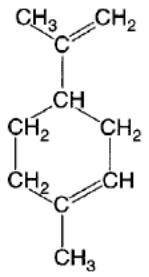
(d) In the diagram below, the boxes on the left give the names of some petroleum fractions. The boxes on the right show some uses of these fractions.
Draw lines between the boxes to link the fractions to their correct uses.
The first one has been done for you.



[4]

Core 2

(a) The structure of limonene is shown below.



(i) What is the molecular formula of limonene?

.....[1]

(ii) Some limonene was added to a few drops of aqueous bromine.
What colour change would you see in the aqueous bromine?

.....[2]

(iii) What feature of a limonene molecule is responsible for this colour change?

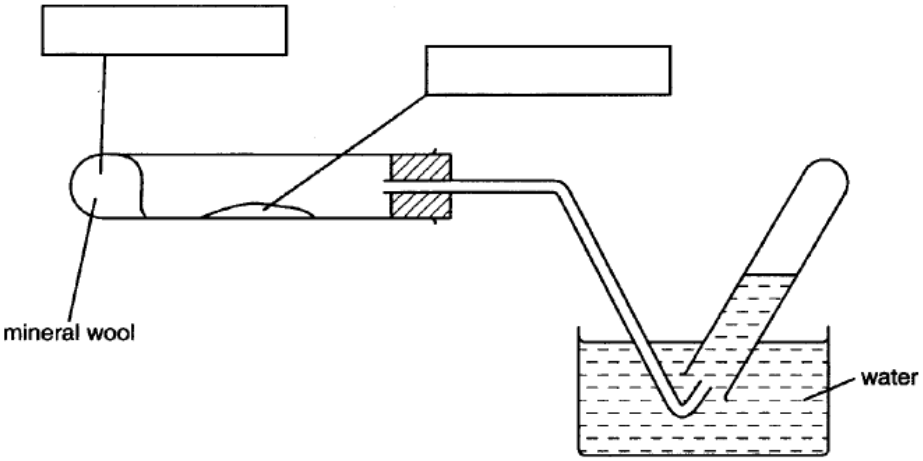
.....[1]

(iv) Name the two substances formed when limonene is burnt in an excess of oxygen.

..... and .....[2]

Alternative to Practical 1

Ethene is made when ethanol is passed over hot aluminium oxide.



(a) Complete the boxes to show the chemicals used. [2]

(b) Show on the diagram with an arrow where the heat is applied. [1]

(c) Label on the diagram where the ethene is collected. [1]

(d) Why must the delivery tube be removed from the water before the heating is stopped?

.....

.....

.....[2]

(e) When ethene is shaken with aqueous bromine, the colour changes from

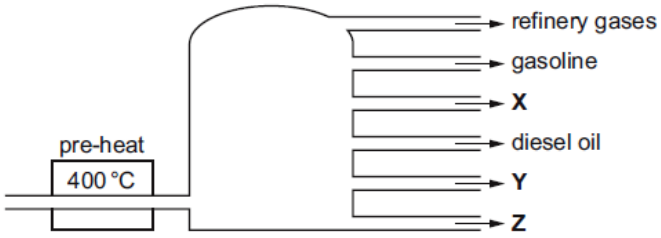
..... to ..... . [2]

0620 Cambridge IGCSE Chemistry Specimen Papers (2016)

Paper 1 Question 37

37 In an oil refinery, petroleum is separated into useful fractions.

The diagram shows some of these fractions.

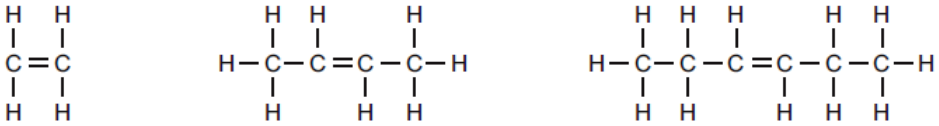


What are fractions X, Y and Z?

	X	Y	Z
A	fuel oil	bitumen	paraffin (kerosene)
B	fuel oil	paraffin (kerosene)	bitumen
C	paraffin (kerosene)	bitumen	fuel oil
D	paraffin (kerosene)	fuel oil	bitumen

Paper 1 Question 38

38 The structures of three compounds are shown.



Why do these substances all belong to the same homologous series?

A They all contain an even number of carbon atoms.

B They all contain the same functional group.

C They are all hydrocarbons.

D They are all saturated.

Paper 1 Question 39

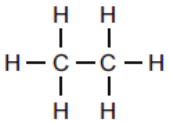
39 Which bond is **not** in a molecule of ethanoic acid?

A C–O **B** C=O **C** C=C **D** O–H

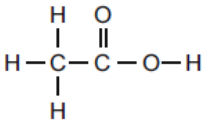
Paper 1 Question 40

40 Which structure is **incorrect**?

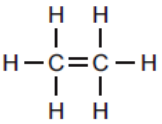
A



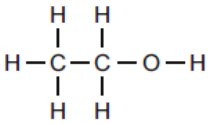
B



C



D



Paper 3 Question 8

8 Ethene, C_2H_4, is manufactured by cracking petroleum fractions.

(a) (i) What do you understand by the term *fraction?*

.....

..... [1]

(ii) Complete the symbol equation for the manufacture of ethene from dodecane, $C_{12}H_{26}$.

$$C_{12}H_{26} \rightarrow C_2H_4 + ...$$

[1]

(b) Two fractions obtained from the distillation of petroleum are refinery gas and gasoline.
State **one** use of each of these fractions.

refinery gas .....

gasoline ..... [2]

(c) Ethene is an unsaturated hydrocarbon.
What do you understand by the following terms?

unsaturated .....

hydrocarbon ..... [2]

(d) Ethene is used to make ethanol.

(i) Which of these reactions is used to make ethanol from ethene?
Tick one box.

catalytic addition of steam ☐

fermentation ☐

oxidation using oxygen ☐

reduction using hydrogen ☐

[1]

(ii) Draw the structure of ethanol, showing all atoms and bonds.

[2]

(e) Ethene is used to make poly(ethene).
Complete the following sentences about this reaction.
Use words from the list below.

additions **carbohydrates** **catalysts** **monomers** **polymers**

The ethene molecules which join to form poly(ethene) are the ..... .

The poly(ethene) molecules formed are ..... . [2]

[Total: 11]

Paper 4 Question 9

(b) Some plastics, formed by polymerisation, are non-biodegradable.

Describe **two** pollution problems that are caused by non-biodegradable plastics.

.....

.....

.....

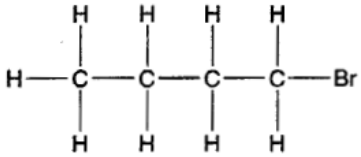
..... [2]

EXTENSION question

Extension 4

Organic compounds that contain the halogens can have chloro, bromo or iodo in their names.

(a) The following diagram shows the structure of 1-bromobutane.



(i) Draw the structure of an isomer of this compound.

(ii) Draw a possible structure of a dibromobutane.

(iii) Name two chemicals that react together to make only one product – dibromobutane.

..... and .....

[4]

(b) Draw a diagram to show the arrangement of the valency electrons in the covalent compound chloromethane.
Use o to represent an electron from carbon
Use x to represent an electron from hydrogen
Use ⊗ to represent an electron from chlorine

[3]

0620 Cambridge IGCSE Chemistry Specimen Papers (2016)

Paper 2 Question 37

37 Which reaction does **not** take place in the dark?

A $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

B $CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$

C $C_2H_4 + H_2O \rightarrow C_2H_5OH$

D $C_2H_4 + H_2 \rightarrow C_2H_6$

Paper 2 Question 38

38 Ethane and ethene are both hydrocarbons.

Ethane reacts with chlorine and ethene reacts with bromine.

Which row describes the type of reaction that ethane and ethene undergo?

	ethane	ethene
A	addition	addition
B	addition	substitution
C	substitution	substitution
D	substitution	addition

Paper 4 Question 8

8 The alcohols form an homologous series.

(a) Give **three** characteristics of an homologous series.

.....

.....

.....

..... [3]

(b) The following two alcohols are members of an homologous series and they are isomers.

$CH_3 — CH_2 — CH_2 — CH_2 — OH$ and $(CH_3)_2CH — CH_2 — OH$

(i) Explain why they are isomers.

.....

.....

..... [2]

(ii) Deduce the structural formula of another alcohol which is also an isomer of these alcohols.

[1]

Organic 1 – answers

Core 1

(a) B and D

(b) **(i)** substance or group of substances with a specific boiling range or condensed at a similar temperature

(ii) distillation / fractional distillation / fractionation

(iii) vaporised — change of state to gas / vapour state
condensed — change of state from gas / vapour to liquid

(iv) boiling point

(c) **(i)** high temperature and catalyst

(ii) ethane / C_2H_4

(d) petrol → fuel for cars
lubricating fraction → waxes and polishes
paraffin → aircraft fuels
bitumen → making roads

Core 2

(a) **(i)** $C_{10}H_{16}$

(ii) brown / orange / red
to colourless

(iii) C = C bond / carbon – carbon double bond

(iv) carbon dioxide and water

Alternative to Practical 1

(a) left hand box – ethanol
right hand box – aluminium oxide

(b) underneath aluminium oxide

(c) ethene label to test-tube

(d) water sucked back
cracks / breaks tube

(e) brown / red / orange / yellow to colourless

Specimen Paper 1

37 D

38 B

39 C

40 C

Specimen Paper 3

8 **(a)** **(i)** (group of) molecules with similar boiling points / (group of) molecules with similar relative molecular masses / molecules with limited range of boiling points / molecules with limited range of molecular masses / molecules coming off at the same place in the fractionation column / owtte

(ii) $C_{10}H_{22}$
allow: reasonable mixtures, e.g. $C_7H_{16} + C_3H_6$

(b) refinery gas: (fuel) for heating / (fuel) for cars / (fuel) for cooking;
gasoline: (fuel) for cars / mowers, etc.;

(c) unsaturated: contains double bonds / contains C=C bonds;
hydrocarbon: containing carbon and hydrogen only;

(d) **(i)** 1st box down ticked (catalytic addition of steam)

(ii) correct structure of ethanol;
bond between O–H;

(e) monomers;
polymers;

Specimen Paper 4

9 **(b)** Any two from:
ingestion can be fatal to animals / owtte;
animals can be caught in plastics, e.g. fishing line / owtte;
combustion releases toxins / owtte;
land-fill uses natural resources / owtte;
allow: any appropriate example

Extension 4

(a) **(i)** correct formula of an isomer
$CH_3.CH_2.CHBr.CH_3$
or $CH_3.CH(CH_3).CH_2Br$
or $(CH_3)_3CBr$

(ii) any correct formula for a dibromomethane

(iii) butene

bromine

(b) correct formula CH_3Cl showing 8e around C and Cl and 2e around hydrogen

Specimen Paper 2

37 B

38 D

Specimen Paper 4

8 **(a)** Any three from:
same general formula;
consecutive members differ by CH_2;
similar chemical properties;
same functional group;
physical properties vary in a predictable way / give trend such as mp increases with n;

(b) **(i)** they have the same molecular formula;
not: general formula
different structures / structural formulae;

(ii) $CH_3–CH_2–CH(OH)–CH_3$ / $(CH_3)_3C–OH$
allow: butan–2–ol and 2–methylpropan–2–ol