

# Organic Chemistry

## Question Paper 2

<b>Level</b>	GCSE
<b>Subject</b>	Chemistry (Gateway Science)
<b>Exam Board</b>	OCR
<b>Topic</b>	C6: Global Challenges
<b>Sub Topic</b>	C6.2: Organic Chemistry
<b>Booklet</b>	Question Paper 2

**Time Allowed:** 60 minutes

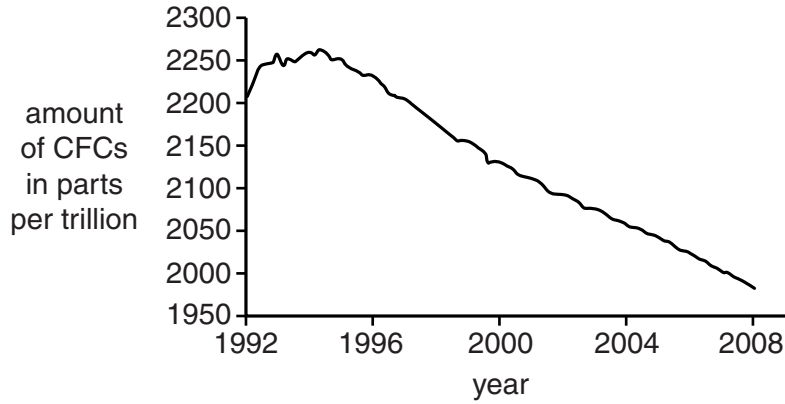
**Score:** /50

**Percentage:** /100

1 This question is about CFCs.

Look at the graph.

It shows how the amount of CFCs in the air has changed from 1992 to 2008.



(a) Describe the pattern shown on the graph.

Explain why this has happened.

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..... [2]

(b) Scientists' attitudes to CFCs have changed since CFCs were first introduced in the 1950s.

Describe how and explain why.

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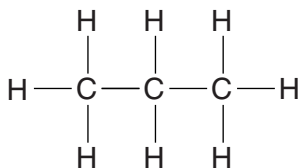
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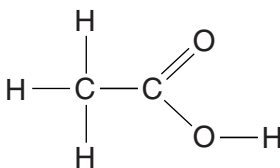
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[Total: 5]

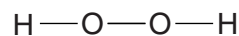
2 Look at the displayed formulas of some compounds.



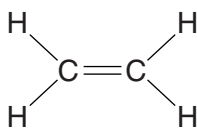
compound **A**



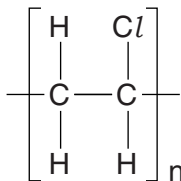
compound **B**



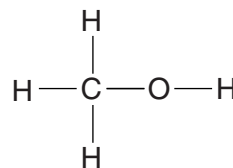
compound **C**



compound **D**



compound **E**



compound **F**

(a) Compound **F** is **not** a hydrocarbon.

Explain how you can tell from the displayed formula.

.....  
 ..... [1]

(b) Which compound is an **unsaturated** hydrocarbon?

Choose from **A, B, C, D, E** or **F**.

..... [1]

(c) Which compound is a **polymer**?

Choose from **A, B, C, D, E** or **F**.

..... [1]

(d) Compound **D** makes an addition polymer.

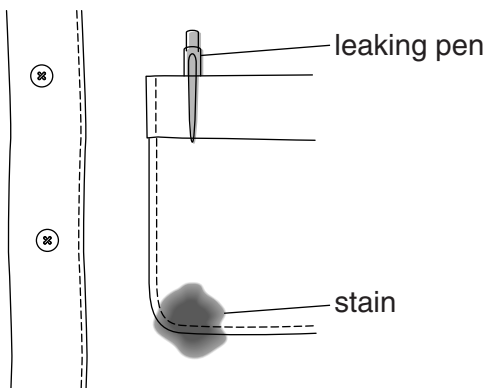
Draw the **displayed formula** of this addition polymer.

[1]

[Total: 4]

3 Chemicals called esters can be used as **solvents**.

Sarah investigates how good four different solvents are at removing a stain from cotton.



Look at her results.

Solvent	Percentage of stain removed		Effect on cotton
	At 40°C	At 60°C	
<b>A</b>	0%	35%	colour fades
<b>B</b>	10%	60%	none
<b>C</b>	85%	100%	cotton shrinks
<b>D</b>	75%	95%	none

(a) Which solvent is the most suitable for removing stains from cotton?

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Explain your choice.

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..... [2]

(b) Sarah thinks her results do not provide sufficient evidence to make a firm conclusion.

Explain what further tests would help to make her conclusion more secure.

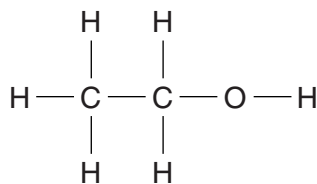
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..... [2]

4 Ethanol, propanol and butanol are alcohols.

Look at the displayed formula of ethanol.



(a) Ethanol is made by the hydration of ethene,  $\text{C}_2\text{H}_4$ .

Write the **word** equation for this reaction.

..... [1]

(b) Alcohols have the general formula  $\text{C}_n\text{H}_{2n+1}\text{OH}$ .

(i) A molecule of propanol has **3** carbon atoms.

Write the formula of propanol.

..... [1]

(ii) Draw the **displayed** formula of butanol,  $\text{C}_4\text{H}_9\text{OH}$ .

[1]

(c) Ethanol is also made by fermentation of sugars in a batch process.

The table compares making ethanol by hydration and by fermentation.

	<b>Hydration</b>	<b>Fermentation</b>
<b>Raw materials</b>	ethene from crude oil	sugar from plants
<b>Type of process</b>	continuous	batch
<b>Rate of reaction</b>	fast	slow
<b>Conditions used</b>	high temperature, 300 °C, high pressure, 60 atm, and a catalyst	low temperature, 40 °C, atmospheric pressure and an enzyme in yeast acts as a catalyst
<b>Purity of product</b>	pure	impure
<b>Atom economy</b>	100%	51%

Evaluate the advantages and disadvantages of each method.

Which method do you think is the best for manufacturing ethanol in the UK?

Explain why.



*The quality of written communication will be assessed in your answer to this question.*

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[6]

[Total: 9]

5 Chlorofluorocarbons, CFCs, were used in the 1970s.

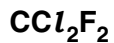
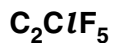
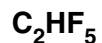
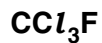
The use of CFCs has now been banned in the UK.

(a) Explain why the use of CFCs has been banned.

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

(b) CFCs have now been replaced by other compounds.

Choose from the list one compound that has replaced CFCs.



answer .....

[1]

[Total: 3]

6 This question is about fuels.

(a) Crude oil is a fossil fuel.

Crude oil is being used up faster than it is being made.

Write about the problems this will cause in the future.

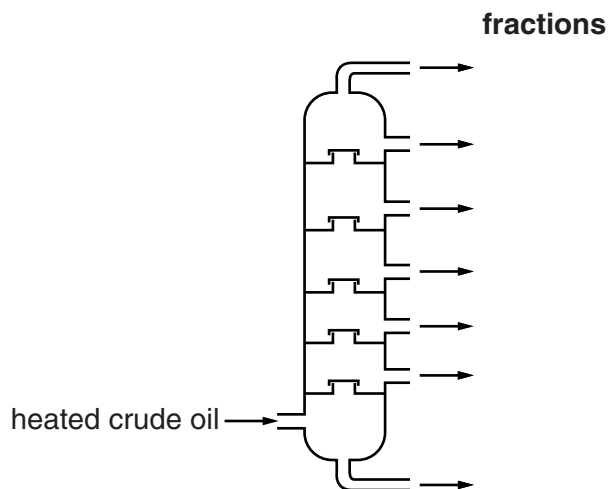
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..... [2]

(b) Crude oil is separated into many fractions by fractional distillation.

The diagram shows a fractionating column.



Look at the table. It shows the boiling point range for some of the fractions.

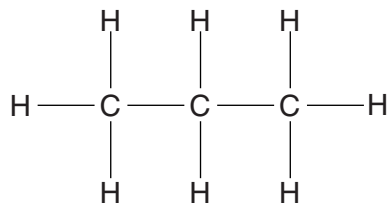
Fraction	Boiling point range in °C
bitumen	above 350
heating oil	240 to 350
paraffin	120 to 240
petrol	20 to 70
LPG	-160 to 20

Write down the name of the fraction which 'exits' from the **bottom** of the fractionating column.

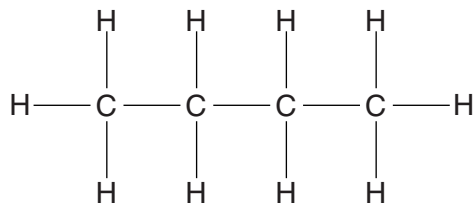
..... [1]



(c) LPG contains propane and butane.



propane



butane

(i) Write down the **molecular formula** of **butane**.

answer .....

[1]

(ii) Look at the displayed formulas of propane and butane.

Propane and butane are **hydrocarbons**.

They are also **alkanes**.

Explain why they are both hydrocarbons and alkanes.

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..... [3]

[Total: 7]

7 Jill wants to buy a sports jacket that she can wear **in all weathers**.

Look at the information about polymers **A, B, C, D** and **E**.

Polymer	Is it stiff or flexible?	Is it waterproof?	Is it breathable?
<b>A</b>	stiff	no	yes
<b>B</b>	flexible	no	yes
<b>C</b>	flexible	yes	yes
<b>D</b>	stiff	yes	yes
<b>E</b>	flexible	yes	no

Which polymer would be best for making Jill’s sports jacket?

Explain your choice.

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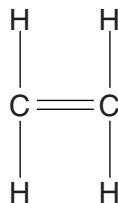
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..... [2]

[Total: 2]

8 Look at the displayed formula of ethene.



(a) Why is ethene described as **unsaturated**?

..... [1]

(b) Bromine water is used to test for an alkene.

Ethene decolourises bromine water.

(i) What type of reaction is this?

..... [1]

(ii) What type of compound is formed in this reaction?

..... [1]

(c) Poly(ethene) is used to make plastic bags.

Draw the displayed formula of poly(ethene).

[2]

[Total: 5]

9 Perfumes, flavourings and nail varnish remover all contain an ester.

Esters are flammable.

Describe how to do a simple experiment to make an ester including an explanation of the safety precautions you should take.



*The quality of written communication will be assessed in your answer to this question.*

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..... [6]

[Total: 6]

10 This question is about foods.

(a) Mayonnaise is made by mixing oil, water and egg yolk.

Egg yolk acts as an emulsifier and stops the oil and water from separating.

Look at the diagram.

It shows a molecule of an emulsifier.



Explain how the emulsifier stops oil and water from separating.

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

(b) When eggs are cooked, a chemical change happens.

Explain why the texture of the egg changes during this chemical change.

.....  
..... [1]

(c) Baking powder is used to make cakes rise.

Baking powder contains sodium hydrogencarbonate.

Sodium hydrogencarbonate decomposes when it is heated.

Write the **balanced symbol** equation for the decomposition of sodium hydrogencarbonate.

..... [2]

[Total: 5]