

Name:

Date:

C7 - Test 5
ORGANIC CHEMISTRY
Advanced

GCSE

CHEMISTRY

AQA - Combined Science

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

Instructions

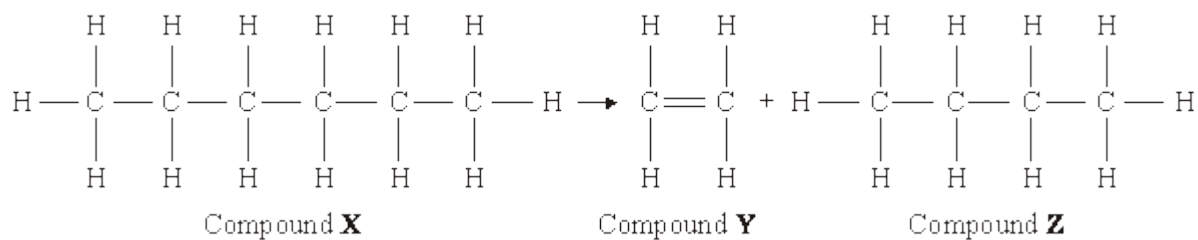
- Answer all questions
- Answer questions in the space provided
- All working must be shown

Information

- The marks for the questions are shown in brackets

1.

The diagram shows a reaction which takes place in an oil refinery.



- (a) **X**, **Y** and **Z** are all examples of which type of compound?

(1)

- (b) What type of chemical reaction takes place when compound **X** is converted into compounds **Y** and **Z**?

(1)

- (c) Compounds **Y** and **Z** are both useful substances.

Compound **Y** is unsaturated. Compound **Z** is saturated.

- (i) Suggest **one** use for compound **Y**.

(1)

- (ii) Suggest **one** use for compound **Z**.

(1)**(Total 4 marks)****2.**

Crude oil is a mixture of mostly alkanes.

- (a) Crude oil is separated into useful fractions by fractional distillation.

- (i) Describe and explain how the mixture of alkanes is separated by fractional distillation.

(3)

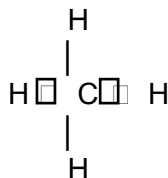
- (ii) The table gives the name and formula for each of the first three alkanes.

Complete the table to show the formula of butane.

Name of alkane	Formula
Methane	CH ₄
Ethane	C ₂ H ₆
Propane	C ₃ H ₈
Butane	

(1)

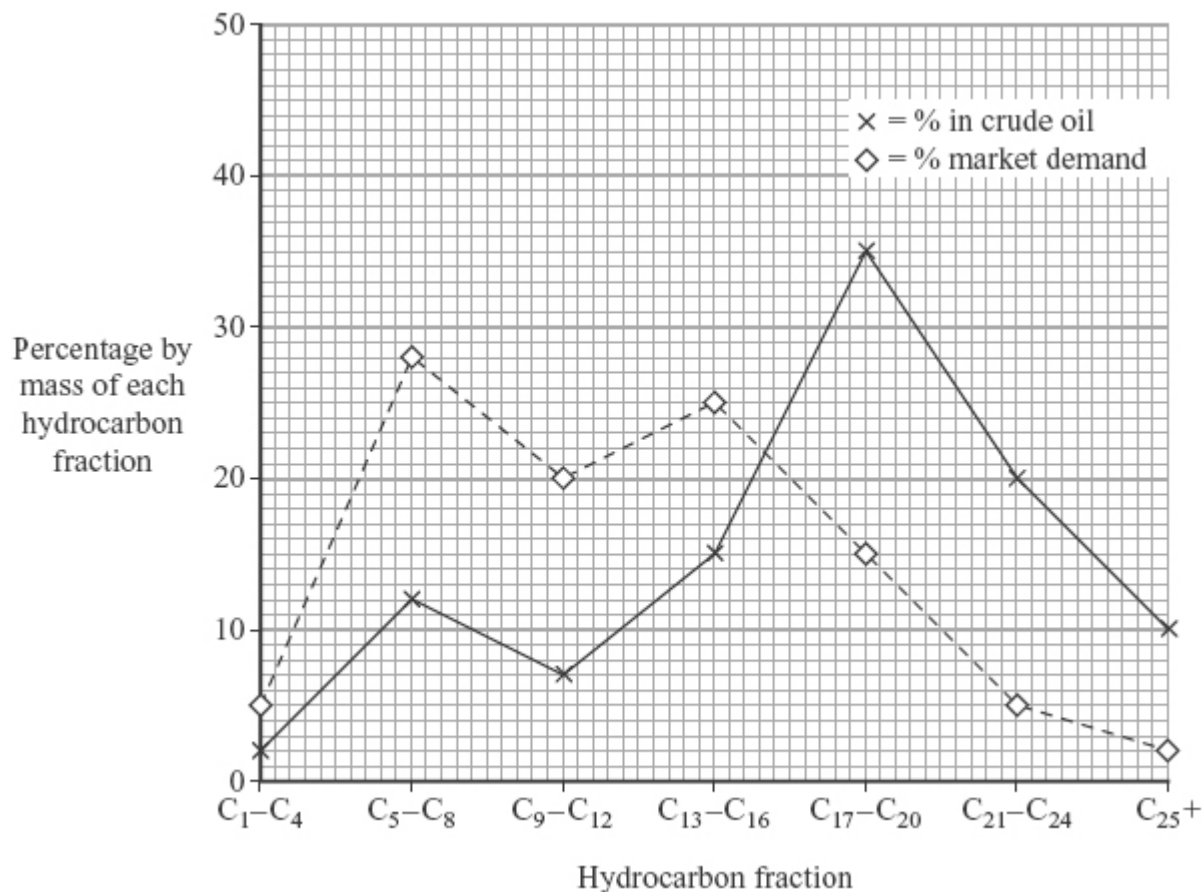
- (b) The structural formula of methane, CH₄, is:



Draw the structural formula of propane, C₃H₈

(1)

- (c) The relative amounts of and the market demand for some hydrocarbons from the fractional distillation of crude oil are shown in the graph.



- (i) Why is the market demand for the C₅ – C₈ fraction higher than the market demand for the C₂₁ – C₂₄ fraction?

(1)

- (ii) Cracking is used to break down large hydrocarbon molecules into smaller hydrocarbon molecules.

Complete the symbol equation by writing in the formula of the other hydrocarbon.



(1)

(iii) The C₅ – C₈ fraction has low supply and high market demand.

Suggest **three** ways in which the oil industry could overcome this problem.

1. _____

2. _____

3. _____

(3)
(Total 10 marks)

3.

The table gives some information about the first four alkanes.

Name	Formula	Boiling point in °C	When one molecule of the alkane is completely burned	
			Number of CO ₂ molecules formed	Number of H ₂ O molecules formed
Methane	CH ₄	-168	1	2
Ethane	C ₂ H ₆	- 89	2	3
Propane	C ₃ H ₈	- 42	3	4
Butane	C ₄ H ₁₀	- 0.5		

(a) The alkanes in crude oil can be separated using fractional distillation.

Explain why.

(2)

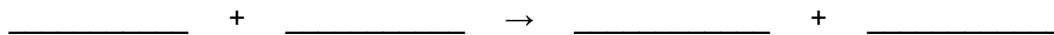
(b) What is the general formula of the alkanes in the table?

(1)

(c) Draw the displayed (structural) formula of ethane.

(2)

(d) Write a balanced symbol equation for the complete combustion of butane.



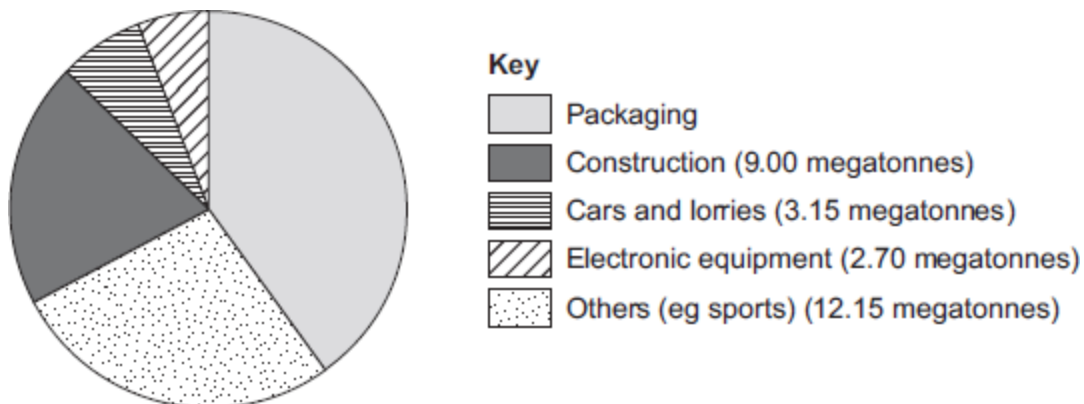
(3)

(Total 8 marks)

4.

Polymers have many important uses. Each year 45 megatonnes of polymers are used.

The pie chart below shows the mass in megatonnes of polymers used in different ways.



(a) What percentage of polymers is used in packaging?

Percentage of polymers used in packaging = _____ %

(2)

(b) (i) Poly(ethene) is often used for packaging. Poly(ethene) is made from ethene.

Ethene is an alkene with the chemical formula C_2H_4

Draw the displayed structure for ethene.

(1)

(ii) Poly(ethene) is formed from ethene in a polymerisation reaction.

Describe, in terms of molecules, what happens in a polymerisation reaction.

(3)

(Total 6 marks)

5.

This information about diesel was printed in a magazine.

Almost all of the crops that we eat can be converted into fuel for cars.

Vegetable oils can be used as biodiesel. Diesel from crude oil is called fossil diesel.

When either biodiesel or fossil diesel burn they both produce similar amounts of carbon dioxide.

Both types of diesel produce carbon monoxide. However, biodiesel produces fewer carbon particles and less sulfur dioxide.

(a) Carbon monoxide can be produced when diesel burns in a car engine. Explain how.

(2)

