AQA GCSE CHEMISTRY (HIGHER) · 8462

CHEMISTRY



EXAM QUESTION PACK

4.7.1 CARBON COMPOUNDS AS FUELS AND FEEDSTOCK (PACK 3)

SCORE	PERCENTAGE
/211	%

STEMUP

These questions belong to AQA, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by AQA. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with AQA and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. AQA has not endorsed, approved or been involved in the production of it. AQA and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

AQA publishes its past papers, mark schemes and examiner reports. Always check the current specification at aqa.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Q1.

(a) This label has been taken from a bottle of vinegar.



Vinegar is used for seasoning foods. It is a solution of ethanoic acid in water.

In an experiment, it was found that the ethanoic acid present in a 15.000 cm^3 sample of vinegar was neutralised by 45.000 cm^3 of sodium hydroxide solution, of concentration 0.20 moles per cubic decimetre (moles per litre).

The equation which represents this reaction is

$$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$$

Calculate the concentration of the ethanoic acid in this vinegar:

(i) in moles per cubic decimetre (moles per litre);

_____

_____

_____

_____

Concentration =_____ moles per cubic decimetre

(2)

(ii) in grams per cubic decimetre (grams per litre).

Relative atomic masses: H = 1; C = 12; O = 16.

_____

_____

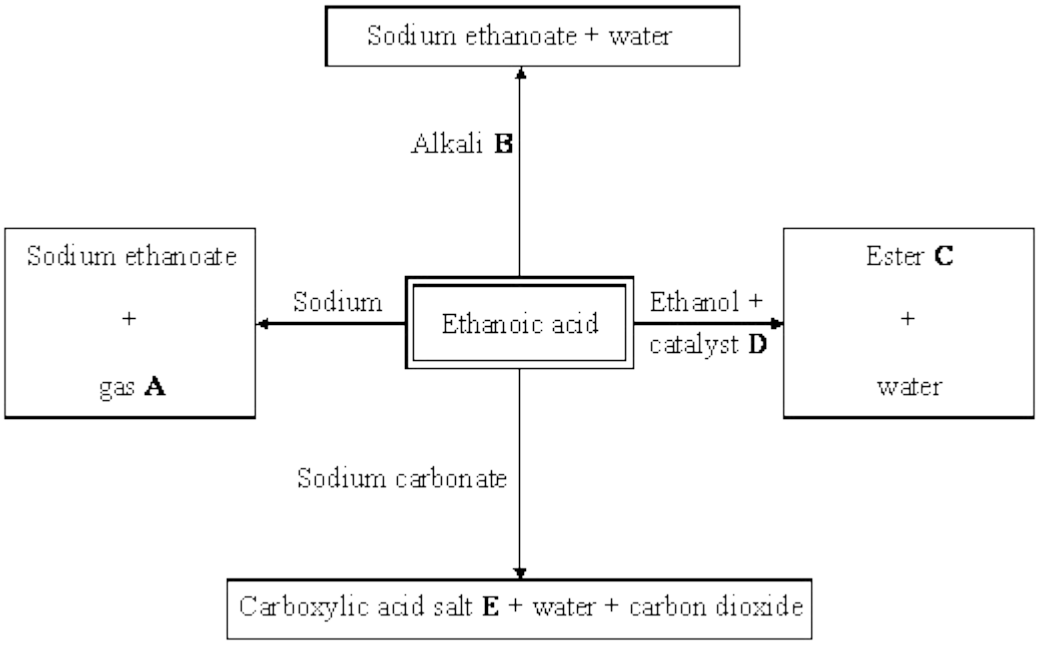
_____

STEMUP.CO.UK

Concentration = _____ grams per cubic decimetre

(2)

(b) The flow diagram shows some reactions of ethanoic acid.



Give the name of:

(i) gas **A**,

_____

(1)

(ii) alkali **B**,

_____

(1)

(iii) ester **C**,

_____

(1)

(iv) catalyst **D**,

_____

(1)

(v) carboxylic acid salt **E**.

_____

(1)

(Total 9 marks)

Q2.

Petrol is a hydrocarbon fuel.

STEMUP.CO.UK

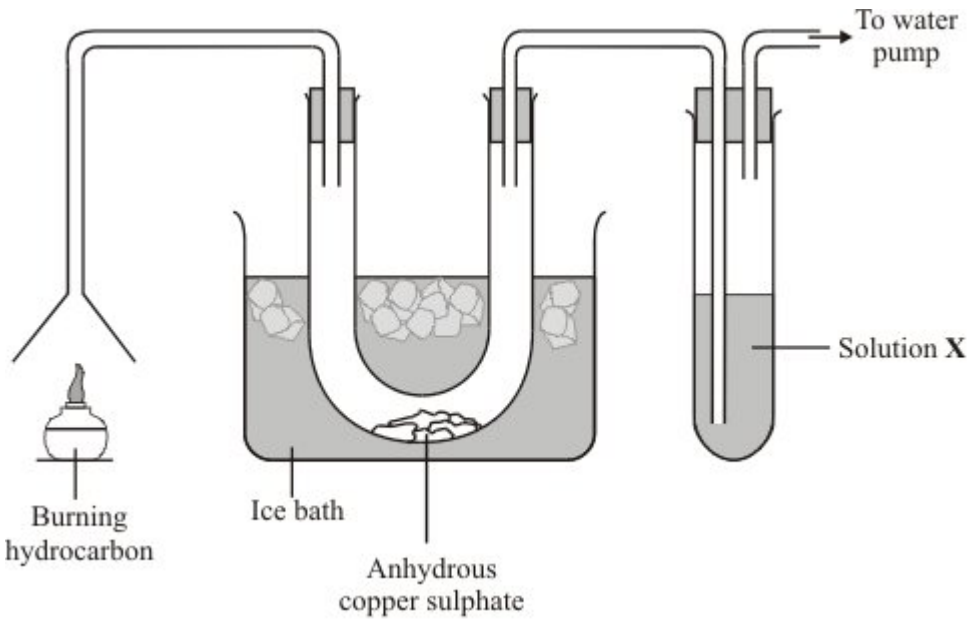
(a) Complete this sentence.

Hydrocarbons are compounds which are made from the elements _____

and _____ only.

(2)

(b) This apparatus was used to study the combustion of a hydrocarbon fuel.



(i) Name the substance which changed the anhydrous copper sulphate from white to blue.

_____

(1)

(ii) Carbon dioxide is also produced when the hydrocarbon fuel is burned.
Name the solution, labelled **X** on the diagram, which tests for carbon dioxide.

_____

(1)

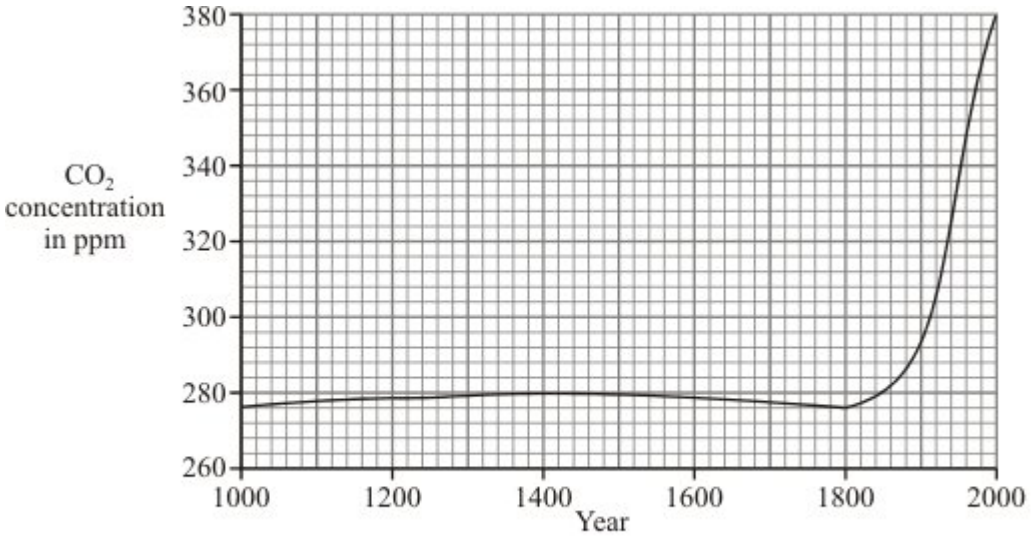
(iii) Complete this sentence.

Carbon dioxide turns solution **X** _____ .

(1)

(c) The graph shows how the concentration of carbon dioxide in the air has varied since the year 1000.

STEMUP.CO.UK



(i) Describe the changes in the concentration of carbon dioxide in the air since the year 1000.

_____

_____

_____

_____

_____

_____

(3)

(ii) Suggest why the concentration of carbon dioxide in the air has changed since the year 1800.

_____

_____

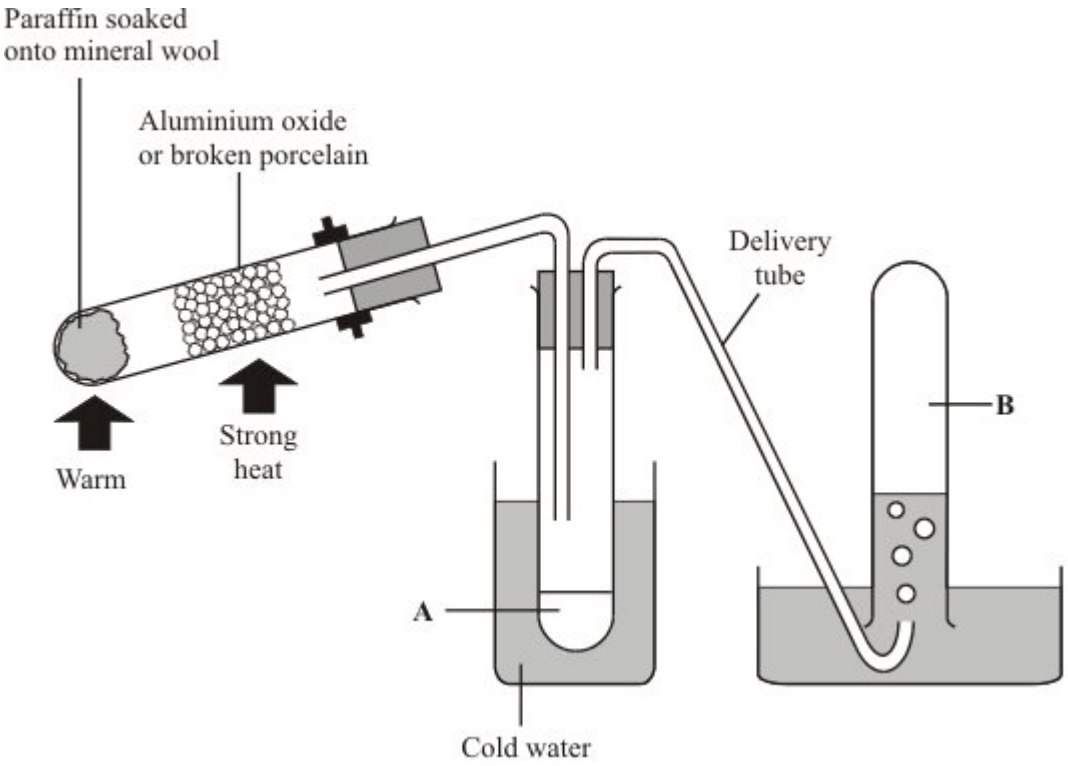
(1)

(Total 9 marks)

Q3.

The diagram shows an apparatus that can be used to carry out cracking reactions in a laboratory.

STEMUP.CO.UK



(a) Why is aluminium oxide or broken porcelain used?

_____

_____

(1)

(b) Paraffin contains decane. The cracking of decane can be represented by the equation below. A decane molecule is split into two smaller molecules.

Complete the equation by adding the formula of the other product.

$C_{10}H_{22}$ (l) → _____ (l) + C_2H_4 (g)

decane

(1)

(c) Would you expect C_2H_4 molecules to collect at position **A** or **B** shown on the diagram?

Position _____ .

Explain your answer.

_____

_____

(1)

(d) Cracking reactions involve *thermal decomposition*.

What is meant by thermal decomposition?

_____

STEMUP.CO.UK

_____

_____

_____

(2)

(e) Explain, as fully as you can, why cracking is used in the oil industry.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

_____

_____

_____

_____

_____

_____

_____

(3)

(f) The cracking reaction produces a mixture of products. The mixture contains hydrocarbons with different boiling points.

Suggest a method of separating this mixture.

_____

_____

(1)

(Total 9 marks)

Q4.

The table gives some data about four fuels, **A**, **B**, **C** and **D**.

Fuel	Cost in pence per 100 g	Energy in kJ per 100 g	Energy per penny in kJ	Gas (✓) formed on burning		
				Carbon dioxide	Sulphur dioxide	Water vapour
A	6.0	4 800	800	✓		✓
B	4.0	1 200	300	✓		✓
C	3.5	2 800	800	✓	✓	✓
D	18.0	14 400	800			✓

STEMUP.CO.UK

A student was asked to use the data in the table to compare these four fuels, and then place the fuels in an order.

The order that the student chose was:

D best fuel
A
C
B worst fuel

Use the information in the table to suggest reasons why the student chose this order.

To gain full marks in this question you should write down your ideas in good English. Put them into a sensible order and use the correct scientific words.

_____

_____

_____

_____

_____

_____

_____

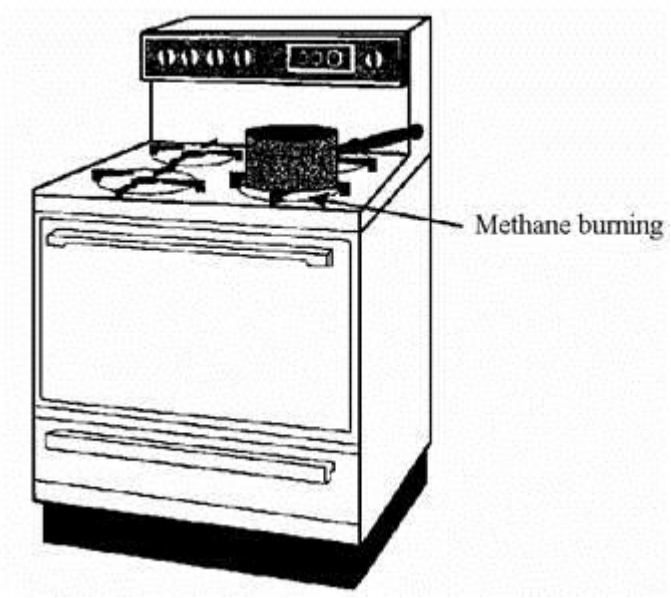
_____

_____

(Total 4 marks)

Q5.

Some gas cookers burn natural gas, methane. Methane, CH_4, is a *hydrocarbon.*



STEMUP.CO.UK

(a) What is meant by *hydrocarbon?*

_____

_____

(2)

(b) When methane burns there must be a good supply of air.

(i) Complete the word equation by choosing the correct **two** chemicals from the box.

carbon dioxide	hydrogen	oxygen	water

methane + oxygen → _____ + _____

(2)

(ii) Without a good supply of air, carbon monoxide is formed. Why is carbon monoxide a dangerous gas?

_____

_____

(1)

(Total 5 marks)

Q6.

(a) Alkenes can be made by cracking large alkane molecules.

(i) Explain how the cracking process is carried out.

_____

_____

_____

_____

(2)

(ii) Give a chemical test which would show the difference between an alkene and an alkane.

Test _____

Result of test _____

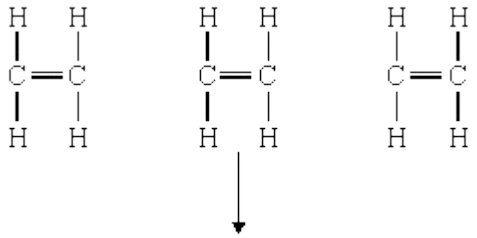
_____

(2)

(b) Alkenes, such as ethene, can be made into polymers.

(i) Complete the following to show how the ethene molecules bond to form part of a polymer.

STEMUP.CO.UK



(1)

(ii) Name the polymer formed from ethene.

_____

(1)

(iii) Explain **one** important problem caused by the everyday use of this polymer.

_____

_____

_____

(2)

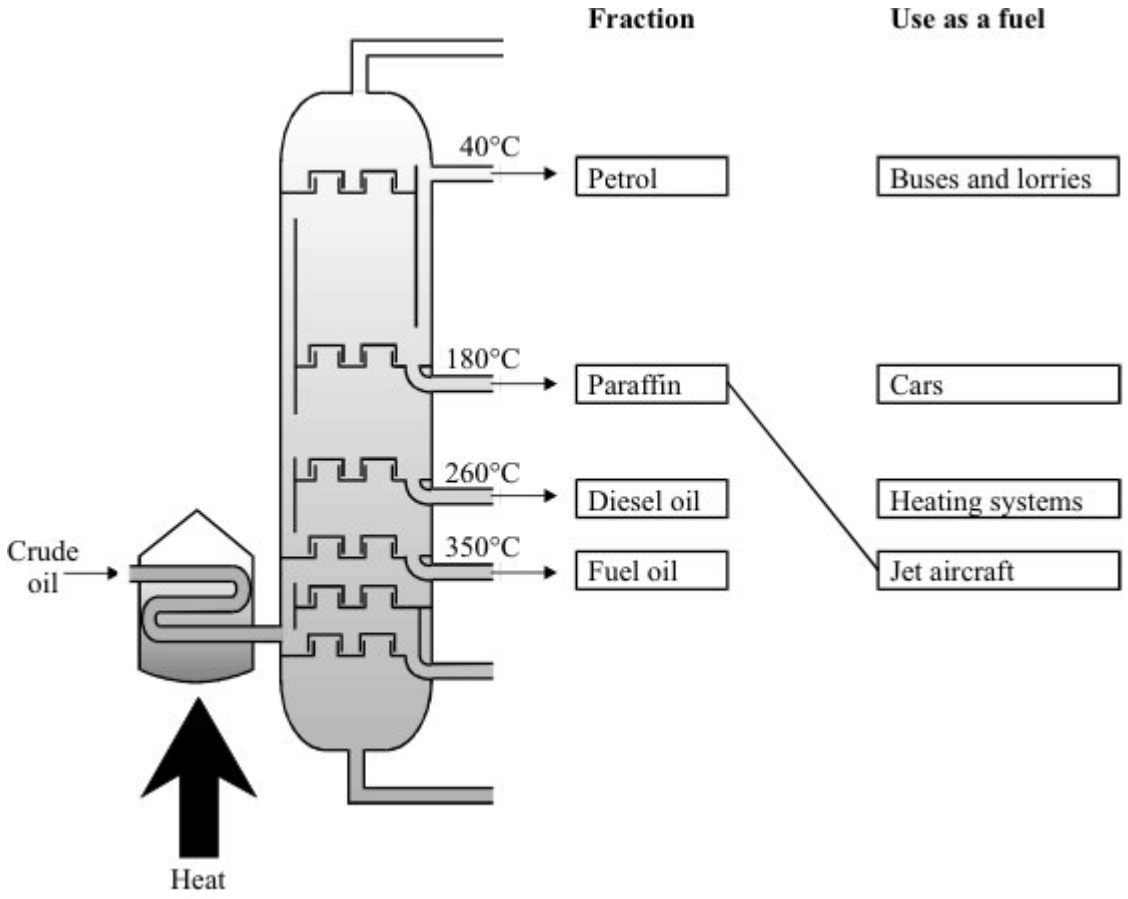
(Total 8 marks)

Q7.

Fractional distillation is used to separate fractions in the crude oil mixture.

(a) Draw a line to join each fraction to its use as a fuel. One line has been drawn for you.

STEMUP.CO.UK



(2)

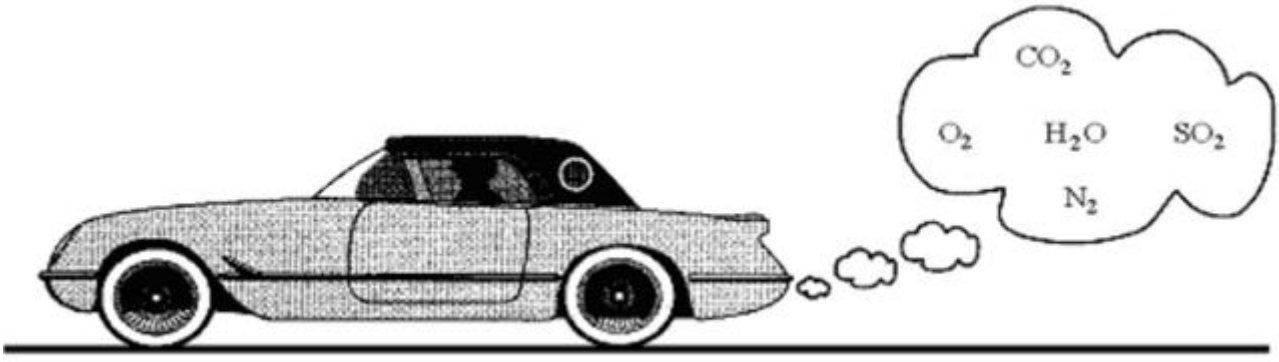
(b) (i) Why does petrol separate from the other fractions in the crude oil mixture?

_____

_____

(1)

(ii) Petrol contains the elements carbon and hydrogen only.



Which **two** of the substances in the diagram are formed when petrol burns?

1. _____

2. _____

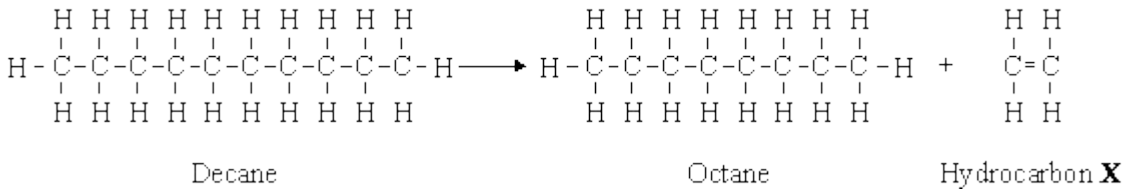
(2)

STEMUP.CO.UK

(Total 5 marks)

Q8.

The high demand for petrol (octane) can be met by breaking down longer hydrocarbons, such as decane, by a process known as cracking.



(a) Apart from heat, what is used to make the rate of this reaction faster?

_____

(1)

(b) Octane is a *hydrocarbon.*

(i) What does *hydrocarbon* mean?

_____

_____

(1)

(ii) Give the molecular formula of octane.

_____

(1)

(c) The hydrocarbon **X** is used to make poly(ethene).

(i) What is the name of **X**?

_____

(1)

(ii) What is the name of the process in which **X** is changed into poly(ethene)?

_____

(1)

(Total 5 marks)

Q9.

The table shows some information about alkanes.

Name	Formula	Relative formula mass	Boiling point in °C
methane	CH_4	16	–160
ethane	C_2H_6	30	–90

STEMUP.CO.UK

propane		44	–40
butane	C_4H_{10}	58	
pentane	C_5H_{12}	72	36
hexane	C_6H_{14}	86	68

(a) Give the formula of propane.

_____

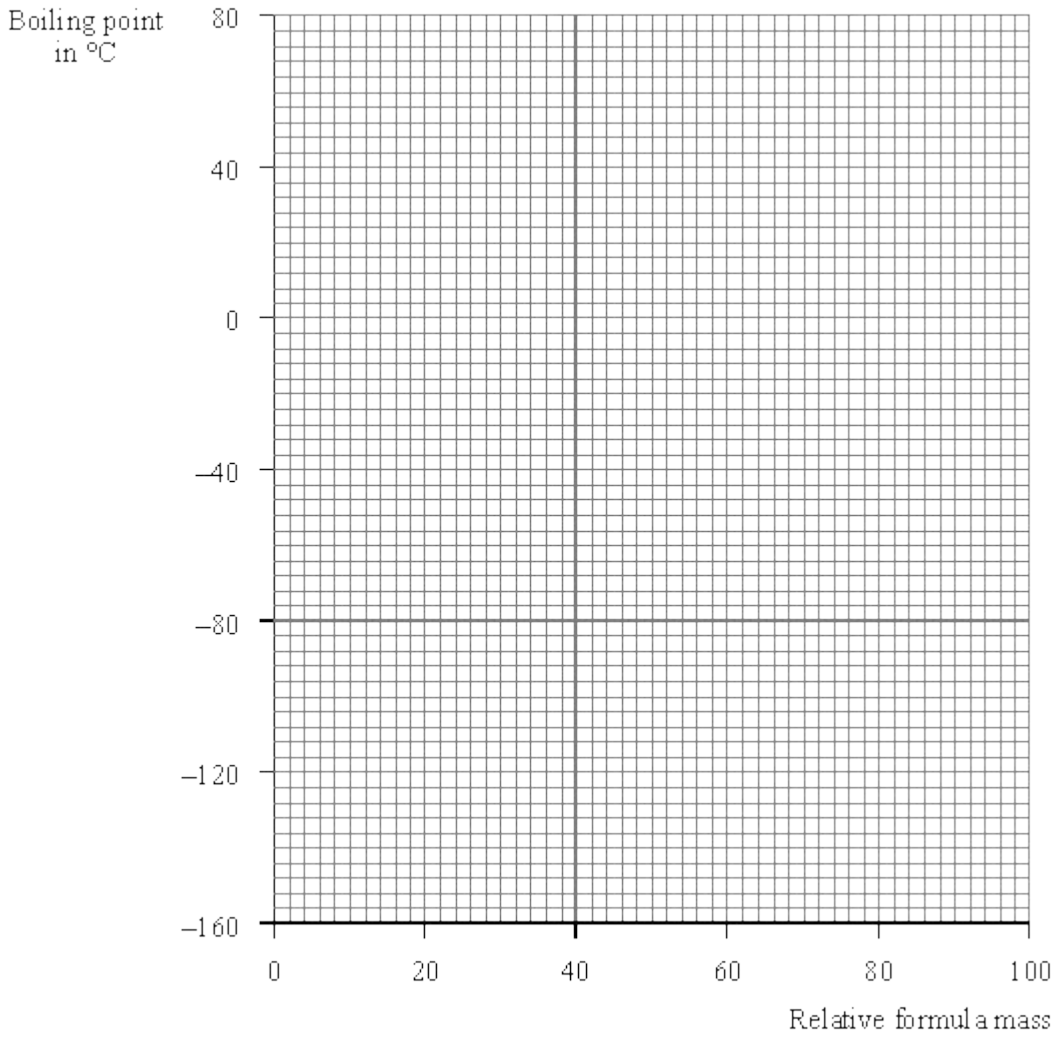
(1)

(b) (i) What happens to the boiling points of the alkanes as the relative formula mass increases?

_____

(1)

(ii) Draw a graph. Plot the points and draw a best fit line.



(3)

(iii) What is the boiling point of butane?

STEMUP.CO.UK

_____

(1)

(iv) Show clearly on the graph how you found the boiling point of butane.

(1)

(c) Circle which of the following is **not** an alkane.

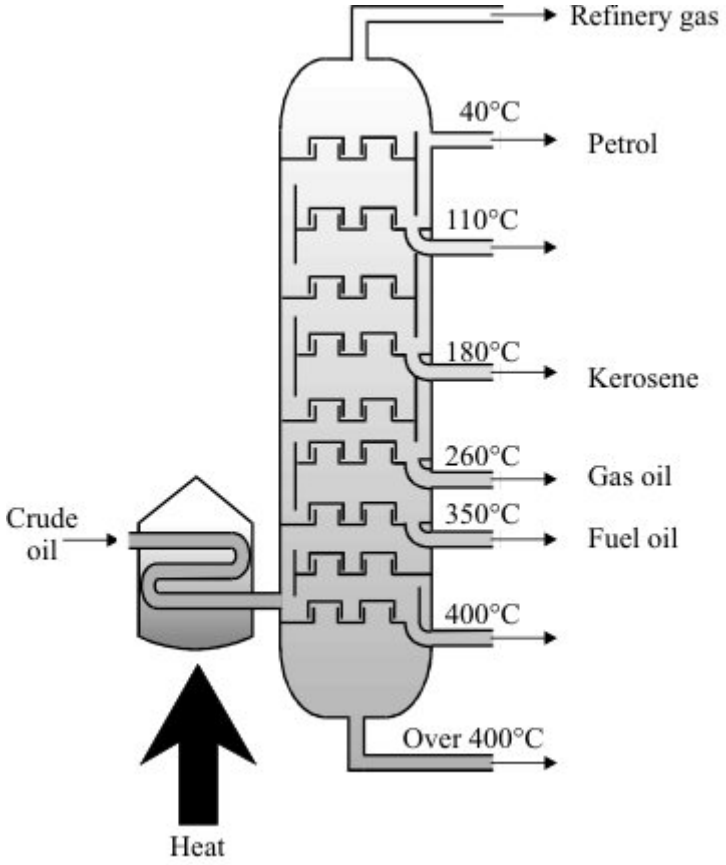
$C_7 11_{16}$ C_9H_{18} $C_{11}H_{24}$ $C_{24}H_{50}$

(1)

(Total 8 marks)

Q10.

To make crude oil more useful it is separated into different fractions.



(a) Complete the gaps in the following sentences.

Crude oil is separated into different fractions by a process called _____

_____ . Each fraction has a different _____ .

(2)

(b) Each fraction is a mixture of compounds. Most of these compounds are hydrocarbons, made up of the elements hydrogen and carbon.

(i) Explain the difference between a mixture and a compound.

_____

STEMUP.CO.UK

_____

_____

(2)

(ii) Explain the difference between a compound and an element.

_____

_____

_____

(2)

(Total 6 marks)

Q11.

One reason the oil industry is important is that it uses crude oil to produce many of the plastic materials we use in everyday life.

(a) The first stage in the formation of a plastic material is called cracking. Butane (C_4H_{10}), a hydrocarbon in crude oil, can be cracked to produce two different hydrocarbons, ethane ($C_2.4$) and ethene (C_2H_4)

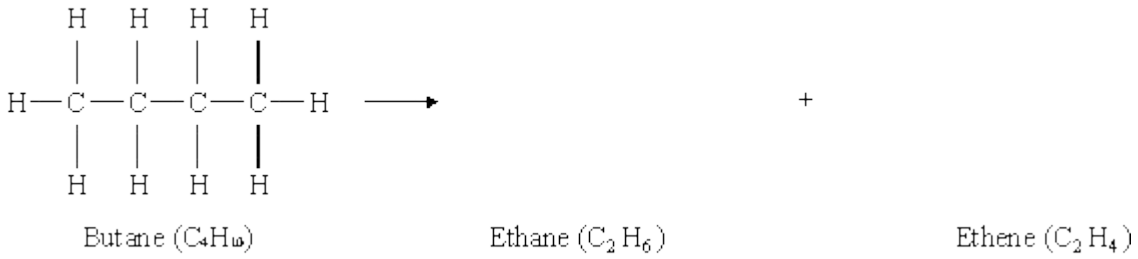
(i) For cracking to happen what needs to be done to the hydrocarbon?

_____

_____

(2)

(ii) Complete the equation for the cracking of butane using displayed formulae.



(2)

(iii) Complete the balanced chemical equation far the complete combustion of ethane in oxygen.

_____$C_2.4$(g) + _____(g) → _____(g) + _____(l)

(3)

(b) The second stage is the formation of the plastic material by polymerisation.

Describe how ethene (C_2H_4) forms poly(ethene). You do not need to give the reaction conditions or the names of catalysts.

_____

_____

STEMUP.CO.UK

_____

_____

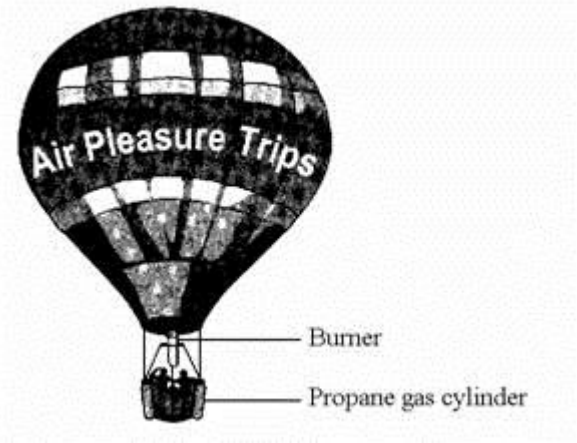
_____

(3)

(Total 10 marks)

Q12.

Hot air balloons are used mainly for pleasure trips.



(a) Air is a mixture of gases. Complete the table. (Carbon dioxide has been done for you.)

Gas	Chemical formula	% in air
nitrogen		78
oxygen	O_2	
argon		0.9
carbon dioxide	CO_2	0.03

(3)

(b) The air in the balloon is heated using a propane burner. Propane, C_3H_8, is a *hydrocarbon* that burns in air forming carbon dioxide, CO_2, and water, H_2O.

(i) What does *hydrocarbon* mean?

_____

_____

(1)

(ii) Which gas, in the air, reacts with propane when it burns?

_____

(1)

STEMUP.CO.UK

(iii) What type of chemical reaction happens when a hydrocarbon burns?

_____

(1)

(iv) The formation of more carbon dioxide causes global problems. Explain why.

_____

_____

_____

_____

(2)

(Total 8 marks)

Q13.

This question is about hydrocarbons.

(a) Use **two** of the words in the box to complete the sentence.

air	finite	organic	renewable	sediment	water

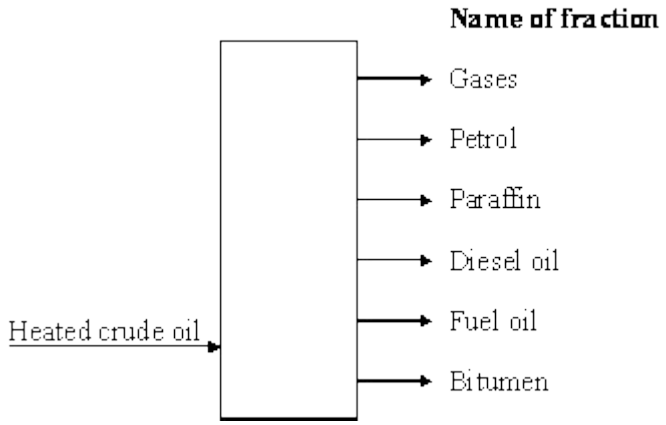
Crude oil is a mixture of hydrocarbons. It was formed from

_____ materials that were trapped in

_____ over a very long period of time.

(2)

(b) Petrol is separated from crude oil by fractional distillation.



(i) Which fraction has the lowest boiling point?

_____

(1)

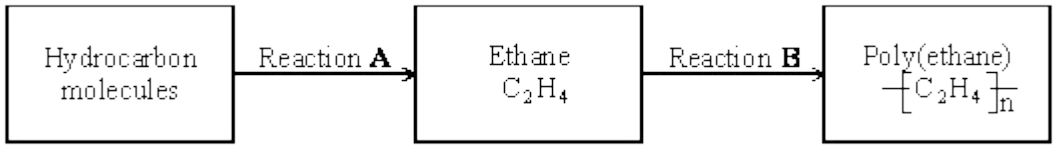
(ii) Which fraction has the highest density?

_____

STEMUP.CO.UK

(1)

(c) Some of the fractions containing larger hydrocarbon molecules are used to make plastics, such as poly(ethene).



(i) What type of chemical change is Reaction **A**?

_____

(1)

(ii) Explain what happens in Reaction **B**.

_____

_____

_____

_____

(2)

(d) Natural gas contains the hydrocarbon called methane. Some water heaters use methane as a fuel. People could die from breathing the fumes produced by heaters that have not been checked and serviced. Explain how these fumes are produced and why they are dangerous.

_____

_____

_____

_____

_____

_____

_____

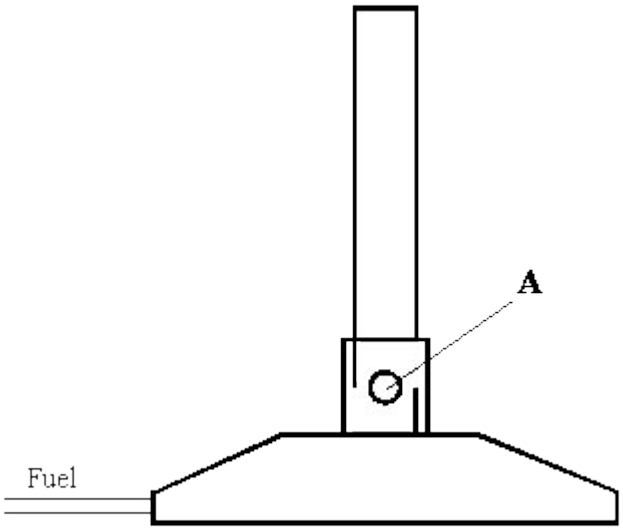
(3)

(Total 10 marks)

Q14.

The diagram below shows a bunsen burner.

STEMUP.CO.UK



Use words from the list to complete the passage about the Bunsen burner. You may use each word once, more than once or not at all.

air	methane
argon	mechanical energy
carbon dioxide	nitrogen
chemical	physical
electrical energy	potential energy
heat	oxygen
kinetic energy	water vapour

In the Bunsen burner the fuel is mixed with _____

which enters through the hole labelled A.

When the fuel burns it reacts with the gas called _____

and energy is given out as _____ .

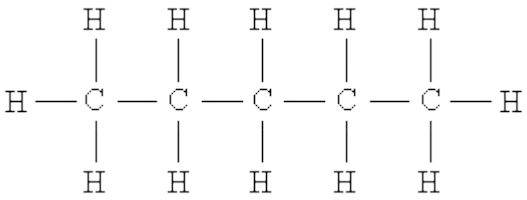
The fuel used in the Bunsen burner contains carbon and hydrogen which are changed during burning into _____ and _____ .

Burning is an example of a _____ change because new substances are formed.

(Total 6 marks)

Q15.

Crude oil is a mixture of a large number of compounds most of which are hydrocarbons such as the molecule shown below.



STEMUP.CO.UK

(a) What is a hydrocarbon?

_____

_____

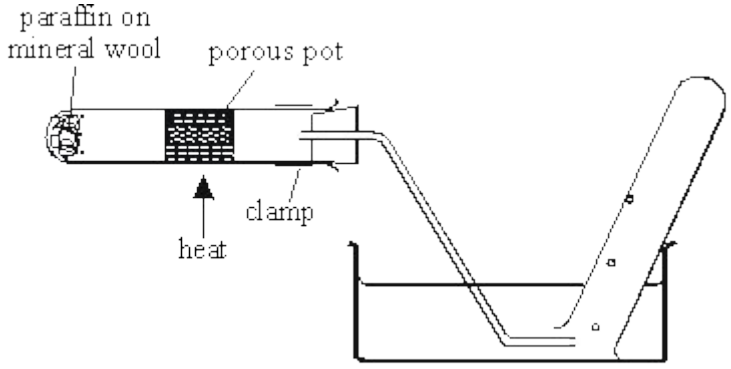
(1)

(b) What is the chemical formula of the molecule shown above?

_____

(1)

(c) The cracking of large molecules obtained from crude oil is one of the important processes in an oil refinery. Cracking involves the thermal decomposition of large molecules. The diagram below shows an apparatus that can be used to demonstrate cracking in the laboratory. The porous pot acts as a catalyst in the reaction.



(i) What happens during thermal decomposition?

_____

_____

_____

(2)

(ii) What effect does the porous pot catalyst have on the reaction?

_____

_____

(1)

(iii) Complete the equation below for the cracking of the molecule. $C_{20}H_{42}$.

$C_{20}H_{42} \rightarrow C_{12}H_{26}$ + _____

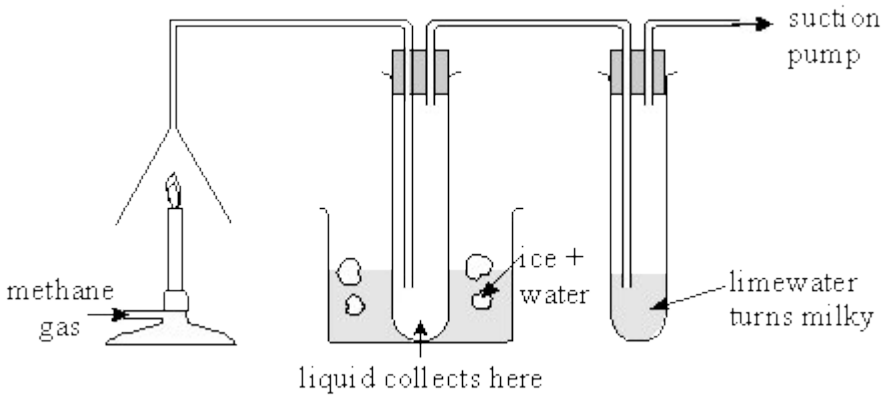
(1)

(Total 6 marks)

Q16.

Methane CH_4 contains the elements carbon and hydrogen only. A student wanted to find out which new substances are produced when methane is burned. The student set up the apparatus shown below.

STEMUP.CO.UK



(a) Which gas in the air reacts with methane when it burns?

_____

(1)

(b) Name the liquid collected.

_____

(1)

(c) Name the gas which turns limewater milky.

_____

(1)

(d) When methane burns an exothermic reaction takes place. What is meant by an exothermic reaction?

_____

_____

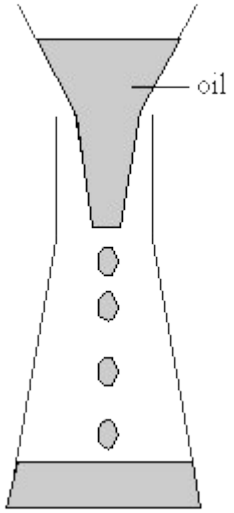
(2)

(Total 5 marks)

Q17.

A teacher carried out an experiment to study car engine oil. The experiment was carried out in a fume cupboard and the teacher wore plastic gloves. The oil was poured through a funnel. The time taken for all the oil to go through the funnel was measured. The experiment was repeated with the oil at different temperatures.

STEMUP.CO.UK



(a) What **two** safety precautions were taken in the experiment?

1. _____

2. _____

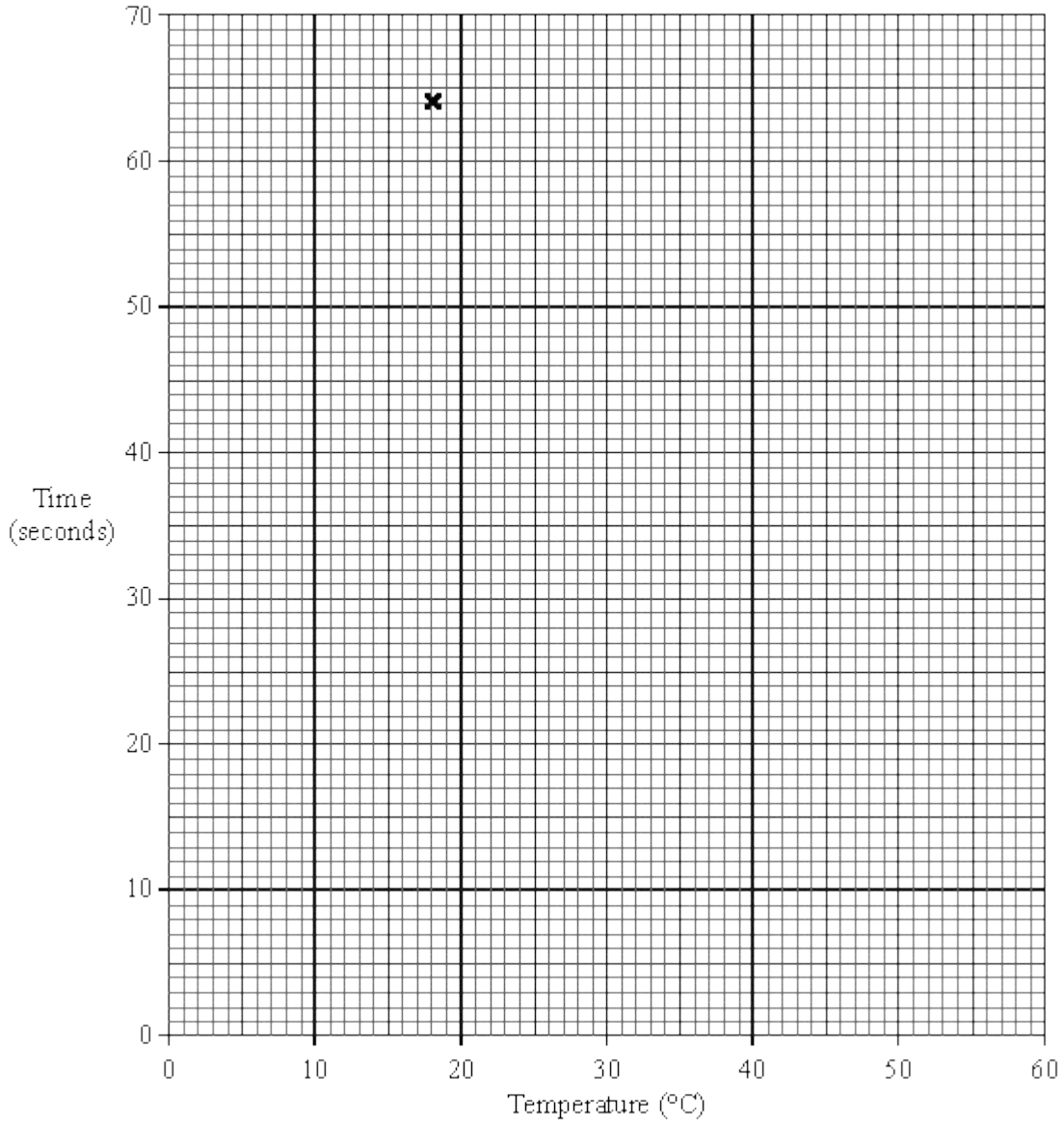
(1)

(b) The results of the experiment are shown in the table below.

TEMPERATURE (°C)	TIME (seconds)
18	64
25	43
32	28
42	19
52	15

(i) Plot the results on the graph paper. One of the results has been plotted for you. Join the points in a smooth curve.

STEMUP.CO.UK



(3)

(ii) Use your graph to find the time it would take the oil to travel through the funnel at 37 °C.

Time = _____ seconds

(1)

(iii) How does the time taken for the oil to go through the funnel change when the temperature is increased?

_____

_____

(1)

(c) An engine oil must be viscous enough to stop the metal parts of the engine from rubbing against each other. It must not be too viscous or the parts cannot move freely.

(i) Complete the sentences below.

STEMUP.CO.UK

The more viscous a liquid is, the less easily it _____ .

As the liquid gets hotter it gets _____ viscous.

(2)

(ii) Why should the oil in a car engine **not** be allowed to get too hot?

_____

_____

_____

(1)

(Total 9 marks)

Q18.

Crude oil is a mixture of many *saturated hydrocarbons*. They can be separated into *fractions* by the process of fractional distillation.

State what is meant by:

(i) *hydrocarbon*. _____

_____

(2)

(ii) *saturated*. _____

_____

(1)

(iii) *fraction*. _____

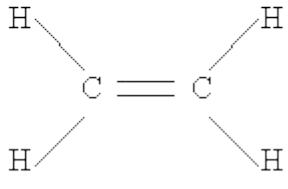
_____

(1)

(Total 4 marks)

Q19.

Propane and ethene are both important hydrocarbons.

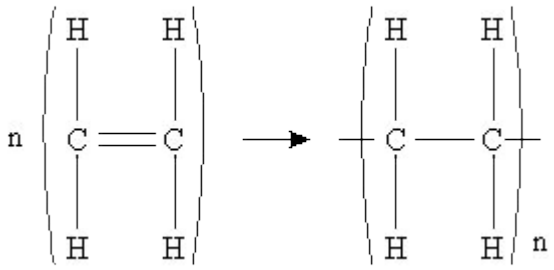
	propane	ethene
formula	C_3H_8	
structure		

STEMUP.CO.UK

(a) **Complete the table** by adding the formula of the ethene molecule and the structure of the propane molecule.

(2)

(b) Ethene can be changed into a plastic. The equation shown below represents the reaction in which ethene is polymerised.



(i) What is the name of the plastic formed in this reaction?

_____

(1)

(ii) What type of polymerisation reaction is shown in the equation?

_____

(1)

(Total 4 marks)

Q20.

Crude oil is a complex mixture of hydrocarbons, mainly alkanes. The number of carbon atoms in the molecules ranges from 1 to over 100.

(a) How does the boiling point change as the number of carbon atoms in the molecules increases?

_____

_____

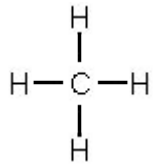
(1)

(b) Name the method used to separate petroleum into fractions.

_____

(1)

(c) The simplest hydrocarbon is methane, CH_4. Its structure can be represented:



Draw the structure of ethane, C_2H_6.

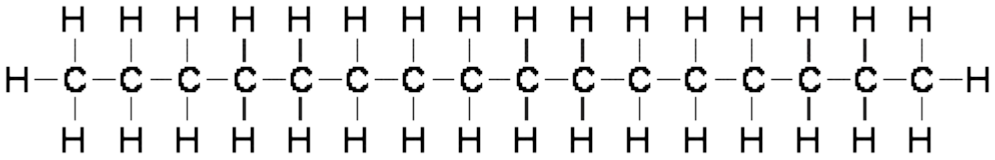
(1)

(Total 3 marks)

STEMUP.CO.UK

Q21.

Diesel oil is obtained from crude oil. It can be used as a fuel for car engines. The diagram below represents a compound found in diesel oil.



(a) What is the formula of this compound?

_____

(1)

(b) Each of the lines on the diagram above represents a covalent bond.

What is a covalent bond?

_____

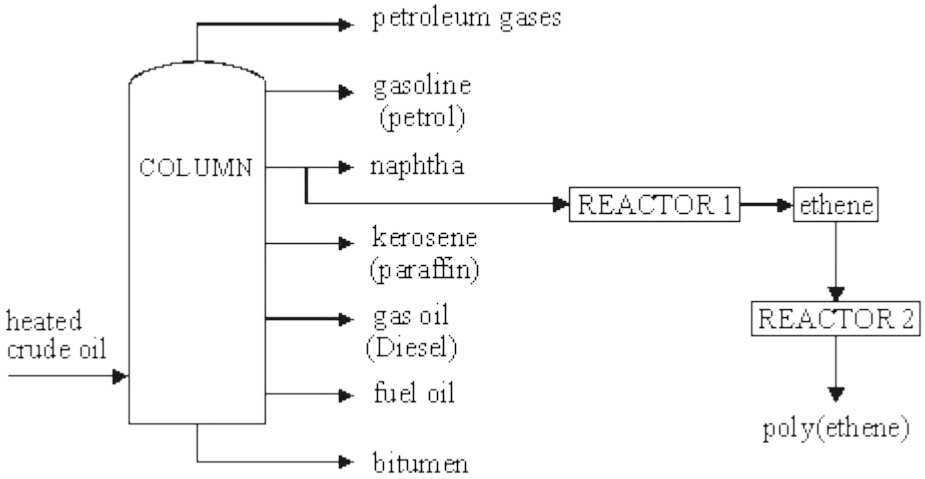
_____

(2)

(Total 3 marks)

Q22.

Crude oil is a mixture of many compounds. The diagram below shows some of the processes that take place in a petrochemical plant.



(a) Name the process which takes place in the COLUMN.

_____

(1)

(b) Name the type of reactions which take place in:

(i) REACTOR 1 _____

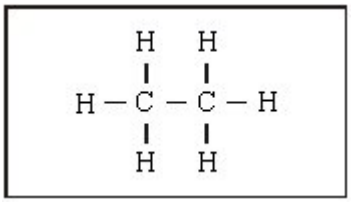
(ii) REACTOR 2 _____

(2)

STEMUP.CO.UK

(c) The petroleum gases contain ethane, C_2H_6 and propane, C_3H_8.

The structure of a molecule of ethane can be represented as:



ethane

Draw the structure of a molecule of propane in the space below.

propane

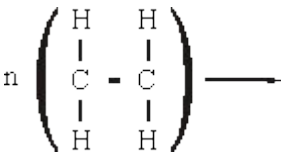
(1)

(d) Ethane and propane are said to be *saturated* hydrocarbons.
What does *saturated* mean when used to describe hydrocarbons?

(1)

(e) Many molecules of ethene join together to form poly(ethene) in REACTOR 2.

Complete the diagram below to show the formation of poly(ethene).



(2)

(Total 7 marks)

Q23.

(a) Crude oil is a mixture of many compounds. Most of the compounds consist of molecules made only of carbon and hydrogen. Choose **one** word from the list below to complete the sentence.

carbohydrates **carbonates** **hydrocarbons** **hydrogencarbonates**

Compounds made only of carbon and hydrogen are called _____

(1)

(b) The fractions contain molecules with similar numbers of carbon atoms. The main fractions are shown in the table below.

NAME OF FRACTION	NUMBER OF CARBON ATOMS IN MOLECULES

STEMUP.CO.UK

petroleum gases	1 to 4
gasoline	4 to 12
naphtha	7 to 14
kerosene	11 to 15
diesel oil	14 to 19
lubricating oil	18 to 30
residue	more than 30

Naphtha burns more easily than diesel oil.
Explain why.

_____

_____

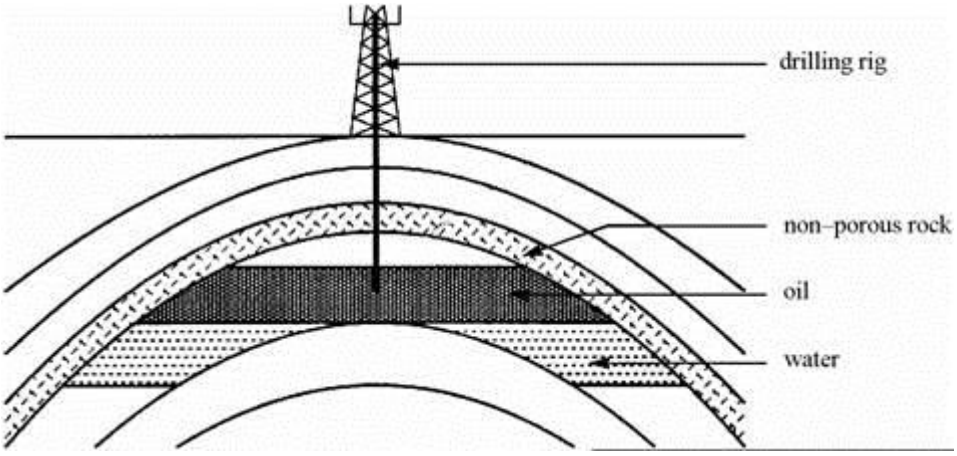
_____

(1)

(Total 2 marks)

Q24.

Crude oil is obtained by drilling into the Earth's crust. The diagram shows a section through the Earth's crust to show how this is done.



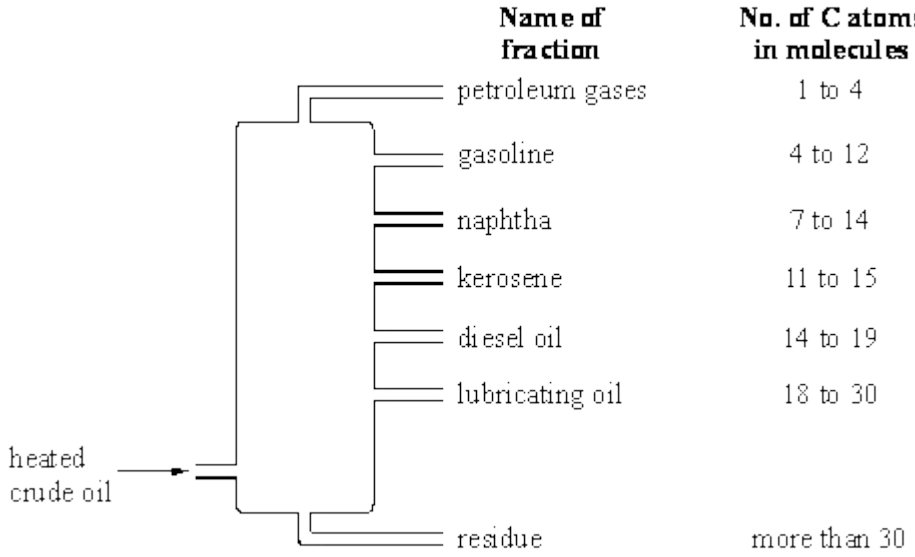
(a) Crude oil contains many hydrocarbons. Which elements do hydrocarbons contain?

_____

(1)

(b) The crude oil is separated by fractional distillation. The diagram shows a column used for this.

STEMUP.CO.UK



(i) Explain, as fully as you can, how fractional distillation works.

_____

_____

_____

_____

_____

(3)

(ii) Naphtha burns more easily than diesel oil. Explain why.

_____

_____

_____

(1)

(iii) Naphtha contains a saturated hydrocarbon with the formula C_7H_{16} .
Draw the structural formula of this compound.

(2)

(Total 7 marks)

Q25.

Crude oil contains many different hydrocarbons.

STEMUP.CO.UK

(i) Which formula in the list represents a hydrocarbon?
Draw a **ring** around the correct formula.

CO_2 **$C_6H_{12}O_6$** **C_8H_{18}** **H_2O**

(1)

(ii) Which word from the list below best describes crude oil?
Draw a **ring** around the correct word.

alloy **compound** **element** **mixture**

(1)

(iii) Choose, from the list below, words to complete the passage about the separation of the hydrocarbons in crude oil by fractional distillation.

atoms **burned** **condensed** **evaporated**
filtered

fractions **ions** **molecules** **neutralised**

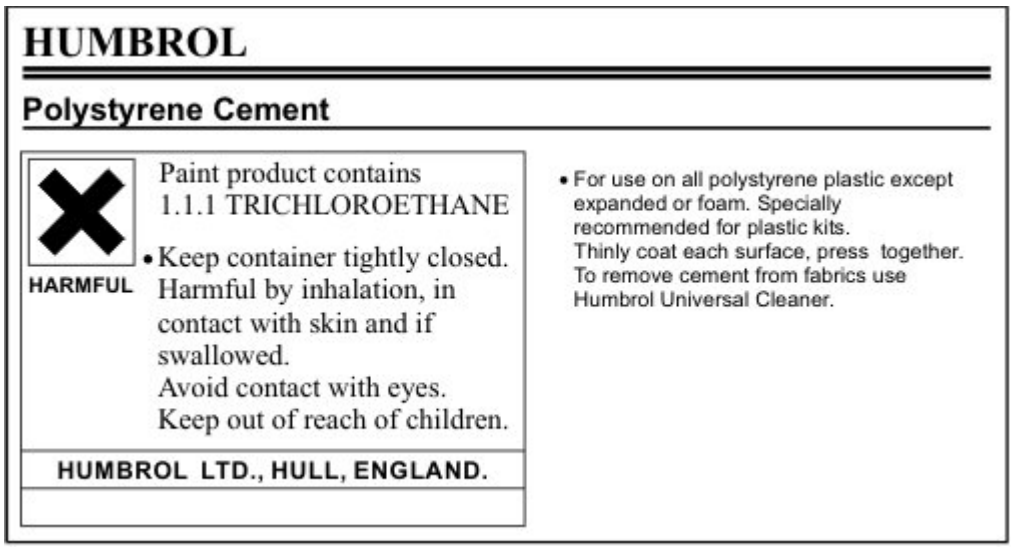
During fractional distillation the many hydrocarbons in crude oil are separated into _____ each of which contains _____ with a similar number of carbon _____ .

To do this the oil is first _____ and then _____ at a number of different temperatures.

(5)
(Total 7 marks)

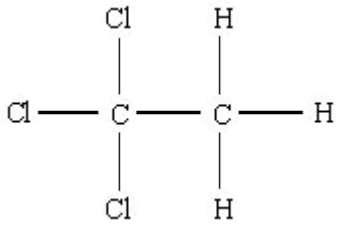
Q26.

The label has been taken from a tube of *Humbrol Polystyrene Cement*, a glue used in model making.



(a) The solvent used is 1,1,1-trichloroethane. The structural formula of this molecule is:

STEMUP.CO.UK



(i) What do the lines between the atoms represent?

_____

(1)

(ii) State whether 1,1,1-trichloroethane is saturated or unsaturated. Give **one** reason for your answer.

_____

_____

_____

(1)

(iii) 1,1,1-trichloroethane is being replaced in favour of a 'better' solvent. Use information on the label to help you to suggest why.

_____

_____

(1)

(b) Polystyrene is a plastic. Plastics are polymers which are made by the process of polymerisation.

(i) What is meant by polymerisation?

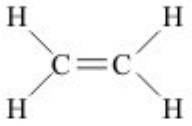
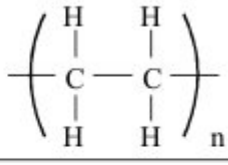
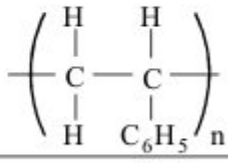
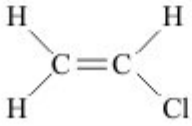
_____

_____

(2)

(ii) The table gives information about monomers and the polymers made from them.
Complete the table.

STEMUP.CO.UK

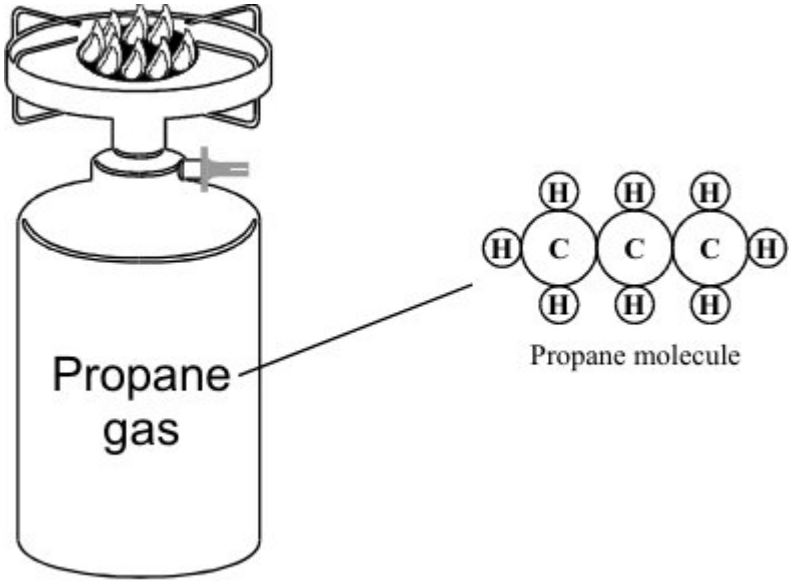
MONOMER		POLYMER	
name	formula	name	formula
ethene			
styrene		polystyrene	
chloroethene		poly(chloroethene)	

(3)

(Total 8 marks)

Q27.

Propane has a small, hydrocarbon molecule, so it is used as a fuel.



(a) Complete the sentences by choosing the correct words from the box.

carbohydrate	**high**	**hydrogen**
hydroxide	**low**	**volatile**

Propane is a hydrocarbon with a _____ boiling point. Propane is a hydrocarbon because it is made of _____ and carbon only.

(2)

(b) Describe, in as much detail as you can, what happens when propane burns.

STEMUP.CO.UK

_____

_____

_____

_____

_____

_____

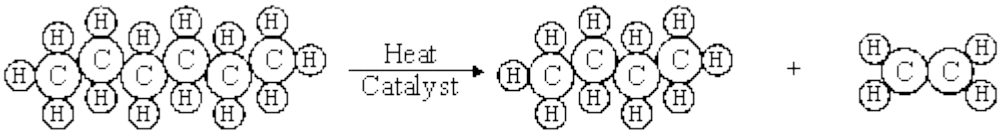
(3)

(Total 5 marks)

Q28.

The many hydrocarbons in crude oil are separated into fractions.

(a) Some of the larger hydrocarbon molecules can be broken down to produce smaller, more useful hydrocarbon molecules.



Hexane Butane Ethene

Hexane and butane are alkanes. Describe the structure of alkanes.

_____

_____

_____

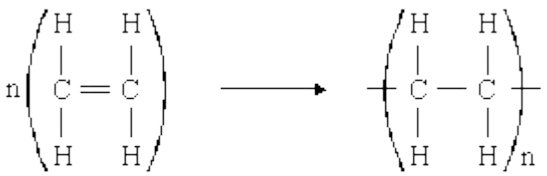
_____

_____

_____

(3)

(b) Ethene is used to make poly(ethene).



Ethene Poly(ethene)

This process is called polymerisation. Explain what is meant by polymerisation.

_____

_____

STEMUP.CO.UK

_____

_____

(2)

(Total 5 marks)

Q29.

Crude oil is separated into fractions by fractional distillation.

The table gives information about some of the fractions.

Fraction	Boiling point range in °C	Number of carbon atoms per molecule
Gas	Below 20	1 – 4
Petrol	20 – 100	5 – 10
Paraffin	100 – 250	11 – 15
Diesel	250 – 350	16 – 20
Lubricant	350 – 500	21 – 35
Bitumen	Above 500	Above 35

(a) What is the relationship between the boiling point of a fraction and the number of carbon atoms in its molecules?

_____

_____

(1)

(b) Give **one** further difference, other than boiling point, between diesel and paraffin that also depends on the number of carbon atoms in their molecules.

_____

_____

(1)

(c) All the fractions contain hydrocarbons.

Name the **two** elements in a hydrocarbon.

_____ and _____

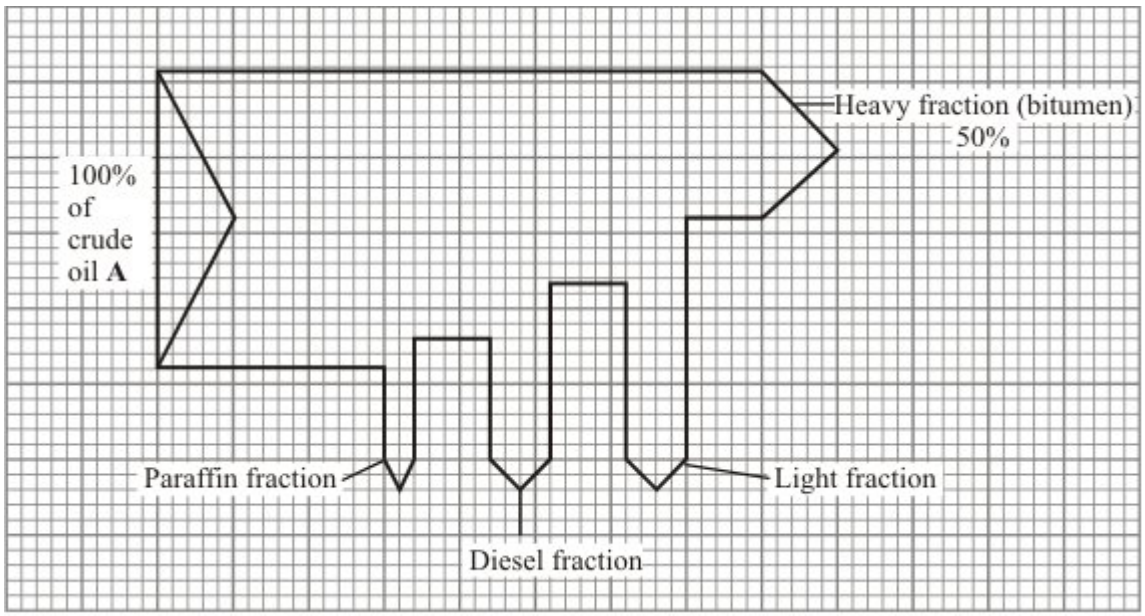
(1)

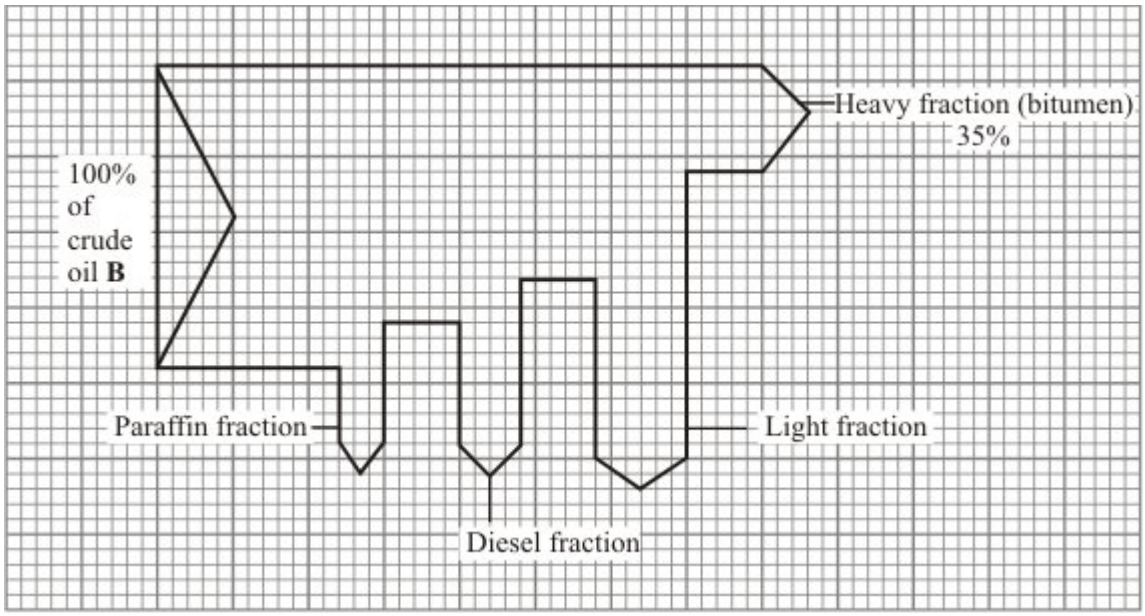
(Total 3 marks)

Q30.

STEMUP.CO.UK

The diagrams show the percentages of the four main fractions produced from two samples of crude oil, **A** and **B**.





(a) The light fraction contains hydrocarbons used for the manufacture of useful chemicals such as polymers. Which one of the samples, **A** or **B**, would be more useful for the manufacture of polymers? Explain your answer.

_____

_____

_____

_____

_____

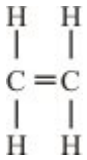
_____

(2)

STEMUP.CO.UK

(b) Heptane (C_7H_{16}), is one of the hydrocarbons used for the manufacture of poly(ethene). The first stage of the process is the production of ethene and another hydrocarbon from heptane.



C_7H_{16} → + 

heptane ethene

(i) In the box, draw the structural formula of the other hydrocarbon produced.

(1)

(ii) Describe how the reaction is carried out.

_____

_____

_____

_____

_____

_____

(2)

(Total 5 marks)

Q31.

(a) Some hydrocarbons are used as fuels in power stations.

The table gives the boiling points of four hydrocarbons.

Hydrocarbon	Boiling point in °C
W	165
X	–160
Y	–40
Z	180

(i) Which of these hydrocarbons are gases at room temperature (20 °C)?

_____

STEMUP.CO.UK

(1)

(ii) Which of these hydrocarbons has the largest molecules?

_____

(1)

(iii) Which of these hydrocarbons ignites most easily?

_____

(1)

(b) Some hydrocarbons are used to produce polymers.

Which type of hydrocarbons can be converted into polymers?

_____

(1)

(Total 4 marks)

Q32.

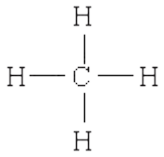
(a) A piece of lithium is placed on the surface of some water in a beaker.
Hydrogen is given off.
Lithium hydroxide is also formed.

Write a word equation for this reaction.

_____

(2)

(b) The diagram shows the structure of a molecule of methane.



Write down everything that this diagram tells you about a methane molecule.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

_____

_____

_____

_____

_____

_____

_____

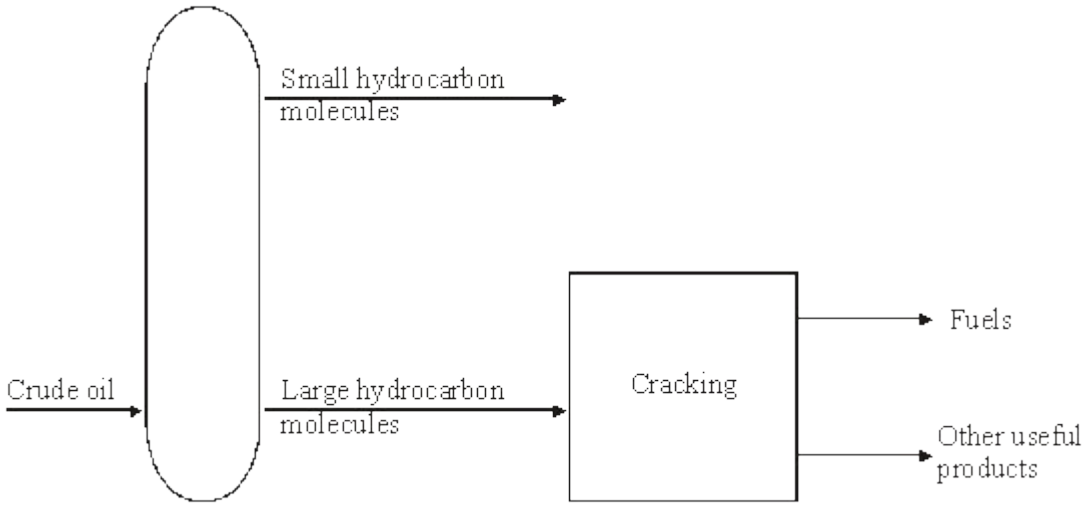
(4)

STEMUP.CO.UK

(Total 6 marks)

Q33.

Crude oil is a mixture of hydrocarbons. These hydrocarbons can be separated and some of them can be used to make other useful products.



(a) Complete the sentence.

Hydrocarbons are made up of _____ atoms and _____ atoms.

(2)

(b) How are the small and large hydrocarbon molecules in crude oil separated?

_____

_____

_____

_____

(2)

(c) The diagram shows that one useful product of cracking is fuels.
Name **one** of the other useful products.

_____

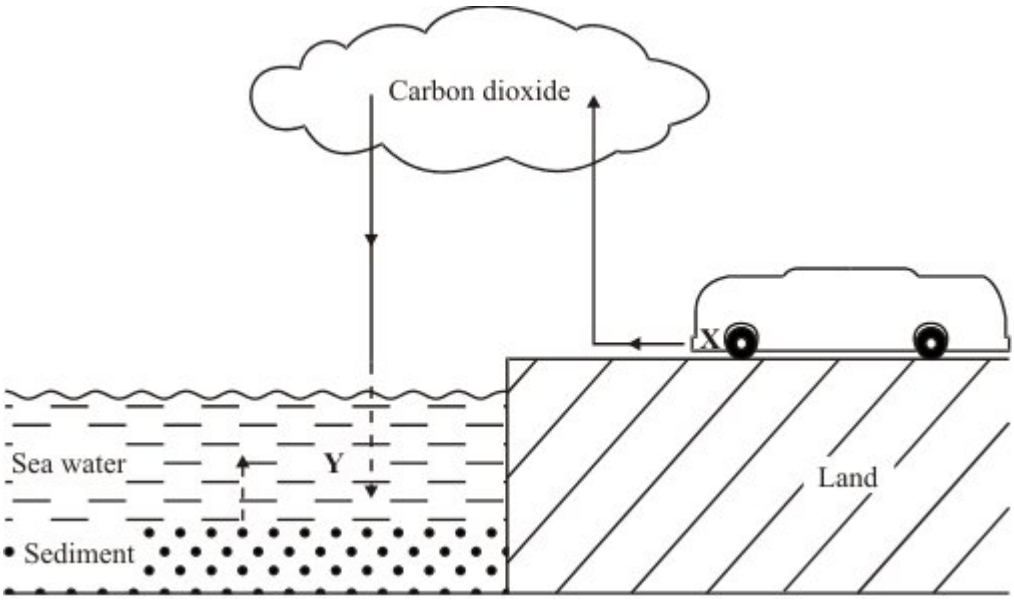
(1)

(Total 5 marks)

Q34.

The amount of carbon dioxide in the atmosphere is increased by reactions that occur in internal combustion engines (**X**) and is decreased by reactions in sea water (**Y**).

STEMUP.CO.UK



Describe, in as much detail as you can, the reactions which take place at **X** and **Y**.

(a) **X** _____

_____

_____

_____

(2)

(b) **Y**

_____

_____

_____

_____

(3)

(Total 5 marks)

Q35.

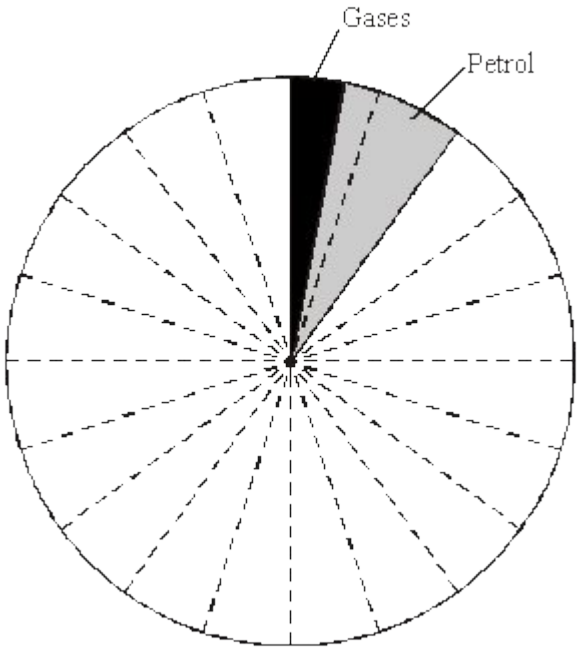
The table shows the composition of some crude oil.

Fraction	Percentage in crude oil
Gases	3
Petrol	7
Naphtha	10
Kerosine	15

STEMUP.CO.UK

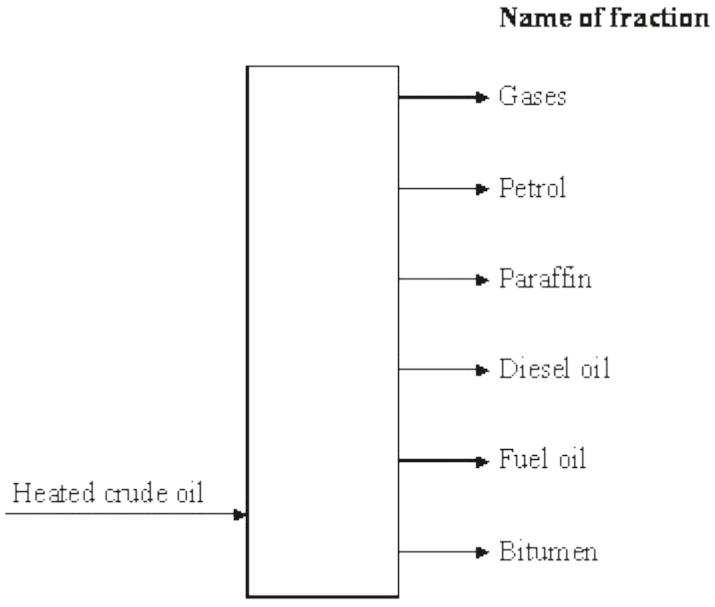
Gas oil	20
Fuel oil	45

(a) Complete the pie chart for the composition of this crude oil. Remember to label the chart.



(3)

(b) The diagram shows the process of separating a different sample of crude oil into fractions.



(i) What is the name given to this process?

_____

(1)

(ii) Which fraction has the lowest boiling point?

STEMUP.CO.UK

_____

(1)

(iii) Which fraction is the least volatile?

_____

(1)

(Total 6 marks)

STEMUP.CO.UK