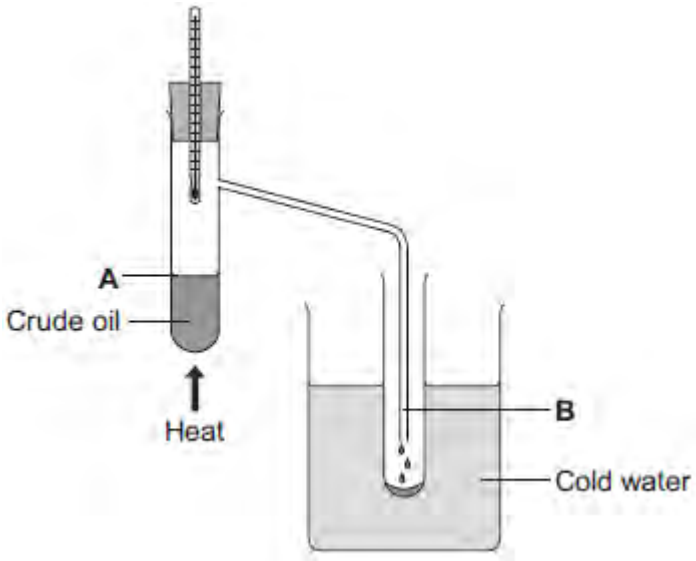
Q1. Crude oil is a mixture of a very large number of compounds.

Figure 1 shows a laboratory experiment to separate crude oil.

Figure 1



(a) Complete the sentence.

The name for compounds that contain only hydrogen and

carbon is ..... .

(1)

(b) Use the correct word from the box to complete each sentence.

condensation	**decomposition**	**distillation**
evaporation	**reduction**	

(i) The process of separating crude oil is fractional ..... .

(1)

(ii) The process taking place at **A** is ..... .

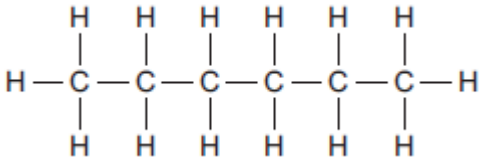
(1)

(iii) The process taking place at **B** is ..... .

(1)

(c) One of the compounds in crude oil is hexane. The displayed structure of hexane is shown in **Figure 2**.

Figure 2



Complete the sentences.

(i) Each line between the atoms in hexane represents a covalent ..... .

(1)

(ii) Complete the chemical formula for hexane.

C_6H.....

(1)

(iii) Hexane can be broken down into smaller molecules by a process called

..... .

(1)

(d) Small molecules, called alkenes, are used to make polymers.

(i) Name the polymer made from butene.

..... .

(1)

(ii) Incinerators are used to burn waste polymers, such as plastic bags.

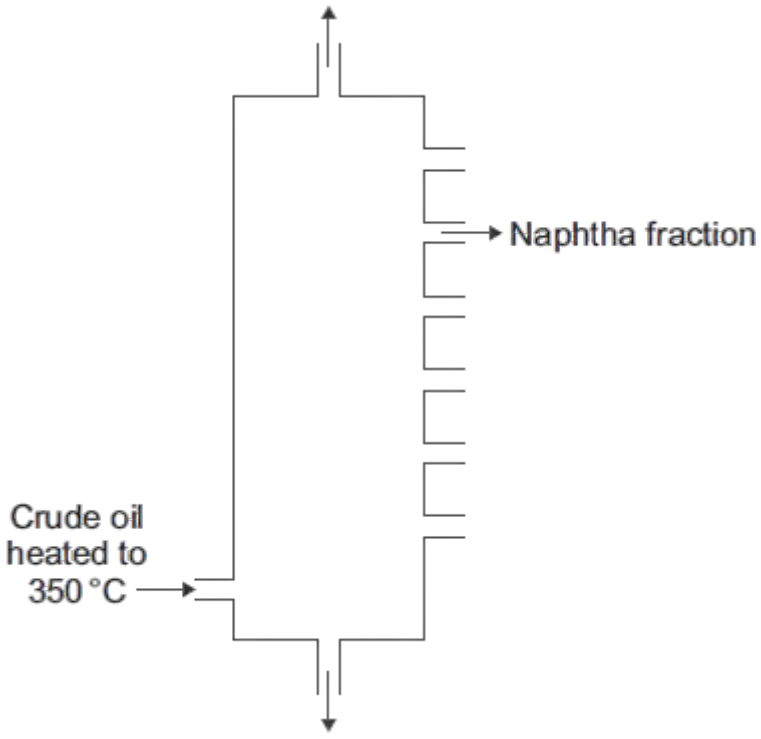
Tick (✓) **one** advantage and tick (✓) **one** disadvantage of burning plastic bags.

	Advantage Tick (✓)	Disadvantage Tick (✓)
Energy is released.		
More recycling is needed.		
Carbon dioxide is produced.		

(2)
(Total 10 marks)

Q2. Crude oil is used to produce poly(ethene).

(a) Fractional distillation is used to separate crude oil into fractions.



(i) Write a number, **2**, **3**, **4** or **5**, next to each stage so that the description of fractional distillation is in the correct order. Numbers **1** and **6** have been done for you.

Number	Stage
1	The crude oil is heated to 350 °C.
	When a fraction in the vapours cools to its boiling point, the fraction condenses.
	Any liquids flow down to the bottom of the column and the hot vapours rise up the column.
6	The condensed fraction is separated and flows out through a pipe.
	When the hot vapours rise up the column, the vapours cool.
	Most of the compounds in the crude oil evaporate.

(2)

(ii) The naphtha fraction is cracked to produce ethene (C_2H_4).
Ethene is used to make the polymer called poly(ethene).

Name **two** substances produced when poly(ethene) burns in air.

1 .....

2 .....

(2)

(b) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Each year in the UK, billions of plastic bags are given free to shoppers. These bags are made from poly(ethene) and are often used only once.
After being used many of these plastic bags are either thrown away as litter or buried in landfill sites.

In 2006 over 10 billion of these plastic bags were given free to shoppers.
In 2009 the number of plastic bags given to shoppers had decreased to 6.1 billion.
One reason for the decrease was because some supermarkets made people pay for their plastic bags.

From 2011 a new type of plastic shopping bag made mainly from poly(ethene) had a use-by date of only one year printed on the bag.

Use the information above and your knowledge and understanding to describe advantages and disadvantages of using plastic shopping bags made from poly(ethene).

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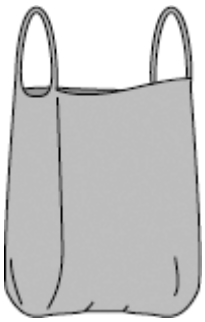
(6)
(Total 10 marks)

Q3. The plastic used for shopping bags is made from crude oil.



(a) Complete each sentence.

(i) The compounds of hydrogen and carbon

in crude oil are called .....

(1)

(ii) Crude oil is separated into fractions, such as naphtha, using

fractional .....

(1)

(b) Plastics are made from alkenes.
The alkenes are made from naphtha.

Draw a ring around the correct answer to complete each sentence.

(i) First the liquid naphtha is made into a gas. This process is called

distilling.
filtering.
vaporising.

(1)

(ii) The naphtha gas is then passed over a hot catalyst.

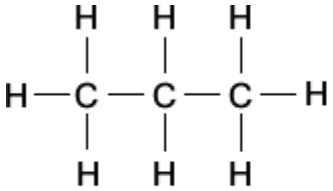
This process is called

boiling.
bonding.

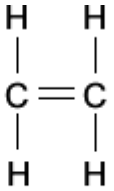
cracking.

(1)

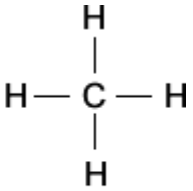
(c) The displayed formulas of three molecules are:



Molecule A



Molecule B



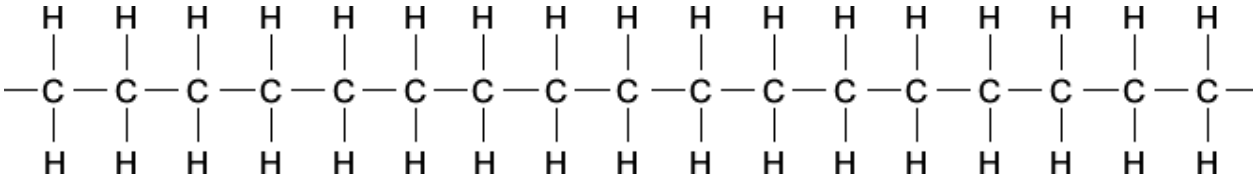
Molecule C

Which molecule, **A**, **B** or **C**, is an alkene?

(1)

(d) The plastic for the bag is made when many alkene molecules are joined together to make the polymer called poly(ethene).

Part of a very large poly(ethene) molecule is shown below.



After plastic bags have been used for shopping, the bags can be reused, recycled, buried in landfill sites or burned.

(i) Reusing and recycling used plastic bags is good for the environment because this conserves crude oil.

Tick (✓) another reason why recycling used plastic bags is good for the environment.

Reason	**Tick (✓)**
energy is used to transport and melt the used	

plastic bags	
new plastic products are made from the used plastic bags	
new plastic bags made from crude oil are cheap to produce	

(1)

(ii) Complete the sentence.

One reason why burying used plastic bags in landfill sites is not good for the environment is that poly(ethene) .....

(1)

(iii) Some statements about burning used plastic bags are given below.

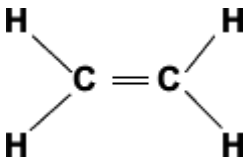
Tick (✓) **one** advantage and tick (✓) **one** disadvantage of burning used plastic bags.

	Advantage Tick (✓)	**Disadvantage Tick (✓)**
new plastic bags can be produced		
carbon dioxide is produced		
water is one of the products		
energy is released		

(2)
(Total 9 marks)

Q4. Supermarkets in the UK have been advised by the Government to stop giving plastic bags to customers.
Plastic bags are made from a polymer.
The polymer is made from ethene.

The structural formula of ethene is shown.



Ethene is made by cracking hydrocarbons.
These hydrocarbons come from crude oil.

(a) Complete these sentences about ethene.

(i) Ethene is a hydrocarbon because it contains only ..... and

.....

(2)

(ii) Ethene is unsaturated because it has a ..... bond.

(1)

(b) Tick (✓) the name of the polymer formed when many ethene molecules join together.

Name of polymer	Tick (✓)
poly(chloroprene)	
poly(ethene)	
poly(propene)	

(1)

(c) Suggest **two** reasons why supermarkets should stop giving plastic bags to customers.

1 .....

.....

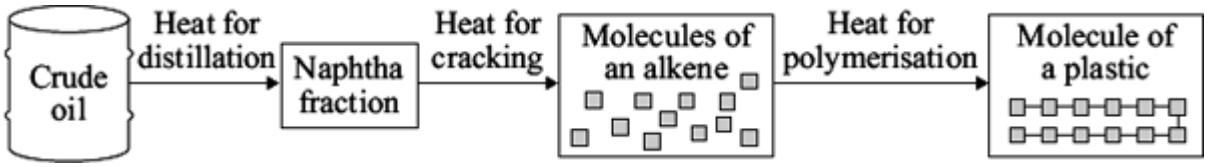
2 .....

.....

(2)
(Total 6 marks)

Q5. Crude oil is used to make plastics.

(a) To make a plastic from crude oil involves many processes.



(i) How do alkene molecules form a molecule of a plastic?

.....

.....

(1)

(ii) Suggest **one** of the main costs of making a plastic from crude oil.

.....

.....

(1)

(iii) Suggest **two** problems caused by the disposal of plastics in landfill sites.

1 .....

.....

2 .....

.....

(2)

(b) Some companies are using bio-plastics made from plants such as corn.
Less fossil fuel is used to make bio-plastics than is used to make plastics from crude oil.

Plastics made from plants would be more environmentally friendly than plastics made from crude oil.

Explain why.

.....

.....

.....

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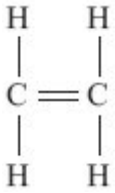
(2)
(Total 6 marks)

Q6. Crude oil is used to make useful substances such as alkenes and plastics.

(a) The alkene shown is ethene.



(i) Tick (✓) the correct formula for ethene.

Formula	(✓)
CH_4	
C_2H_4	
C_2H_6	

(1)

(ii) Tick (✓) the name of the plastic formed when many ethene molecules join together.

Name of plastic	(✓)
Poly(ethene)	
Poly(ethanol)	
Poly(propene)	

(1)

(b) Read the article about plastics and then answer the questions.

THE PROBLEM WITH PLASTIC WASTE

The UK produces about 3 million tonnes of plastics from crude oil every year.

Most of the litter found on UK beaches is plastic waste.

80% of the plastics produced end up in landfill sites.

The UK recycles only 7% of plastic waste.

(i) Draw a ring around the correct answer in the box to complete the sentence.

Litter that is plastic waste needs to be removed from beaches

because it	decomposes is flammable is not biodegradable	.

(1)

(ii) Suggest a problem caused by 80% of the plastics going to landfill sites.

.....

.....

(1)

(iii) The UK government has set a target to recycle 30% of plastic waste.

How are resources saved by recycling more plastics?

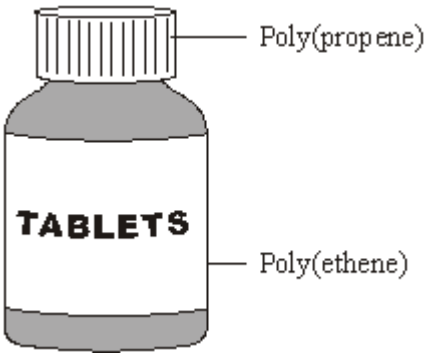
.....

.....

(1)

(Total 5 marks)

Q7. Tablet containers are often made from two different polymers.



(a) Ethene, C_2H_4, and propene, C_3H_6, can be made from crude oil.

(i) Complete the following sentence.

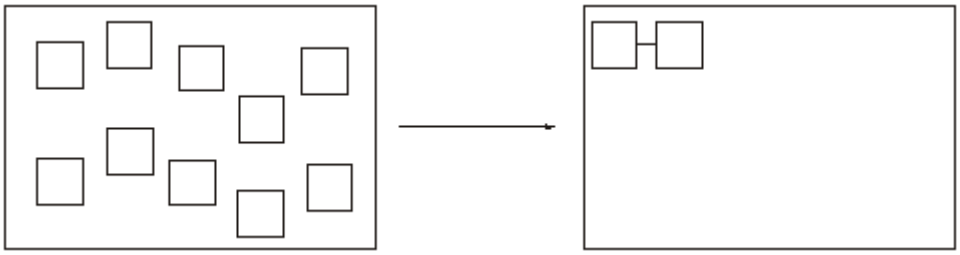
Ethene and propene are called hydrocarbons because they are made up of carbon and ..... atoms only.

(1)

(ii) Ethene molecules are used to form poly(ethene) molecules.

Complete the diagram to show the poly(ethene) molecule.

Ethene molecules **Poly(ethene) molecule**



(2)

(b) The tablet containers could be disposed of in a landfill site or could be recycled.

(i) Suggest **two** reasons why disposing of the tablet containers in a landfill site could

cause problems.

1 .....

.....

2 .....

.....

(2)

(ii) Suggest **one** reason why recycling the tablet containers would be difficult.

.....

.....

(1)
(Total 6 marks)