Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2012

Science A
Unit Chemistry C1

CH1FP

F

Chemistry
Unit Chemistry C1

Friday 15 June 2012 1.30 pm to 2.30 pm

For this paper you must have:
- a ruler
- the Chemistry Data Sheet (enclosed).

You may use a calculator.

Time allowed
- 1 hour

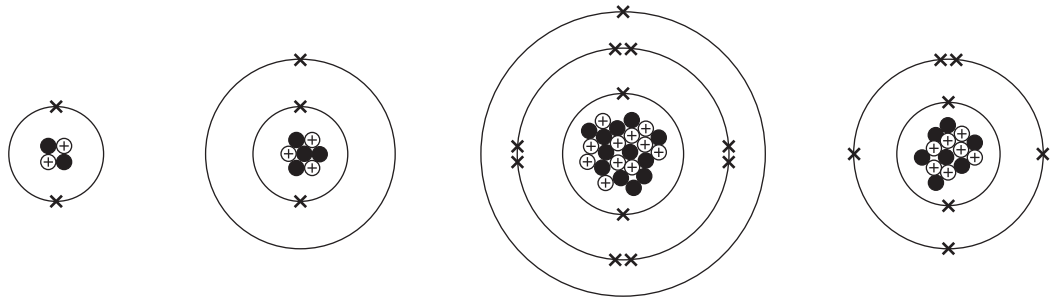
Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 8(b) should be answered in continuous prose.
  In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

Advice
- In all calculations, show clearly how you work out your answer.

Answer **all** questions in the spaces provided.

1 The diagrams show the sub-atomic particles in four different atoms.



Atom A **Atom B** **Atom C** **Atom D**

Use the Chemistry Data Sheet to help you to answer these questions.

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

1 (a) (i) The centre of each atom is called the

energy level.
molecule.
nucleus.

(1 mark)

1 (a) (ii) The centre of each atom contains neutrons and

bonds.
electrons.
protons.

(1 mark)

1 (b) Complete the sentence.

There is no overall electrical charge on each atom because the

number of ..... is equal to the number of ..... .

(1 mark)

1 (c) What is the name of the element represented by atom **D**? .....

(1 mark)

1 (d) Which **two** of the atoms, **A**, **B**, **C** and **D**, are in the same group of the periodic table?

Give a reason for your answer.

Atom [ ] and atom [ ]

Reason .....

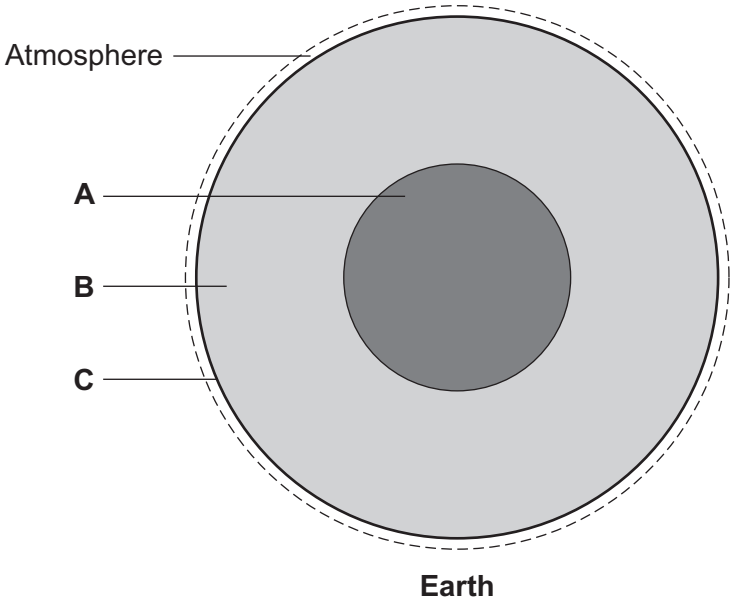
.....

(2 marks)

6

Turn over for the next question

2 This is a diagram of the layered structure of the Earth.



Earth

2 (a) Draw a line from each layer to the correct name of the layer.

Layer	**Name**
Layer **A**	core
Layer **B**	crust
Layer **C**	mantle
	nucleus

(3 marks)

2 (b) The Earth's early atmosphere was 96 % carbon dioxide.
The atmosphere of the Earth today is 0.04 % carbon dioxide.

The percentage of carbon dioxide in the Earth's atmosphere has changed.

Give **two** reasons why.

You should consider:

- the formation of surface water (oceans)
- the formation of sedimentary rocks (limestone).

.....

.....

.....

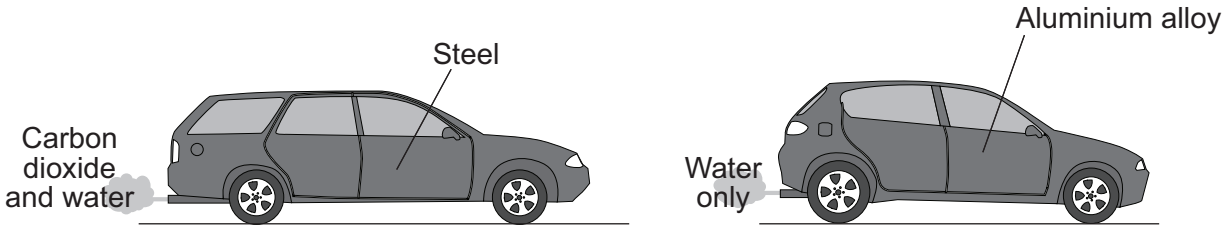
.....

(2 marks)

5

Turn over for the next question

3 The picture shows two different cars.



3 (a) Some properties of aluminium are given below.

Tick (✓) **two** reasons why aluminium is better than steel for car bodies.

Reason	Tick (✓)
Aluminium is not a transition metal.	
Aluminium has a low density.	
Aluminium is expensive to extract.	
Aluminium is resistant to corrosion.	

(2 marks)

3 (b) Each car body is made from an *alloy*.

3 (b) (i) What is an *alloy*?

.....

.....

(1 mark)

3 (b) (ii) An alloy is used to make a car body. A pure metal is **not** used to make a car body.

Suggest why.

.....

.....

(1 mark)

3 (c) The car with a steel body uses petrol for fuel.

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

3 (c) (i) Petrol is made from

air.

crude oil.

metal ores.

(1 mark)

3 (c) (ii) Petrol is a mixture of

carbonates

hydrocarbons

polymers

including C_8H_{18}

(1 mark)

3 (c) (iii) In the car engine petrol reacts with

argon

nitrogen

oxygen

to produce carbon dioxide and water.

(1 mark)

3 (d) Look at the substances coming out of each car's exhaust.

3 (d) (i) Suggest the name of the fuel used in the car with the aluminium alloy body.

Name of fuel .....

(1 mark)

3 (d) (ii) Why is the fuel burned in the car with the aluminium alloy body better for the environment than petrol?

.....

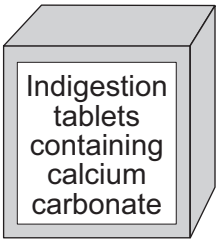
.....

(1 mark)

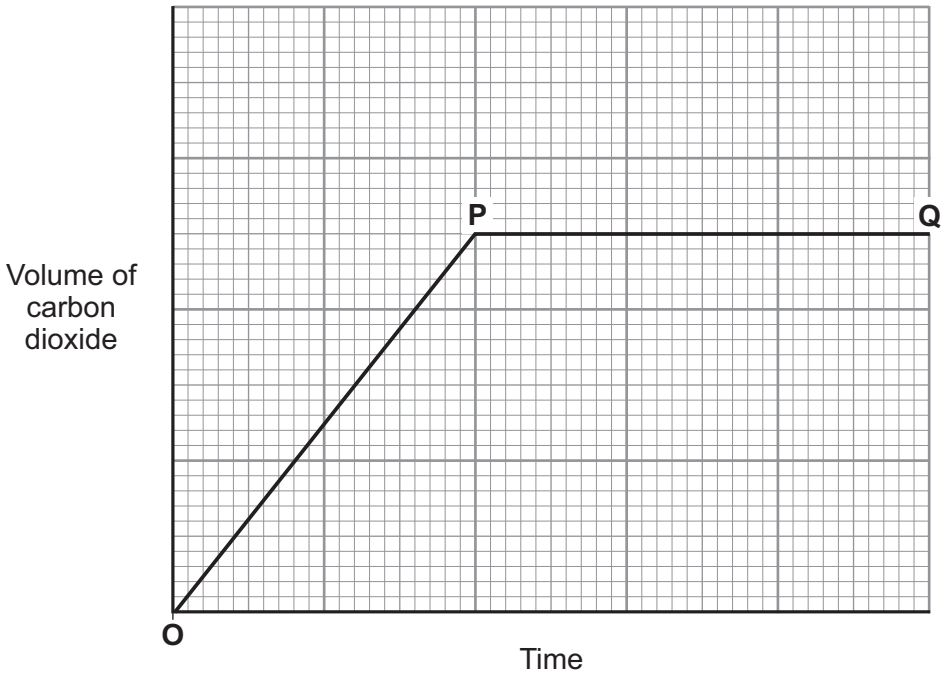
9

Turn over for the next question

4 Human stomachs contain hydrochloric acid.
Stomach ache can be caused by too much acid in the stomach.
Indigestion tablets can be used to reduce the amount of acid in the stomach.



4 (a) The graph shows how the volume of carbon dioxide produced changes with time, after some calcium carbonate is added to hydrochloric acid.



4 (a) (i) Complete the sentence to explain what happens between **O** and **P**.

Between **O** and **P** the calcium carbonate and hydrochloric acid ..... .

(1 mark)

4 (a) (ii) Complete the sentence to explain what happens at **P**.

At **P** the calcium carbonate and hydrochloric acid .....

because .....

(2 marks)

4 (a) (iii) Describe the test for carbon dioxide gas.

Test .....

Result of the test .....

(2 marks)

4 (b) Calcium carbonate is found in limestone.
Limestone is removed from the ground by quarrying.

Tick (✓) **one** advantage and tick (✓) **one** disadvantage of quarrying limestone.

Statement	Advantage Tick (✓)	Disadvantage Tick (✓)
Quarrying limestone destroys the shells and skeletons of marine organisms that formed the limestone.		
Quarrying limestone releases dust, and lorries release carbon dioxide from burning diesel fuel.		
Quarrying limestone provides building materials, employment and new road links.		
Quarrying limestone removes ores from the ground.		

(2 marks)

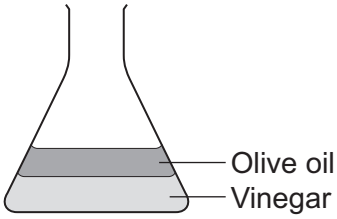
7

5 Olive oil is used to make salad dressings and margarine.

5 (a) Vinegar is often used in salad dressings.
Vinegar contains 95% water and 5% ethanoic acid.

5 (a) (i) To make a simple salad dressing add olive oil to vinegar and shake.
After a few minutes the mixture separates.

Simple salad dressing



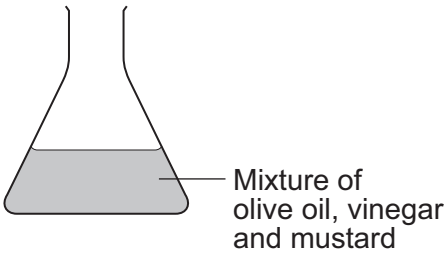
Tick (✓) **one** reason why the olive oil separates above the vinegar.

Reason	Tick (✓)
Olive oil does not dissolve in vinegar.	
Olive oil has a higher density than vinegar.	
Olive oil has a higher boiling point than vinegar.	

(1 mark)

5 (a) (ii) To make a French salad dressing add mustard to the olive oil and vinegar and shake.
After several minutes the mixture does **not** separate.

French salad dressing



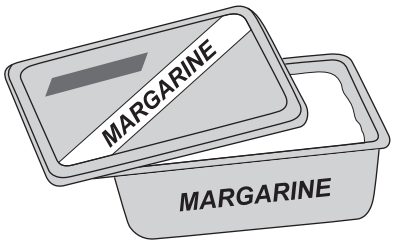
The olive oil, vinegar and mustard mixture does **not** separate.
Give **one** reason why.

.....

.....

(1 mark)

5 (b) Olive oil contains *unsaturated* compounds. Olive oil can be hardened to make margarine.



5 (b) (i) Draw a ring around the correct answer to complete the sentence.

Unsaturated compounds contain | double | ionic | metallic | carbon-carbon bonds.

(1 mark)

5 (b) (ii) Draw **one** line from the test that would detect unsaturated compounds to the result of the test.

Test	Result of test
Add bromine water	Turns cloudy
Add limewater	Turns colourless
Add water	Turns orange

(1 mark)

5 (c) Olives grow on trees.
When olive oil is burned it produces carbon dioxide.

5 (c) (i) Burning olive oil as a fuel is said to be 'carbon neutral'.
Suggest why.

.....

.....

(1 mark)

5 (c) (ii) Olive oil is too expensive to use as biodiesel fuel.
Suggest another reason why olive oil should **not** be used as a fuel.

.....

.....

(1 mark)

6

6 Ethanol (C_2H_5OH) can be made from ethene or from sugar.

6 (a) Complete the table which shows the number of atoms of each element in the formula of ethanol.

Use the Chemistry Data Sheet to help you to complete the table.

Element	Symbol	Number of atoms in the formula C_2H_5OH
Carbon	C	2
Hydrogen	H	.....
.....	O	1

(2 marks)

6 (b) Ethene (C_2H_4) is produced when hydrocarbons are cracked.

6 (b) (i) Tick (✓) **two** conditions needed to crack a hydrocarbon.

Condition	Tick (✓)
The presence of an emulsifier.	
Heating the hydrocarbon to a high temperature.	
Adding oxygen to the hydrocarbon.	
The presence of a catalyst.	

(2 marks)

6 (b) (ii) Draw the missing bonds to complete the displayed structure of ethene.

H H

C C

H H

(1 mark)

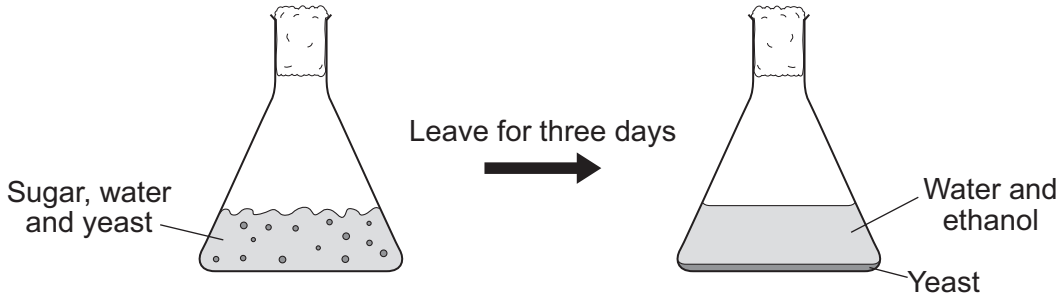
6 (b) (iii) Name the substance added to ethene (C_2H_4) to produce ethanol (C_2H_5OH).

.....

(1 mark)

6 (c) The diagram shows how a solution of ethanol is made from sugar dissolved in water.

The boiling point of ethanol is 78 °C and the boiling point of water is 100 °C.



6 (c) (i) Name the gas produced during this reaction.

.....

(1 mark)

6 (c) (ii) What are the main steps needed to obtain pure ethanol from the mixture produced after three days?

.....

.....

.....

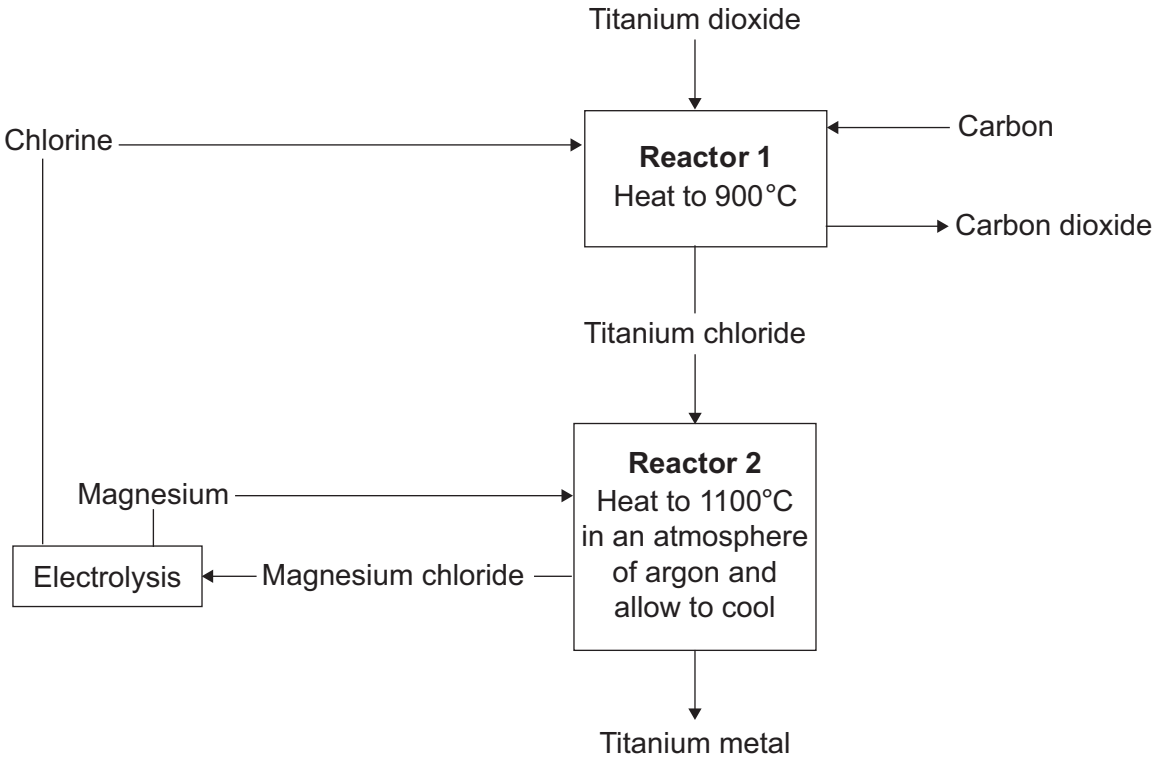
.....

(2 marks)

9

Turn over for the next question

7 Rutile is an ore of titanium. Rutile contains titanium dioxide.
The flow chart shows how titanium metal is extracted from titanium dioxide.



7 (a) Titanium is much more expensive than iron.

Give **one** reason why.

.....

.....

(1 mark)

7 (b) Name the only waste product shown on the flow chart.

.....

(1 mark)

7 (c) Describe the example of recycling shown on the flow chart.

.....

.....

.....

.....

(2 marks)

7 (d) The air is removed from **Reactor 2**. An atmosphere of argon is used for the reaction between titanium chloride and magnesium metal.

Explain why.

.....

.....

.....

.....

(2 marks)

Question 7 continues on the next page

7 (e) Titanium metal is produced by reacting titanium chloride with magnesium.

950 kg of titanium chloride was mixed with 240 kg of magnesium metal. The mixture was heated and produced 950 kg of magnesium chloride.

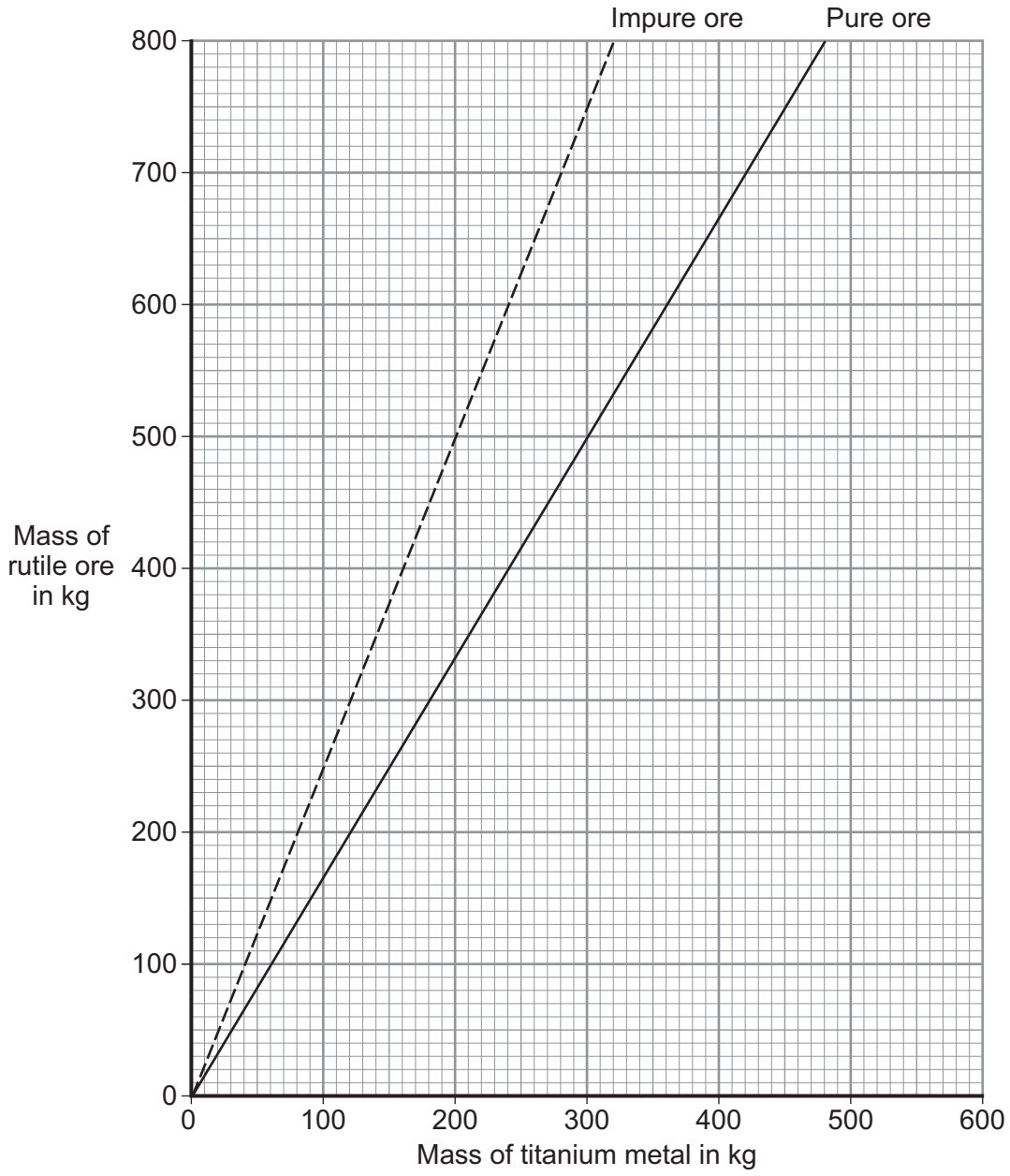
Calculate the mass of titanium metal produced.

.....

Mass = ... kg

(1 mark)

7 (f) The graph shows the mass of titanium metal produced from a pure rutile ore and from an impure rutile ore.



The difference between the two lines represents the amount of waste rock in the impure ore.

300 kg of titanium metal was produced from the impure ore.

Calculate the mass of waste rock in the impure ore.

.....

Mass = ... kg

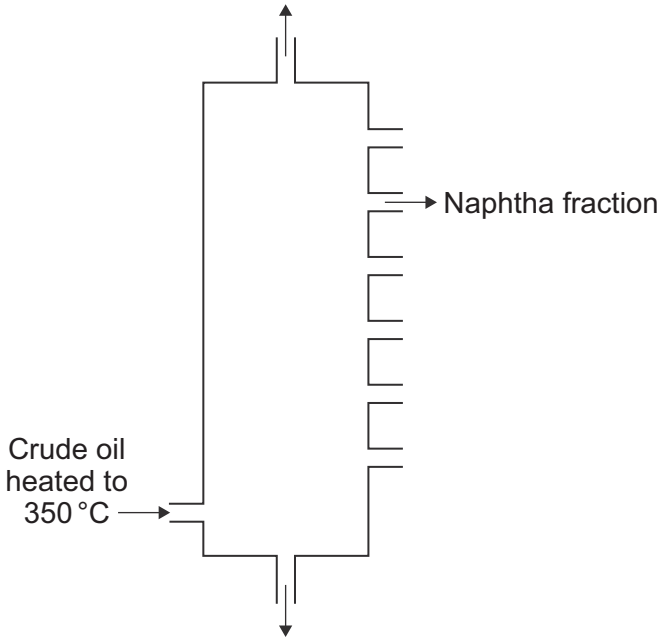
(1 mark)

8

Turn over ▶

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

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



8 (a) (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 marks)

8 (a) (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 marks)

8 (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 marks)

10

END OF QUESTIONS

There are no questions printed on this page

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