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	
TOTAL	

AQA

General Certificate of Secondary Education
Foundation Tier
June 2014

Science A
Unit Chemistry C1

CH1FP

F

Chemistry
Unit Chemistry C1

Tuesday 10 June 2014 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.

A

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 7(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.

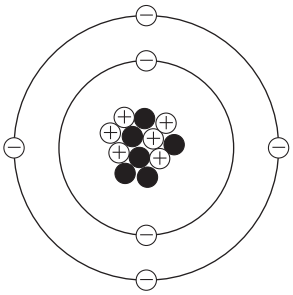
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Answer **all** questions in the spaces provided.

1 Fossil fuels contain carbon.

1 (a) **Figure 1** represents a carbon atom.

Figure 1



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

1 (a) (i) The name of the particle with a positive charge is

an electron.

a neutron.

a proton.

[1 mark]

1 (a) (ii) The centre of the atom is called the

energy level.

molecule.

nucleus.

[1 mark]

1 (a) (iii) Use the Chemistry Data Sheet to help you to answer this question.

Use the correct number from the box to complete each sentence.

[2 marks]

4	**6**	**8**	**10**	**12**

The mass number of this carbon atom is ☐

In the periodic table, carbon is in Group ☐

Do not write outside the box

1 (b) Coal is a fossil fuel.

A piece of coal contains:

- 80% carbon
- 9% oxygen
- 1% sulfur
- 5% hydrogen.

The rest of the coal is other elements.

1 (b) (i) What is the percentage of other elements in this piece of coal?

[1 mark]

..... %

1 (b) (ii) Coal burns in air to produce carbon dioxide, sulfur dioxide and water.

Draw **one** line from each product to the type of pollution caused by each product.

[3 marks]

Product	Type of pollution
Carbon dioxide	Acid rain
Sulfur dioxide	Global dimming
Water	Global warming
	No pollution

8

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2 Some theories suggest that the Earth's early atmosphere was the same as Mars' atmosphere today.

Table 1 shows the percentage of four gases in the atmosphere of Mars today and the atmosphere of Earth today.

Table 1

Gases	The atmosphere of	
	Mars today	**Earth today**
Carbon dioxide	95.00%	0.04%
Nitrogen	3.50%	78.00%
Argon	1.00%	0.96%
Oxygen	0.50%	21.00%

2 (a) Which **one** of the gases in **Table 1** is a noble gas?

[1 mark]

.....

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

2 (b) (i) Noble gases are in Group

0

1

7

[1 mark]

2 (b) (ii) Noble gases are

slightly reactive.

unreactive.

very reactive.

[1 mark]

Do not write outside the box

2 (c) The percentage of carbon dioxide in the Earth's early atmosphere was 95.00%.
It is 0.04% in the Earth's atmosphere today.

2 (c) (i) Calculate the decrease in the percentage of carbon dioxide in the Earth's atmosphere.
[1 mark]

.....

.....

Decrease in percentage = ...%

2 (c) (ii) Give **two** reasons for this decrease.
[2 marks]

.....

.....

.....

.....

6

Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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3 Limestone is used for statues and buildings.

Limestone contains calcium carbonate ($CaCO_3$).

3 (a) **Figure 2** shows a limestone quarry.

Figure 2



3 (a) (i) Suggest **one** problem quarrying limestone will cause for people living nearby.

[1 mark]

.....

.....

3 (a) (ii) Suggest **one** benefit of quarrying limestone for people living nearby.

[1 mark]

.....

.....

3 (a) (iii) Why are limestone statues and buildings damaged by rain?

[1 mark]

.....

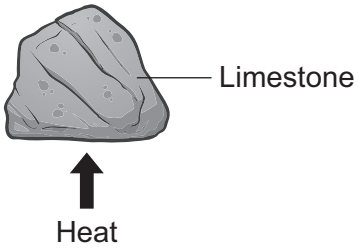
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Question 3 continues on the next page

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3 (b) A student investigated what happens when limestone is heated, as shown in **Figure 3**.

Figure 3



This is the method the student used:

- measure the mass of limestone before heating
- measure the mass of solid product after heating
- repeat the experiment two more times.

The student's results are shown in **Table 2**.

Table 2

	Experiment 1	**Experiment 2**	**Experiment 3**
Mass of limestone before heating in g	5.0	5.0	5.0
Mass of solid product after heating in g	3.6	3.4	3.8
Mass lost in g	1.4	1.6	

3 (b) (i) Calculate the mass lost in experiment **3**.

[1 mark]

.....

.....

Mass lost = ... g

3 (b) (ii) Calculate the mean mass lost in the three experiments.

[1 mark]

.....

.....

Mean mass lost = ... g

Do not write outside the box

3 (b) (iii) Suggest **one** reason why the mass lost was **not** the same for the three experiments.

[1 mark]

.....

.....

3 (c) The word equation for the reaction when calcium carbonate is heated is:

calcium carbonate ⟶ calcium oxide + carbon dioxide

3 (c) (i) Complete the sentence.

[1 mark]

The reaction when calcium carbonate is heated is called

thermal ..... .

3 (c) (ii) Heating 5.0 g of calcium carbonate produces 2.8 g of calcium oxide.

Calculate the mass of carbon dioxide produced.

[1 mark]

.....

.....

Mass of carbon dioxide = ... g

3 (c) (iii) Describe how to test a gas to show that it is carbon dioxide.

[2 marks]

Test .....

.....

Result .....

.....

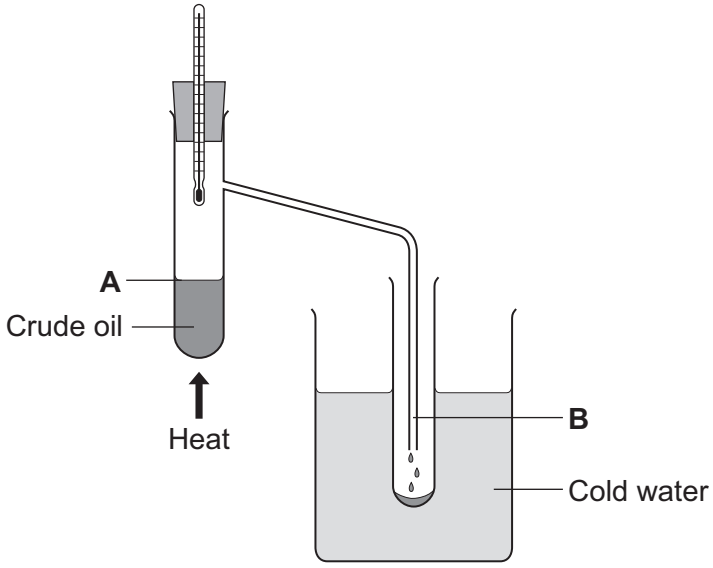
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4 Crude oil is a mixture of a very large number of compounds.

Figure 4 shows a laboratory experiment to separate crude oil.

Figure 4



4 (a) Complete the sentence.

[1 mark]

The name for compounds that contain only hydrogen and

carbon is ..... .

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

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

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

[1 mark]

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

[1 mark]

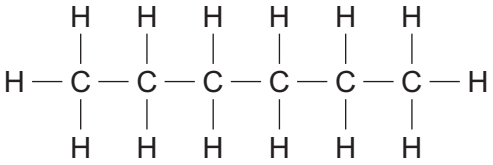
4 (b) (iii) The process taking place at **B** is ..... .

[1 mark]

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4 (c) One of the compounds in crude oil is hexane. The displayed structure of hexane is shown in **Figure 5**.

Figure 5



Complete the sentences.

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

[1 mark]

4 (c) (ii) Complete the chemical formula for hexane.

[1 mark]

C_6H.....

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

[1 mark]

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

4 (d) (i) Name the polymer made from butene.

[1 mark]

.....

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

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

[2 marks]

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

10

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5 Where copper ore has been mined there are areas of land that contain very low percentages of copper compounds.

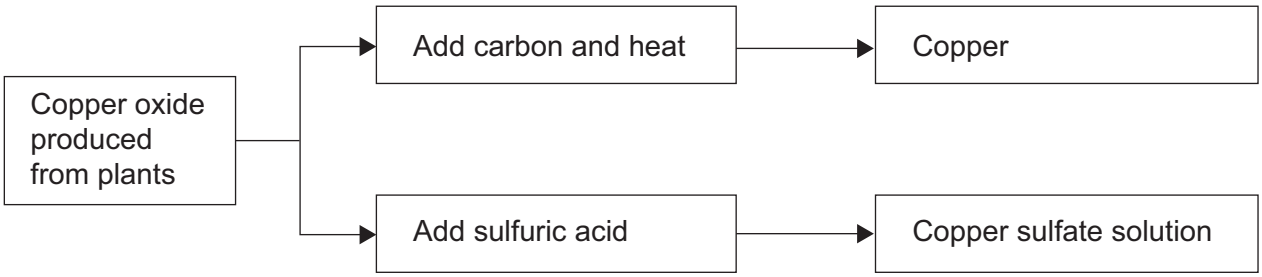
One way to extract the copper is to grow plants on the land.

The plants absorb copper compounds through their roots.

The plants are burned to produce copper oxide.

The copper oxide produced from plants can be reacted to produce copper or copper sulfate solution, as shown in **Figure 6**.

Figure 6



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

5 (a) (i) Copper ores contain enough copper to make extraction of the metal

carbon neutral.

economical.

reversible.

[1 mark]

5 (a) (ii) Using plants to extract metals is called

photosynthesis.

phytomining.

polymerisation.

[1 mark]

5 (a) (iii) Copper oxide reacts with carbon to produce copper and

carbon dioxide.

oxygen.

sulfur dioxide.

[1 mark]

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5 (b) Copper is produced from copper sulfate solution by displacement using iron or by electrolysis.

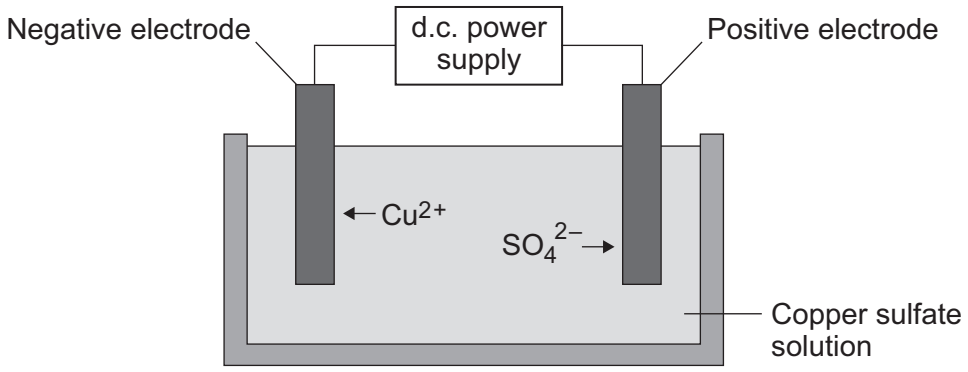
5 (b) (i) Complete the word equation.

[2 marks]

copper sulfate + iron ⟶ ..... + ...

5 (b) (ii) **Figure 7** shows the electrolysis of copper sulfate solution.

Figure 7



Why do copper ions go to the negative electrode?

[1 mark]

.....

.....

5 (c) Suggest **two** reasons why copper should **not** be disposed of in landfill sites.

[2 marks]

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8

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6 Cooking oils contain unsaturated fats. Unsaturated fats are more healthy than saturated fats.

Unsaturated fats change bromine water from orange to colourless.

A scientist from a food company called Vegio wanted to find the amount of unsaturated fat in cooking oils.

The scientist tested Vegio's own brand of oil and oils from four other companies, **A**, **B**, **C** and **D**.

The scientist used the same volume of oil for each test.

The scientist's results are shown in **Table 3**.

Table 3

Company	**Number of drops of bromine water that reacted**		
	Test 1	**Test 2**	**Test 3**
Vegio	14	13	16
A	25	17	27
B	17	18	16
C	5	6	4
D	10	9	7

6 (a) (i) Describe how the bromine water is used to obtain these results.

[3 marks]

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6 (a) (ii) Choose **one** result from **Table 3** that should be tested again.

Result: Company ..... Test .....

Why did you choose this result?

[2 marks]

.....

.....

6 (a) (iii) The same volume of each oil was used for each test.

Suggest **one** other variable that should be controlled in these tests.

[1 mark]

.....

.....

6 (b) The Vegio food company claims that its cooking oil has more unsaturated fat than other cooking oils.

Compare the results for Vegio's cooking oil with the results of the other companies, **A**, **B**, **C** and **D**.

Give **three** conclusions that can be made from the results.

[3 marks]

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7 Ethanol and vegetable oil are used as fuels.

7 (a) There are two different ways to produce ethanol:

- using ethene from crude oil
- using sugar from plants.

7 (a) (i) Ethanol is produced from ethene by **hydration** in the presence of a catalyst.

What is **hydration**?

[1 mark]

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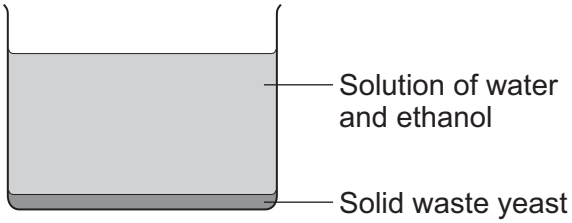
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7 (a) (ii) Fermentation is used to produce ethanol from sugar by:

- dissolving the sugar in water
- adding yeast to the sugar solution
- leaving the mixture for three days.

Figure 8 shows the substances after three days.

Figure 8



Suggest:

- how the solid waste yeast is removed
- how ethanol is obtained from the solution.

[2 marks]

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

Crude oil is separated to produce the fraction petroleum diesel.

Worries about low supplies of crude oil have led to the growing of large areas of crops to produce vegetable oil.

Vegetable oils are used to produce biodiesel.

There are economic, ethical and environmental issues about the use of biodiesel.

Biodiesel and petroleum diesel are used as a fuel for cars. In a car engine the fuel burns and releases waste products through the car exhaust system.

Table 4 shows the amount of waste products formed by biodiesel compared with the amount of waste products formed by petroleum diesel.

(Note that ppm is parts per million.)

Table 4

	Carbon dioxide in ppm	**Nitrogen oxides in ppm**	**Sulfur dioxide in ppm**	**Particulates in g per m^3**
Biodiesel	20 000	760	0	0.3
Petroleum diesel	80 000	700	300	0.6

Use this information and your knowledge and understanding to give advantages and disadvantages of using biodiesel instead of petroleum diesel.

[6 marks]

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END OF QUESTIONS

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Question 3: Figure 2 Photograph © Thinkstock

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