

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

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General Certificate of Secondary Education  
June 2009



**SCIENCE B**  
**Unit Chemistry C1**

**CHY1F**  
**F**

**CHEMISTRY**  
**Unit Chemistry C1**

**Foundation Tier**

Wednesday 17 June 2009 9.00 am to 9.45 am

<p><b>For this paper you must have:</b></p> <ul style="list-style-type: none"> <li>a ruler.</li> </ul> <p>You may use a calculator.</p>
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Time allowed: 45 minutes

**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. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**

- The maximum mark for this paper is 45.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

**Advice**

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

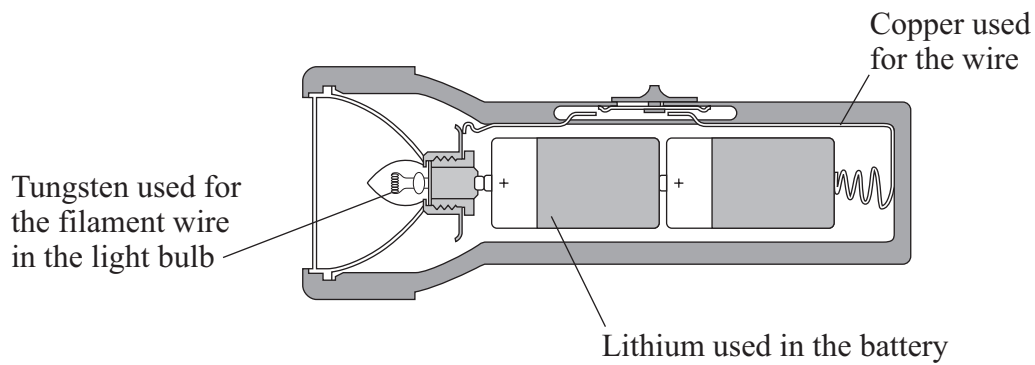
For Examiner's Use			
Question	Mark	Question	Mark
1		6	
2		7	
3			
4			
5			
Total (Column 1)		→	
Total (Column 2)		→	
TOTAL			
Examiner's Initials			



J U N O 9 C H Y 1 F O 1

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

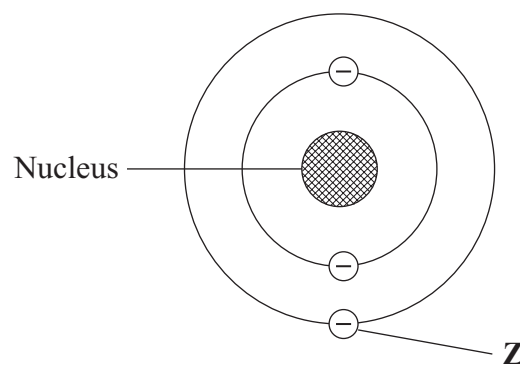
- 1 The diagram shows a circuit that is used in a torch. Electrons flow through this circuit.



- 1 (a) Why is copper used for the wire?

.....  
(1 mark)

- 1 (b) The diagram shows the structure of an atom of lithium.



Name the particle labelled **Z**.

.....  
(1 mark)



- 1 (c) The table shows some properties of the metals used in the electrical circuit.

Metal	Melting point in °C	Boiling point in °C	Reaction with oxygen
Copper	1083	2582	Reacts <b>slowly</b> to form a thin oxide layer on surface
Lithium	179	1317	Reacts <b>rapidly</b> to form oxide
Tungsten	3370	5930	Reacts <b>only</b> when very hot to form oxide

- 1 (c) (i) Use information from the table to suggest the order of reactivity for copper, lithium and tungsten.

**most reactive** .....

.....

**least reactive** .....

(2 marks)

- 1 (c) (ii) The filament wire glows because it gets very hot.

Use information from the table to suggest **one** reason why tungsten is used for the filament wire in the light bulb.

.....

.....

(1 mark)

- 1 (d) The gas used in the light bulb is argon.

Draw a ring around the correct word in the box to complete the sentence.

Argon is used in the light bulb because it is

dense.
solid.
unreactive.

(1 mark)

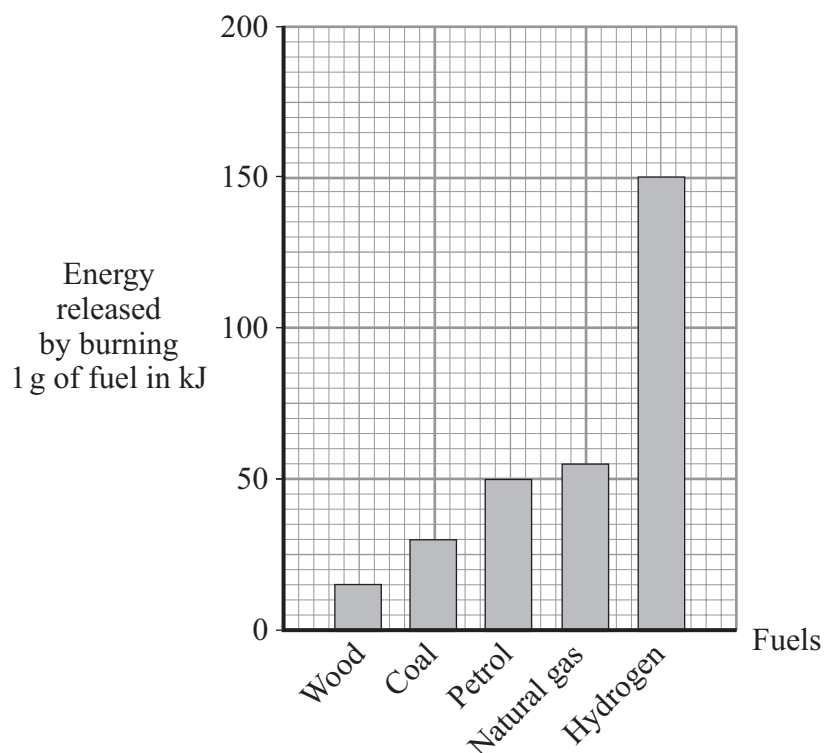
6

Turn over ►



2 Energy is released by burning fuels.

2 (a) The bar chart shows the energy in kilojoules, kJ, released by burning 1 g of five different fuels.



2 (a) (i) Which fuel releases the least energy from 1 g?

.....  
(1 mark)

2 (a) (ii) How much energy is released by burning 1 g of coal?

Energy = ..... kJ  
(1 mark)

2 (a) (iii) Coal burns in oxygen and produces the gases shown in the table.

Name	Formula
Carbon dioxide	CO <sub>2</sub>
Water vapour	H <sub>2</sub> O
Sulfur dioxide	SO <sub>2</sub>

Use information from the table to name **one** element that is in coal.

.....  
(1 mark)



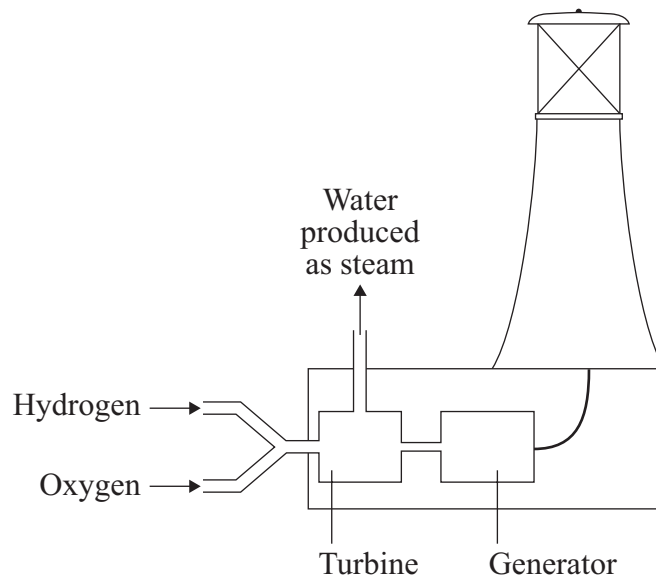
2 (a) (iv) Use information from the bar chart to calculate the mass of petrol that will release the same amount of energy as 1g of hydrogen.

.....  
 .....

Mass = ..... g  
 (1 mark)

2 (b) Hydrogen can be made from fossil fuels.  
 Hydrogen burns rapidly in oxygen to produce water only.

A lighthouse uses electricity generated by burning hydrogen.



2 (b) (i) Use information from the bar chart and the diagram above to suggest **two** advantages of using hydrogen as a fuel.

1 .....

.....

2 .....

.....

(2 marks)

2 (b) (ii) Suggest **one** disadvantage of using hydrogen.

.....

(1 mark)



3 This is part of a food label.

‘A diet low in fat, particularly saturated fat, could help to maintain a healthy heart.’

*Nutritional information table:*

	Per 100 g
Total fat	77.6 g
of which: saturated	11.2 g
unsaturated	66.4 g

Also contains colourings

3 (a) (i) Why is this food described as ‘healthy’?

.....

.....

(1 mark)

3 (a) (ii) Draw a ring around the correct word in the box to complete the sentence.

Unsaturated fat can be detected by reacting it with

bromine.
hydrogen.
sulfur.

(1 mark)

3 (b) Liquid fats are called oils. Oil and water can be shaken together to make a mixture.

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

3 (b) (i) The mixture of oil and water can be prevented

from separating by adding

a colouring.
an emulsifier.
a preservative.

(1 mark)

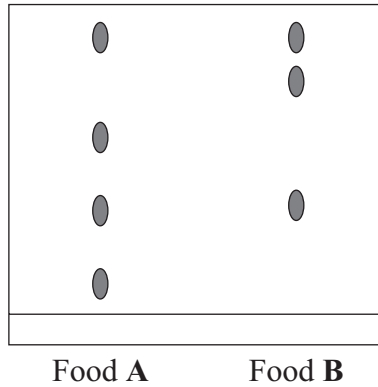
3 (b) (ii) Compared with either oil or water the mixture has a better

shelf life.
smell.
texture.

(1 mark)



- 3 (c) The result of a process used to detect and identify the colours in two foods, **A** and **B**, is shown.



- 3 (c) (i) Describe the differences between the colours used in food **A** and food **B**.

.....

.....

.....

.....

(2 marks)

- 3 (c) (ii) Tick (✓) the name of the process used to detect and identify colours in food.

Process	(✓)
chromatography	
extraction	
hardening	

(1 mark)

7

Turn over ►



- 4 Billions of years ago, the Earth's early atmosphere was probably like the atmosphere of Venus today.

The table shows a comparison of the atmospheres of the Earth and Venus today.

Name of gas	Percentage composition of atmosphere	
	Earth today	Venus today
Nitrogen	78	3.5
Oxygen	21	a trace
Argon	0.97	a trace
Carbon dioxide	0.03	96.5
<b>Average surface temperature</b>	20°C	460°C

- 4 (a) Use the names of gases from the table to complete the sentences.

4 (a) (i) In the Earth's atmosphere today, the main gas is .....  
(1 mark)

4 (a) (ii) In the Earth's atmosphere billions of years ago, the main gas was  
.....  
(1 mark)

4 (b) (i) Scientists do **not** know the accurate composition of the Earth's early atmosphere.  
Suggest why.

.....  
.....  
(1 mark)

4 (b) (ii) Use information from the table to answer this question.

Water vapour is present in the atmospheres of the Earth and Venus today.  
The Earth's surface is mainly covered by water.

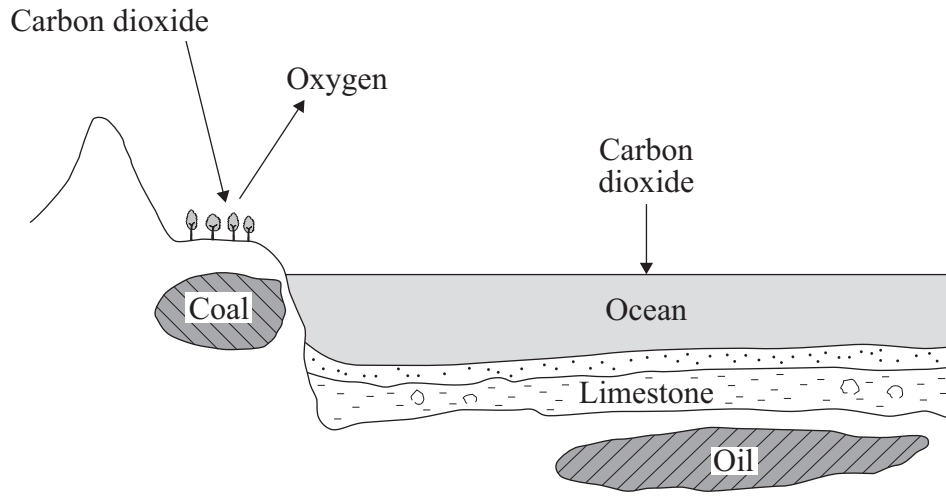
Suggest why there is no water on the surface of Venus.

.....  
.....  
(1 mark)





4 (c) The diagram shows how carbon dioxide is removed from the Earth's atmosphere.



Describe what happened to the carbon dioxide in the Earth's early atmosphere. Use the diagram to help you.

.....

.....

.....

.....

.....

.....

.....

.....

(3 marks)

7

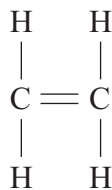
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5 Crude oil is used to make useful substances such as alkenes and plastics.

5 (a) The alkene shown is ethene.



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

Formula	(✓)
CH <sub>4</sub>	
C <sub>2</sub> H <sub>4</sub>	
C <sub>2</sub> H <sub>6</sub>	

(1 mark)

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

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

(1 mark)



5 (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.

5 (b) (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 mark)

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

.....  
.....

(1 mark)

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

How are resources saved by recycling more plastics?

.....  
.....

(1 mark)

5

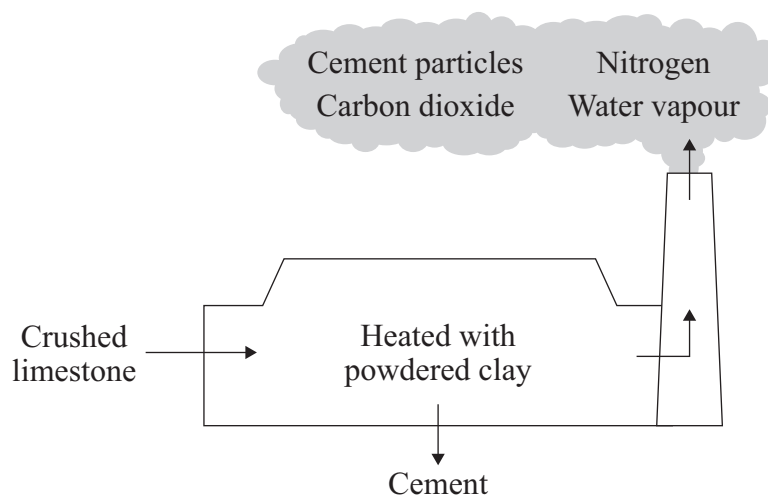
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- 6 A limestone quarry is in an area of natural beauty and near several villages. The company operating the quarry wants planning permission to build a new cement works in the quarry.

The diagram shows some of the substances used and produced at a cement works.



- 6 (a) Limestone is mainly calcium carbonate,  $\text{CaCO}_3$ .  
Write the correct number in the box to complete each sentence.
- 6 (a) (i) The formula shows that calcium carbonate,  $\text{CaCO}_3$ ,  
contains  different elements. (1 mark)
- 6 (a) (ii) Calcium carbonate,  $\text{CaCO}_3$ , contains a total number of  atoms. (1 mark)
- 6 (b) The company wants the new cement works because the nearest cement works is 100 km from the quarry. The company argues that a new cement works sited inside the quarry would reduce carbon dioxide emissions.

Suggest why the new cement works might reduce carbon dioxide emissions.

.....

.....

.....

(1 mark)



6 (c) Residents from the villages near the quarry are concerned that there will be atmospheric pollution from the new cement works.

6 (c) (i) Name and explain how **one** of the emissions from the chimney causes atmospheric pollution.

Name of emission: .....

Explanation: .....

.....  
(2 marks)

6 (c) (ii) Suggest what the company could do to reduce this atmospheric pollution.

.....

.....  
(1 mark)

6

**Turn over for the next question**

**Turn over ►**



- 7 (a) Limestone is a hard rock that is used as a building material.  
Limestone was used by the Egyptians to make plaster.

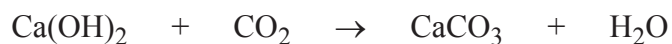
**Reaction 1** – calcium carbonate,  $\text{CaCO}_3$ , was decomposed by heating limestone



**Reaction 2** – water was added to the solid produced to make slaked lime



**Reaction 3** – a mixture of slaked lime and water was used as plaster. After the plaster had set it became even harder with age



- 7 (a) (i) Name the solid formed when calcium carbonate decomposed.

.....  
(1 mark)

- 7 (a) (ii) Use the reactions to explain how the plaster became even harder with age.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
(3 marks)



7 (b) A gardener wanted to make a step up to his greenhouse door. He decided to use a mixture of cement and sand to make mortar.

He experimented using mixtures with different cement to sand ratios.

- The mortar mixtures were put in the same sized mould.
- Each mortar mixture was allowed to set hard.
- He then dropped a metal ball from increasing heights until the set mortar cracked.
- He recorded his results in a table.

Volume of sand in cm <sup>3</sup>	Volume of cement in cm <sup>3</sup>	Height the metal ball dropped to crack the set mortar in cm
800	100	17
700	100	24
600	100	30
500	100	36
400	100	37
300	100	48
200	100	54

7 (b) (i) What is the relationship between the volume of sand and the strength of the mortar?

.....  
 .....  
 (1 mark)

7 (b) (ii) The gardener was not sure about some of his results.

Use the results to explain why.

.....  
 .....  
 .....  
 .....  
 .....  
 (2 marks)

7
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**END OF QUESTIONS**



**There are no questions printed on this page**

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ANSWER IN THE SPACES PROVIDED**

