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	

General Certificate of Secondary Education
Foundation Tier
January 2012

Science B
Unit Chemistry C1

CHY1F

F

Chemistry
Unit Chemistry C1

Written Paper

Thursday 26 January 2012 9.00 am to 9.45 am

For this paper you must have:
- a ruler.

You may use a calculator.

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. 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 45.
- 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.

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

1 This question is about atoms and molecules.

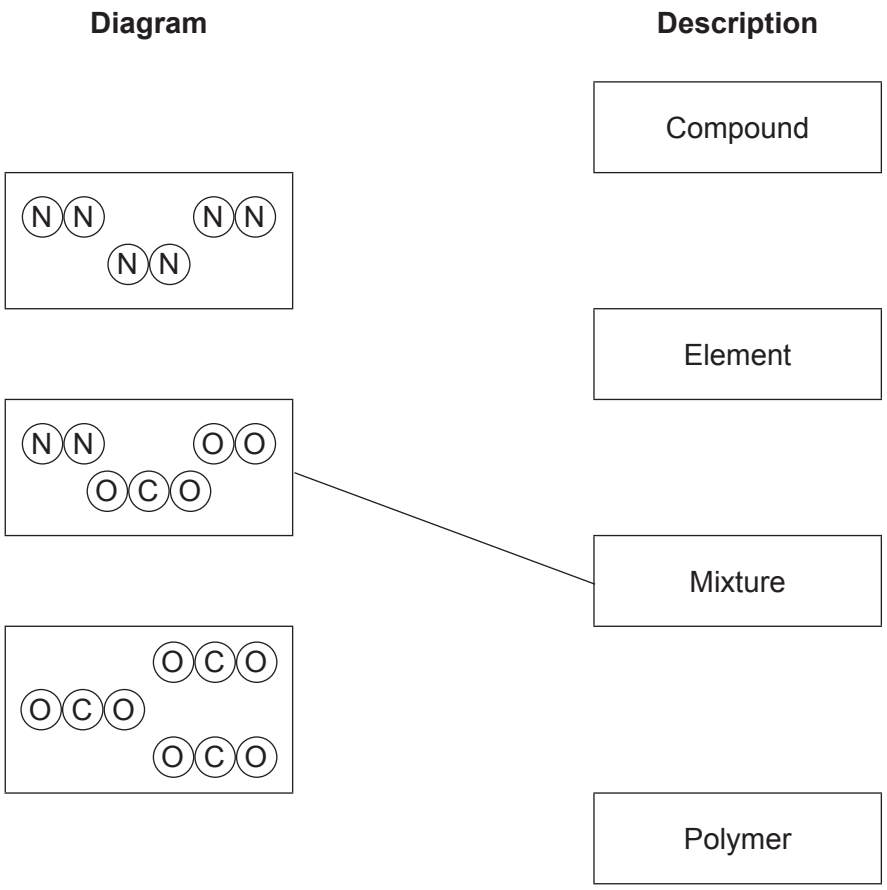
1 (a) In the diagrams below:

(N) is a nitrogen atom

(O) is an oxygen atom

(C) is a carbon atom.

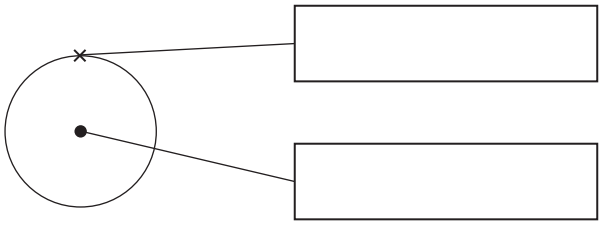
Draw **one** line from each diagram to its correct description.
One line has been done for you.



(2 marks)

1 (b) The diagram below shows a hydrogen atom.
Use words from the box to write the correct labels on the diagram.

alloy	**electron**	**group**	**nucleus**



(2 marks)

1 (c) This chemical equation represents the reaction of hydrogen burning.

$$2\,H_2 \quad + \quad O_2 \quad \rightarrow \quad 2\,H_2O$$

Complete the sentence to describe what is happening in this chemical reaction.

Hydrogen reacts with .....

.....

.....

.....

(2 marks)

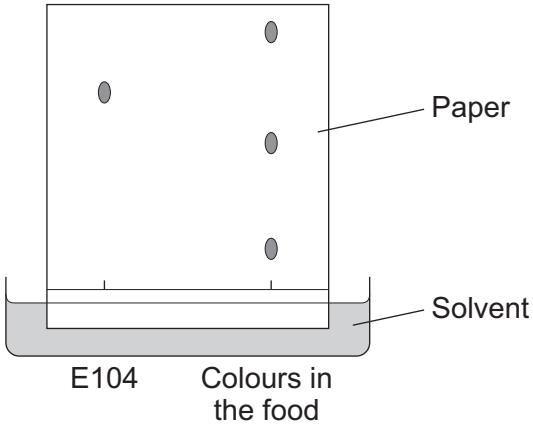
6

Turn over for the next question

2 An article began:

> **Ban yellow additives**
>
> Quinoline yellow (E104) is suspected of causing hyperactivity, asthma and rashes in children.

2 (a) A student tested a food to find out if it contained quinoline yellow (E104). The student's results are shown below.



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

This method of detecting and identifying colours is called

chromatography.

distillation.

electrolysis.

(1 mark)

2 (a) (ii) Using the student's results, how many different colours are in the food? .....

(1 mark)

2 (a) (iii) Using the student's results, how can you tell that the food does **not** contain quinoline yellow (E104)?

.....

.....

(1 mark)

2 (b) Quinoline yellow (E104) is used in foods such as sweets, drinks and ice cream.

2 (b) (i) Give **one** reason why quinoline yellow (E104) is added to foods.

.....

.....

(1 mark)

2 (b) (ii) Suggest what should be done to decide if quinoline yellow (E104) should be banned.

.....

.....

(1 mark)

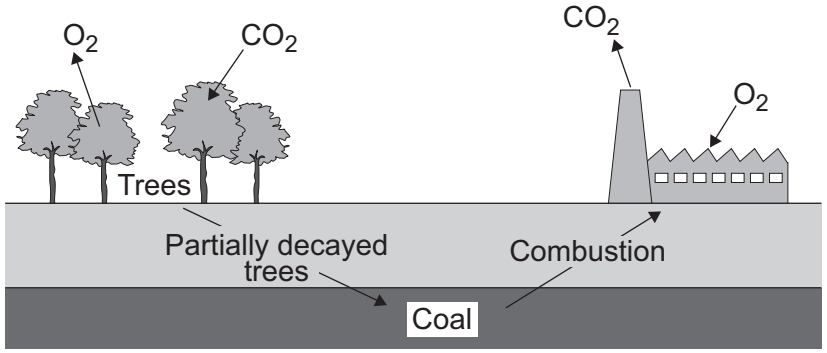
5

Turn over for the next question

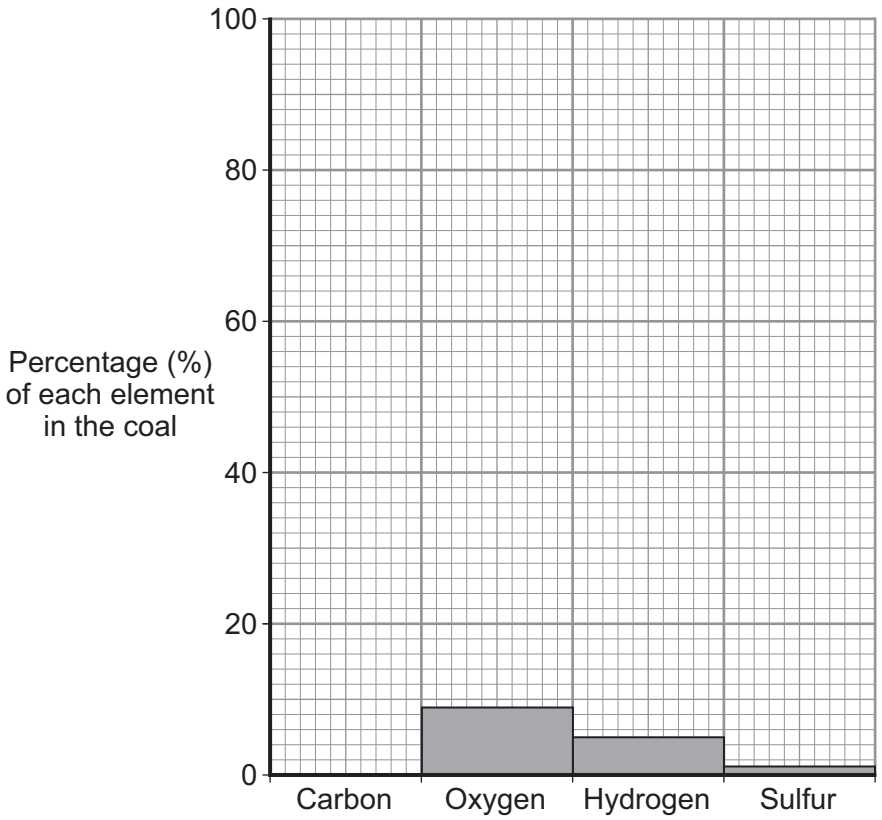
3 About 3000 million years ago carbon dioxide was one of the main gases in the Earth's early atmosphere.

About 400 million years ago plants and trees grew on most of the land. When the plants and trees died they were covered by sand and slowly decayed to form coal.

Today coal is burned in power stations to release the energy needed by industry.



3 (a) The bar chart shows the percentage of some of the elements in this coal.



3 (a) (i) This coal contains 85 % carbon. Draw the bar for carbon on the chart.

(1 mark)

3 (a) (ii) Coal is burned in the atmosphere to release energy.
Two of the products of burning coal are shown.

Draw **one** line from each product to its environmental impact.

Product	Environmental impact
Sulfur dioxide	Acid rain
Carbon particles	Global dimming
	Global warming

(2 marks)

3 (b) Use the information above and your knowledge and understanding to answer these questions.

3 (b) (i) How did the formation of coal decrease the amount of carbon dioxide in the Earth's early atmosphere?

.....

.....

(1 mark)

3 (b) (ii) How does burning coal affect the amount of carbon dioxide in the Earth's atmosphere? Explain your answer.

.....

.....

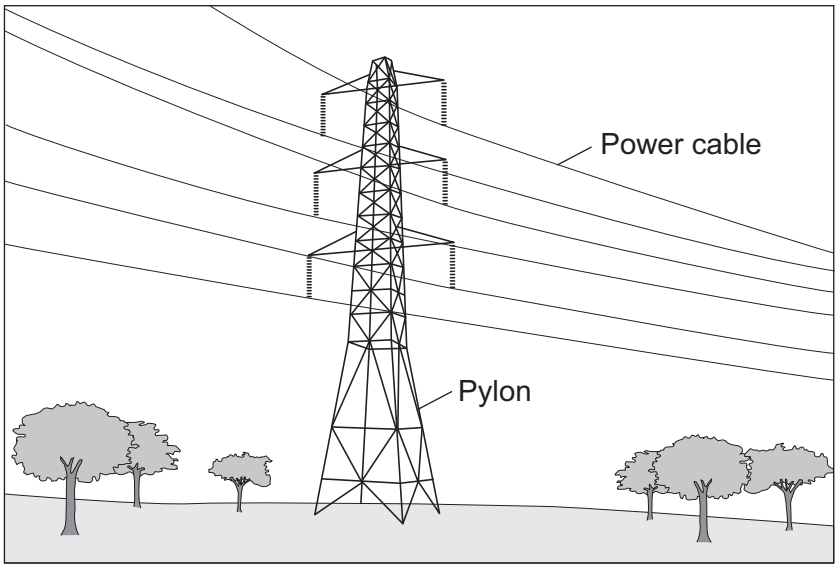
.....

.....

(2 marks)

6

4 Metals are used in the manufacture of pylons and overhead power cables.



4 (a) Suggest **one** reason why iron (steel) is used to make pylons.

.....

.....

(1 mark)

4 (b) The table shows some of the properties of two metals.

Metal	Density in g per cm^3	Melting point in °C	Percentage(%) relative electrical conductivity	Percentage(%) abundance in Earth's crust
copper	8.92	1083	100	0.007
aluminium	2.70	660	60	8.1

Use the information in the table to suggest why aluminium and **not** copper is used to conduct electricity in overhead power cables.

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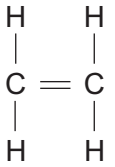
(2 marks)

4 (c) A polymer can be used to cover and insulate power cables.

The polymer is made from the alkene:



Draw a ring around the correct answer to complete each of the sentences.

4 (c) (i) The chemical formula of this alkene is

CH

CH_4

C_2H_4

(1 mark)

4 (c) (ii) The two lines between the carbon atoms are called a

double bond.

nucleus.

single bond.

(1 mark)

4 (c) (iii) The name of the polymer formed when many of these alkene molecules join together

is

poly(ethene).

poly(ethenol).

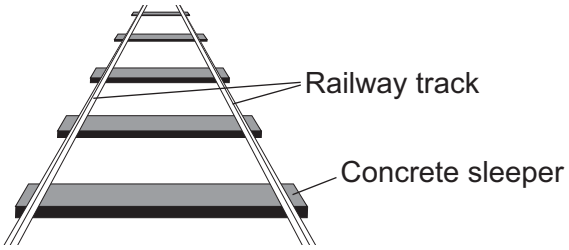
poly(propene).

(1 mark)

6

Turn over for the next question

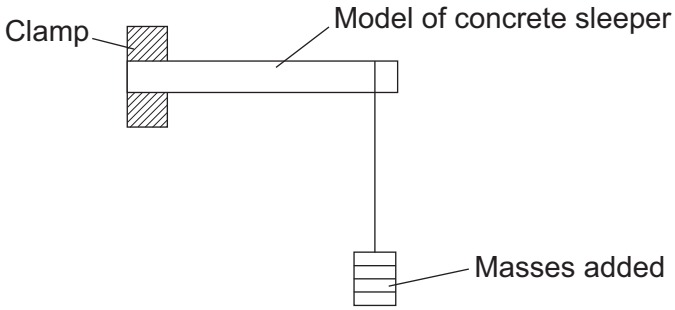
5 In the UK, railway sleepers are often made from concrete.



A scientist was asked to find the best concrete mixture to use so that railway sleepers would not break easily.

The scientist made:

- a mould to make small models of concrete sleepers
- concrete mixtures using crushed rock, sand, cement and water
- the equipment shown to add 0.1 kg masses until the model sleeper broke.



The scientist's results are shown in the table.

Concrete mixture in % by volume			**Total mass added to break the model sleeper in kg**			
Cement	**Sand**	**Crushed rock**	**Test 1**	**Test 2**	**Test 3**	**Mean**
10	70	20	1.1	1.3	1.2	1.2
20	60	20	2.6	2.5	2.4	
30	50	20	3.3	3.3	3.3	3.3
40	40	20	3.8	4.0	3.3	3.9
50	30	20	4.5	4.2	4.3	4.3

5 (a) (i) Calculate the mean total mass added to break the model sleeper that has 20 % cement by volume.

.....

Mean = ... kg

(1 mark)

5 (a) (ii) Choose **one** result in the table that the scientist should check and test again.

Result: % cement by volume ..... Test number .....

Explain why you chose this result.

.....

.....

(2 marks)

5 (a) (iii) What is the relationship between the total mass to break the model sleeper and the percentage (%) of cement by volume in the concrete mixture?

.....

.....

(1 mark)

5 (a) (iv) Suggest **one** other variable that the scientist should have recorded in the table of results.

.....

(1 mark)

5 (b) The scientist thought that full-size railway sleepers should be made from 30 % cement, 50 % sand and 20 % crushed rock.

What other information about these three materials is needed before the scientist recommends using this mixture to make a full-size railway sleeper?

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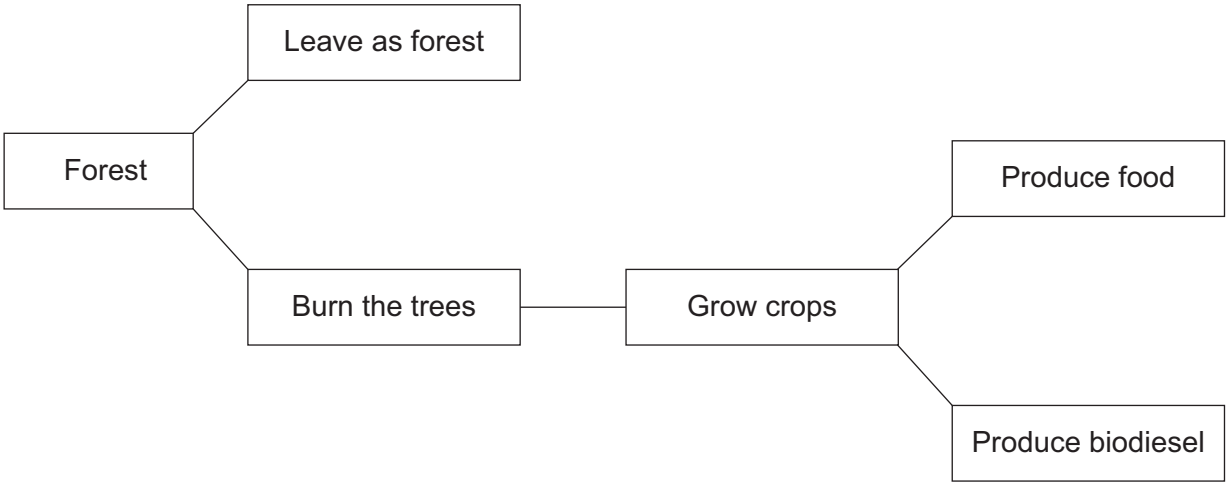
(2 marks)

7

6 Petroleum diesel is a fuel made from crude oil.
Biodiesel is a fuel made from vegetable oils.
To make biodiesel, large areas of land are needed to grow crops from which the vegetable oils are extracted.
Large areas of forest are cleared by burning the trees to provide more land for growing these crops.



6 (a) Use this information and your knowledge and understanding to answer these questions.

6 (a) (i) Carbon neutral means that there is no increase in the amount of carbon dioxide in the atmosphere.

Suggest why adverts claim that using biodiesel is carbon neutral.

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(2 marks)

6 (a) (ii) Explain why clearing large areas of forest has an environmental impact on the atmosphere.

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(2 marks)

6 (b) Why is there an increasing demand for biodiesel?

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(1 mark)

6 (c) Suggest why producing biodiesel from crops:

6 (c) (i) causes ethical concerns

.....

.....

(1 mark)

6 (c) (ii) causes economic concerns.

.....

.....

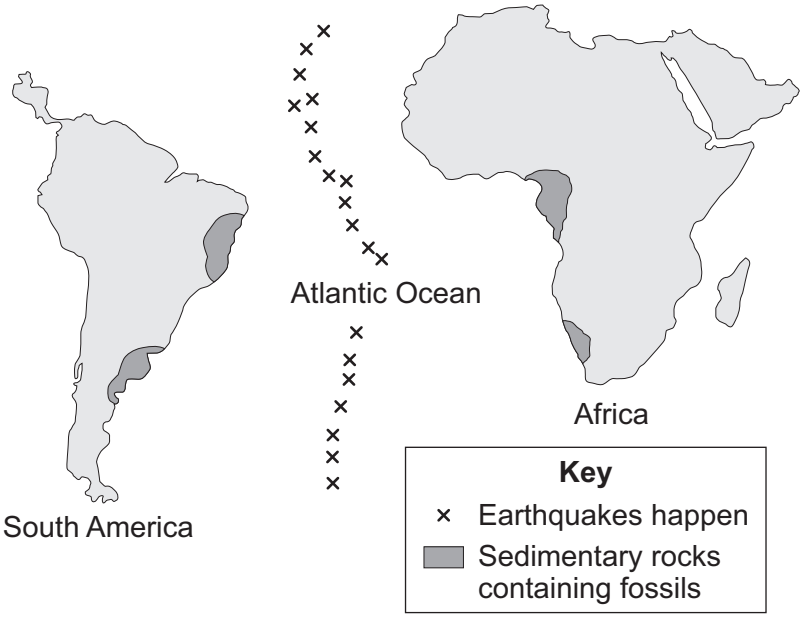
(1 mark)

7

Turn over for the next question

7 Earthquakes happen in some places on Earth.

The diagram shows some of these places that are between the continents of South America and Africa.



7 (a) (i) Why do earthquakes happen in the places shown on the diagram?

.....

.....

(1 mark)

7 (a) (ii) Scientists cannot predict when earthquakes will happen.
Suggest why.

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(1 mark)

7 (b) In 1915, Alfred Wegener proposed the idea of continental drift.
He suggested that South America and Africa had once been joined.
Most scientists in 1915 did not accept his idea.

7 (b) (i) In 1915, Wegener's idea was **not** accepted by most scientists.
Suggest **one** reason why.

.....

.....

(1 mark)

7 (b) (ii) Use the information in the diagram to suggest **two** pieces of evidence that led to Wegener's idea being accepted by most scientists.

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(2 marks)

7 (c) Explain, in as much detail as you can, what is causing the continents of South America and Africa to move further apart.

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(3 marks)

8

END OF QUESTIONS

There are no questions printed on this page

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