Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

AQA

General Certificate of Secondary Education
Foundation Tier
June 2010

Science B
Unit Chemistry C1

CHY1F

F

Chemistry
Unit Chemistry C1

Written Paper

Wednesday 16 June 2010 9.00 am to 9.45 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 45 minutes

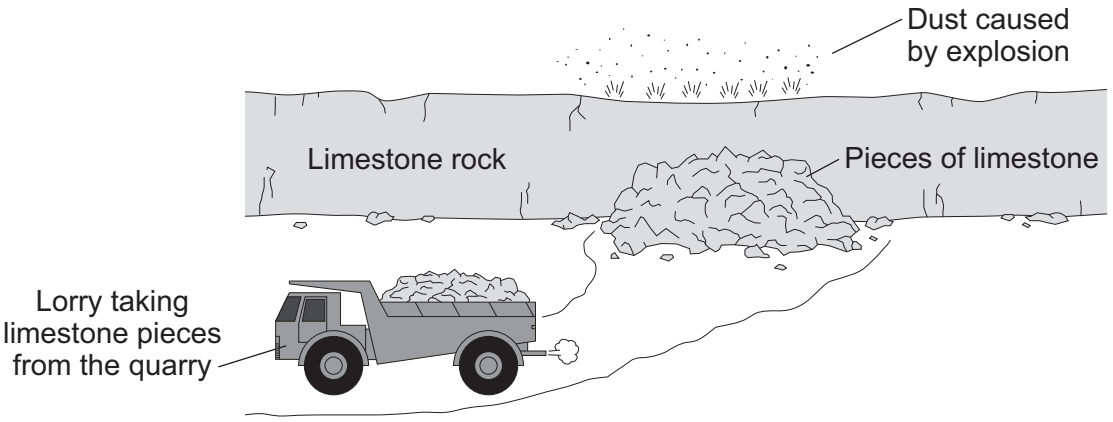
Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work 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 In a quarry, limestone is blasted into pieces by explosives.
The pieces of limestone are taken from the quarry by lorries.



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

Limestone can be used as a | building / plastic / smart | material.

(1 mark)

1 (b) Tick (✓) **one** possible advantage for people who live near to the limestone quarry.

Advantage	Tick (✓)
causes more traffic	
provides jobs	
attracts tourists to the area	

(1 mark)

1 (c) Give **two** types of pollution that would be caused by the limestone quarry.

1 .....

2 .....

(2 marks)

1 (d) Limestone contains calcium carbonate ($CaCO_3$).

Complete the **two** empty boxes in the table about the formula of calcium carbonate.

Name of element	Symbol for the element	Number of atoms in the formula
calcium	Ca	1
carbon	C	1
oxygen	.....	.....

(2 marks)

1 (e) Lorries take some of the limestone to be heated in a lime-kiln.
Calcium carbonate, in the limestone, decomposes when heated.

Use the balanced chemical equation to help you complete the word equation for the decomposition of calcium carbonate.

$CaCO_3 \rightarrow CaO + CO_2$

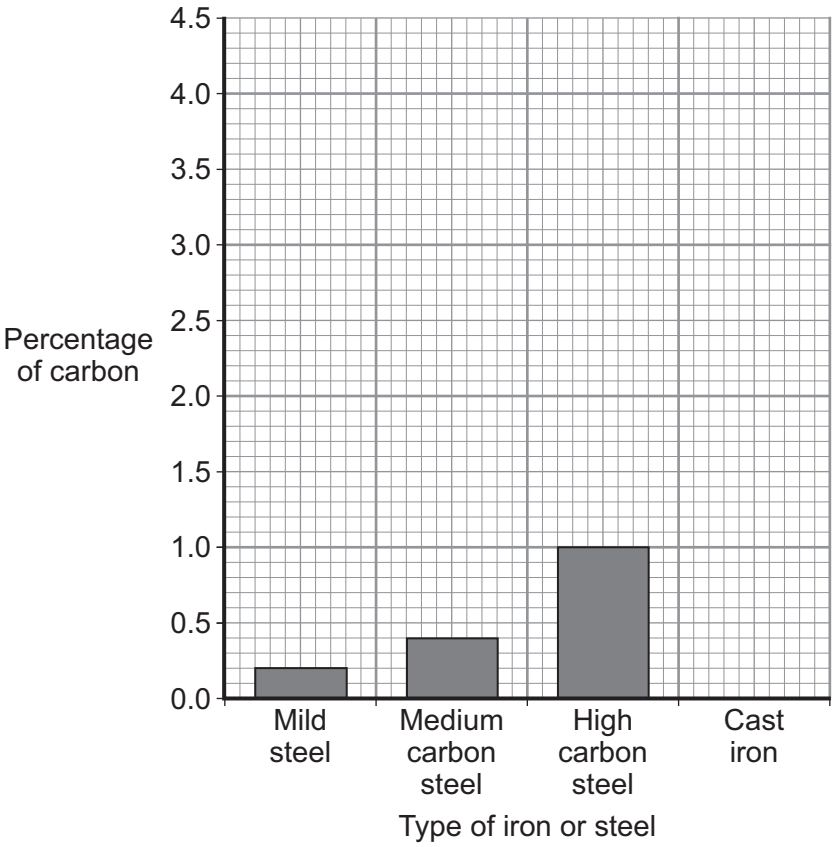
calcium carbonate → ..... + carbon dioxide

(1 mark)

7

Turn over for the next question

2 The bar chart shows the percentage of carbon in three types of steel.



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

Steel is the name used for

alloys
atoms
ores

of iron.

(1 mark)

2 (b) Cast iron contains 4% carbon.

Draw the bar for cast iron on the chart.

(1 mark)

2 (c) Cast iron is more brittle than these three types of steel.

Use the bar chart to suggest why.

.....

.....

(1 mark)

2 (d) One type of stainless steel contains iron with 0.2% carbon to which 8% nickel and 18% chromium were added.

2 (d) (i) Tick (✓) the percentage of iron in this type of stainless steel.

Percentage (%) of iron	Tick (✓)
92.4	
88.6	
73.8	

(1 mark)

2 (d) (ii) Use the bar chart to name the type of steel that contains only 0.2% carbon.

.....

(1 mark)

2 (d) (iii) Draw a ring around the correct word in the box to complete the sentence.

Stainless steel is used for knives and forks because it is resistant to

corrosion.

decomposition.

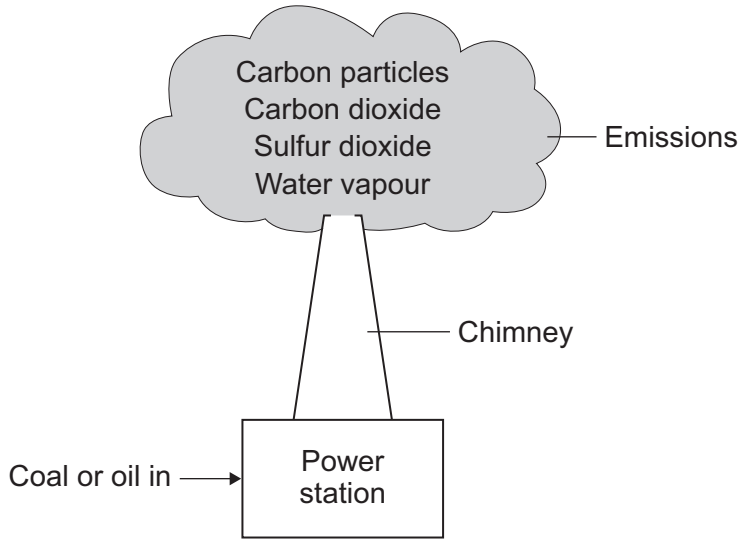
distillation.

(1 mark)

6

Turn over for the next question

3 In the future more coal-fired and fewer oil-fired power stations will be used to generate electricity.
When coal and oil are burned they produce the same types of emissions which can cause environmental problems.



3 (a) Emissions from the chimney can cause acid rain, global dimming and global warming.
Draw **one** straight line from each possible environmental problem to the emission that causes it.

Possible environmental problem	**Emission that causes it**
	carbon particles
acid rain	
	carbon dioxide
global warming	
	sulfur dioxide
global dimming	
	water vapour

(3 marks)

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

3 (b) (i) Incomplete combustion of coal or oil is caused by too little

carbon dioxide.

nitrogen.

oxygen.

(1 mark)

3 (b) (ii) A gas formed by the incomplete combustion of coal or oil is

carbon monoxide.
hydrogen.
oxygen.

(1 mark)

3 (c) The table shows the world production for both coal and oil in 2000.
The world production figures after 2000 are predicted.

Year	World production of coal (billions of tonnes per year)	World production of oil (billions of barrels per year)
2000	3.5	12.5
2050	4.5	5.6
2100	5.0	1.7
2150	5.5	0.5
2200	6.0	0.0

3 (c) (i) How is the world production of oil predicted to change from 2000 to 2200?

.....

.....

(1 mark)

3 (c) (ii) Suggest **two** reasons why the world production of coal is predicted to increase.

1 .....

.....

2 .....

.....

(2 marks)

8

4 An article had the following headline.

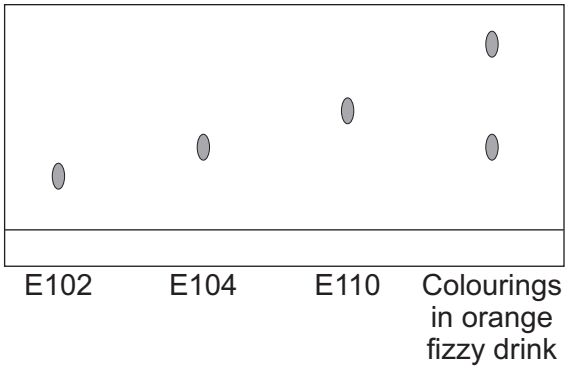
NEW FEAR OVER DRINK ADDITIVES

Some children get headaches and skin problems that are possibly caused by some types of fizzy orange drinks.

These fizzy drinks all contain water, carbon dioxide, artificial flavourings and colourings.

Three artificial colourings that have been used in fizzy orange drinks are tartrazine (E102), quinoline yellow (E104) and sunset yellow (E110).

4 (a) Colourings can be detected by chromatography.
The results of chromatography for the colourings in one fizzy orange drink are shown.



4(a) (i) How many colourings are there in the fizzy orange drink? .....

(1 mark)

4 (a) (ii) Which one of the colourings, E102, E104 or E110, does the fizzy orange drink contain?

Explain your answer.

E..... because .....

.....

.....

(2 marks)

4 (b) (i) Why are artificial colourings added to some fizzy orange drinks?

.....

.....

(1 mark)

4 (b) (ii) Some people believe that artificial colourings cause headaches and skin problems.

Suggest **one** other substance in the fizzy orange drink that may cause these problems.

.....

(1 mark)

4 (c) Plastic bottles are often used as drink containers.

4 (c) (i) Draw a ring around the correct word in each box to complete the sentence.

The plastic is made by joining together many small molecules called

fractions
metals
monomers

to form very large molecules called

alloys.
polymers.
gases.

(2 marks)

4 (c) (ii) Used plastic bottles should **not** be dumped in landfill sites.

Give **two** reasons for this.

1 .....

.....

2 .....

.....

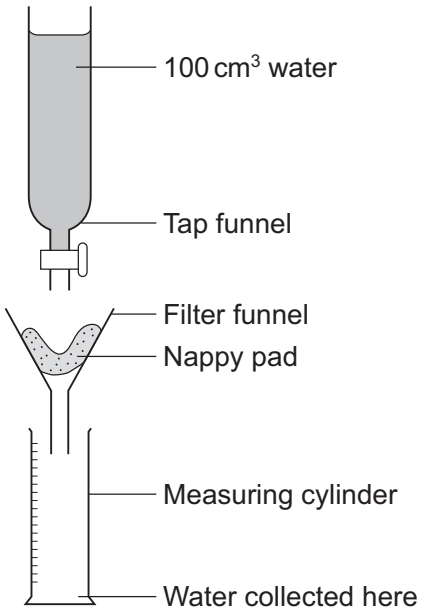
(2 marks)

9

Turn over for the next question

5 Disposable nappies for babies need to absorb as much water as possible. Disposable nappies have a pad containing a special polymer called a hydrogel. Hydrogels absorb water.

A company called Aqanaps compared the water absorption of its nappy pads with nappy pads made by other companies.



- A scientist from Aqanaps poured 100 cm^3 of water onto the pad of one of its nappies.
- He measured the volume of water that passed through.
- He did the test three times using a new nappy pad for each test.
- The scientist then repeated the procedure using the nappy pads from three other companies, **A**, **B** and **C**.

The results are shown in the table.

Company	**Volume of water collected in cm^3**		
	Pad 1	**Pad 2**	**Pad 3**
Aqanaps	55	57	55
A	47	46	39
B	65	63	64
C	38	39	38

5 (a) (i) Choose **one** result in the table that should be tested again.

Result: Company ..... Pad .....

Explain why you chose this result.

.....

.....

.....

(2 marks)

5 (a) (ii) Suggest **one** variable that should be controlled in this investigation.

.....

.....

(1 mark)

5 (a) (iii) Suggest **one** possible cause of error in this investigation.

.....

.....

(1 mark)

5 (b) (i) The Aqanaps company studied the results. The company concluded that it should increase the amount of hydrogel used in its nappy pads.

Give **two** reasons why the company decided to increase the amount of hydrogel used in its nappy pads.

1 .....

.....

2 .....

.....

(2 marks)

5 (b) (ii) Suggest **one** disadvantage for the company if it increases the amount of hydrogel used in its nappy pads.

.....

.....

(1 mark)

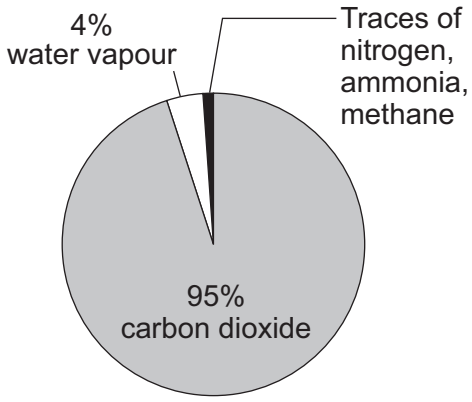
7

6 (a) Scientists have suggested that:

- the Earth formed as a molten ball of rock and minerals
- the rock and minerals cooled slowly
- the surface of the Earth was covered by volcanoes
- the volcanoes released gases that formed the Earth's early atmosphere.

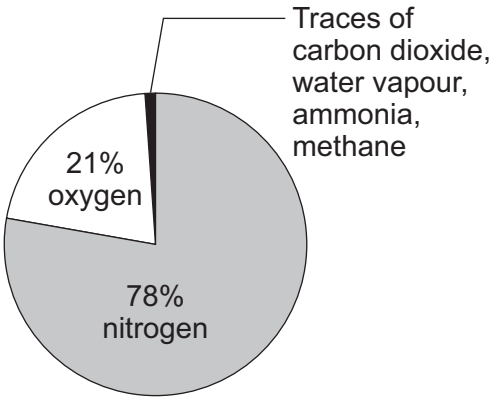
The pie charts show the approximate percentages of gases in the Earth's early atmosphere and in the Earth's atmosphere today.

Earth's early atmosphere



Average surface temperature above 400 °C

Earth's atmosphere today



Average surface temperature 20 °C

6 (a) (i) Explain what has happened to most of the water vapour in the Earth's early atmosphere.

.....

.....

.....

.....

(2 marks)

6 (a) (ii) Give **two** reasons why the percentage of carbon dioxide in the Earth's early atmosphere decreased.

1 .....

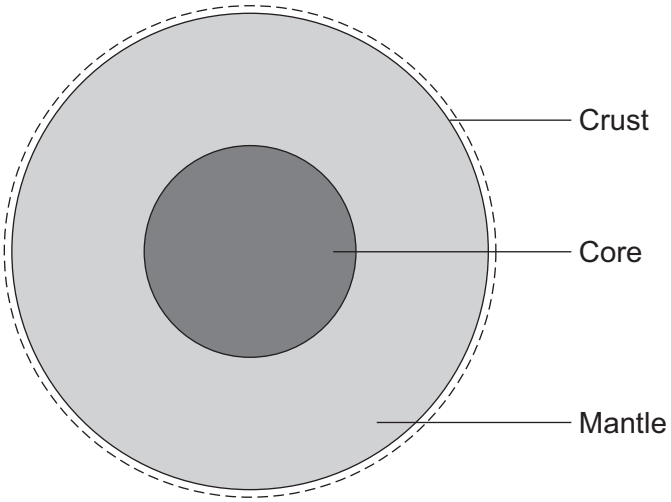
.....

2 .....

.....

(2 marks)

6 (b) Scientists have suggested that the Earth consists of a core, mantle and crust.



A 'traditional' theory is that the core is made of iron and nickel.

A 'controversial' theory is that the core is like a nuclear reactor made of the radioactive elements uranium and plutonium.

6 (b) (i) Why can scientists **not** prove which theory about the core is correct?

.....

.....

(1 mark)

6 (b) (ii) How can the 'controversial' theory be used to explain why the Earth's tectonic plates move?

.....

.....

.....

.....

.....

.....

(3 marks)

8

END OF QUESTIONS

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