Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

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General Certificate of Secondary Education
June 2006

SCIENCE: SINGLE AWARD B (CO-ORDINATED) 3463/2F
Paper 2
Foundation Tier

F

Wednesday 14 June 2006 9.00 am to 9.45 am

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

You may use a calculator.

Time allowed: 45 minutes

Instructions
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

Information
- The maximum mark for this paper is 45.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

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

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

1 (a) A small piece of sodium is added to water.

The table shows some statements.

Only four of these describe what happens when sodium reacts with water.

One of these has been ticked for you.

Put a tick (✓) next to the other **three**.

Sodium hydroxide solution is produced	✓
Sodium fizzes	
Sodium sinks to the bottom of the water	
Sodium moves around	
Sodium reacts to form an acidic solution	
Sodium sometimes melts	
Bubbles of oxygen gas are produced	

(3 marks)

(b) Sodium hydroxide solution is sometimes made by adding a mixture of mercury and sodium to water. The mercury does **not** react.

(i) What does this suggest about the position of mercury, if you were to place it in the reactivity series of metals?

.....

(1 mark)

(ii) Mercury is toxic.

Which hazard symbol, **A**, **B**, **C** or **D**, should be used to warn people of this danger?

A

B

C

D

The hazard symbol for toxic is ..... .

(1 mark)

(c) A salt is produced when sodium hydroxide reacts with nitric acid.

Choose **two** substances from the box to complete the word equation for this reaction.

sodium chloride	**sodium nitrate**	**sodium sulphate**	**water**

Sodium hydroxide + nitric acid → ..... + ...

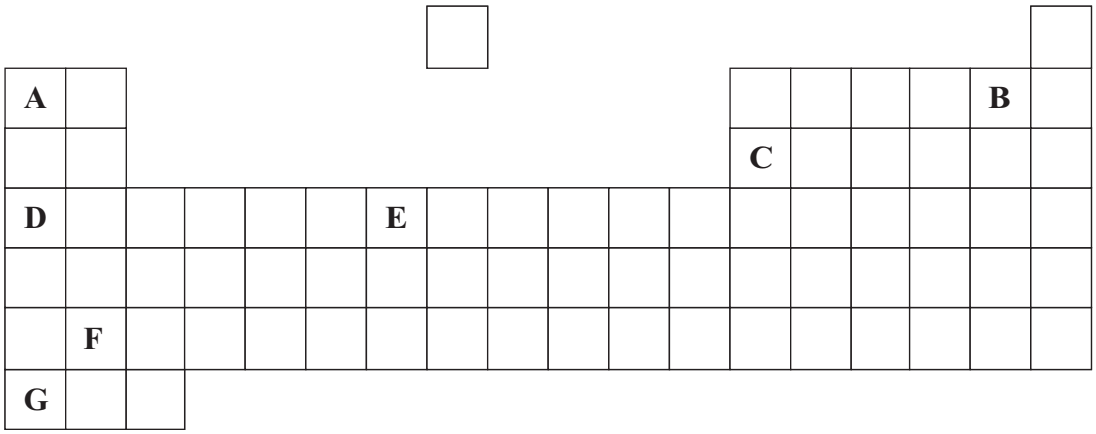
(2 marks)

7

Turn over for the next question

2 The periodic table on the Data Sheet may help you to answer this question.

The diagram shows an outline of the periodic table.



Choose your answers **only** from the letters shown on this outline table.

Which letter, **A** to **G**, represents an element that:

(a) is a non-metal; Letter .....
(1 mark)

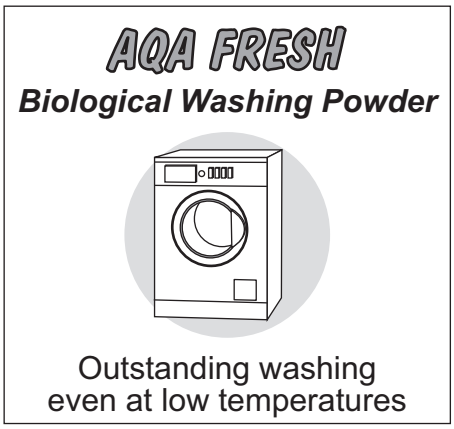
(b) is a group 2 element; Letter .....
(1 mark)

(c) has 19 protons in the nucleus of its atoms; Letter .....
(1 mark)

(d) is a transition element? Letter .....
(1 mark)

4

3 Biological washing powders contain biological catalysts.



(a) (i) How does a catalyst help a chemical reaction?

.....

(1 mark)

(ii) Complete this sentence by choosing the correct word from the box.

bases	**carbohydrates**	**enzymes**	**hydrocarbons**

Biological catalysts are called ..... .

(1 mark)

(b) Biological catalysts help to remove stains from clothes.
Four types of biological catalyst are given in the box.

carbohydrases	**isomerases**	**lipases**	**proteases**

Choose **two** biological catalysts from the box to complete the table.

Name of biological catalyst	**Type of stain which it helps to remove**
	Stains caused by fats
	Stains caused by proteins

(2 marks)

(c) Suggest **one** advantage of using a washing powder containing biological catalysts.

.....

.....

(1 mark)

5

4 This label was on a packet of soda crystals.

(a) Soda crystals are an irritant.

(i) The list gives some of the ways in which substances can be hazardous.

Put a tick (✓) next to the **two** ways in which irritant substances can be hazardous.

Hazard	(✓)
Attack and destroy living tissue	
Blistering of the skin	
Catch fire easily	
Make other substances burn more fiercely	
Reddening of the skin	

(2 marks)

(ii) Suggest an item of safety equipment that should be worn when using a solution of soda crystals.

.....

(1 mark)

(b) Soda crystals dissolve in water to form an alkaline solution.

Which **one** of the following ions makes the solution alkaline?

Draw a ring around your answer.

ammonium **hydrogen** **hydroxide** **sodium**

(1 mark)

(c) A reaction takes place when a warm soda solution is added to aluminium.

A word equation can be used to describe this reaction.

soda solution	+	aluminium solid	→	sodium aluminate solution	+	sodium hydrogencarbonate solution	+	hydrogen gas

(i) An aluminium saucepan should **not** be cleaned with soda solution. Explain why.

.....

.....

(1 mark)

(ii) A sample of the gas produced was collected in a test tube.

How could you show that the gas is hydrogen?

The test you would do: .....

.....

The result of the test: .....

.....

(2 marks)

7

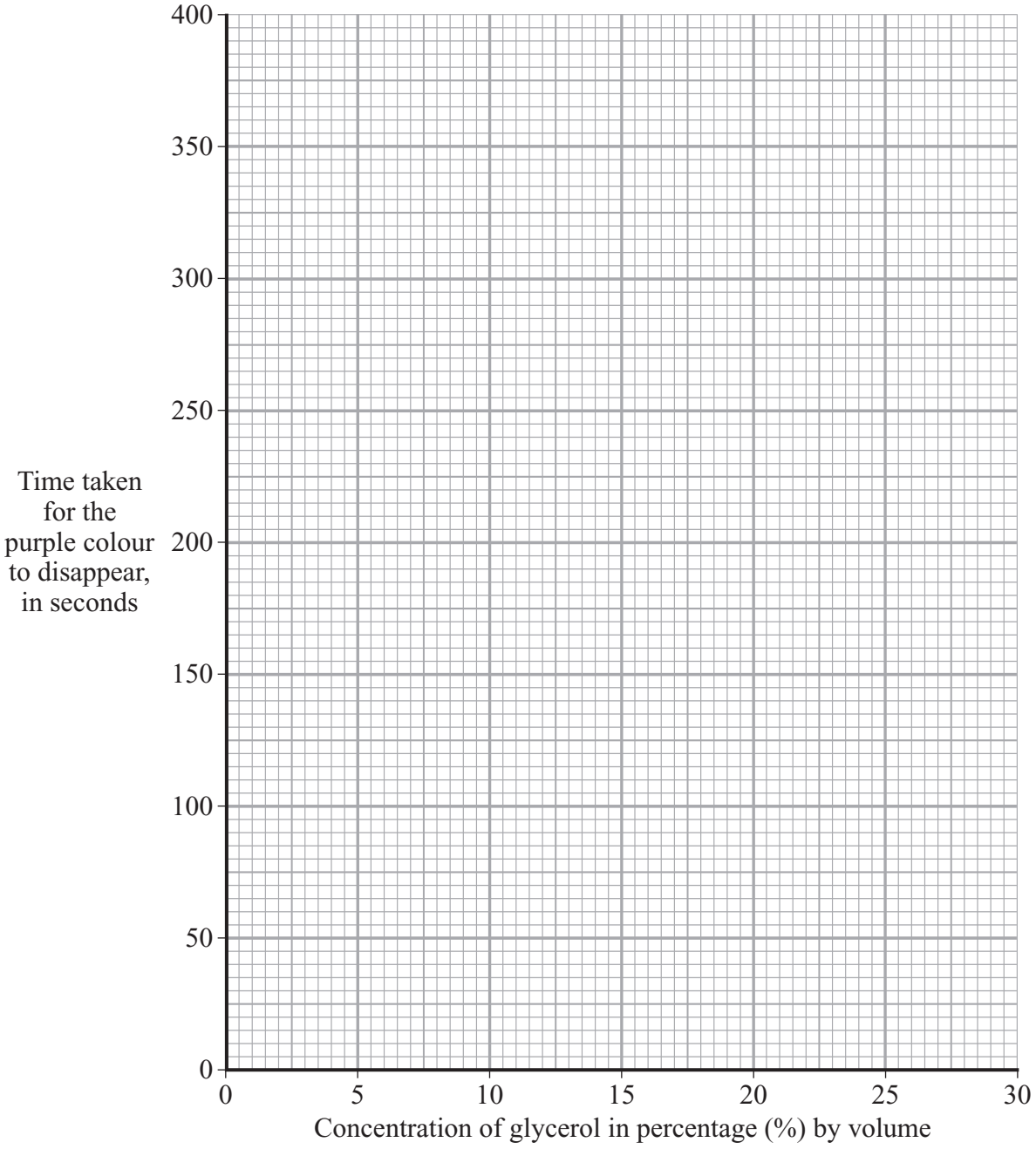
Turn over for the next question

5 Glycerol reacts with a purple solution to form colourless products. The time taken for the purple colour to disappear can be used to measure the rate of this reaction.

A student did some experiments to find out how the concentration of glycerol affects the rate of this reaction. The results are shown in the table.

Concentration of glycerol in percentage (%) by volume	4	10	16	24	30
Time taken for the purple colour to disappear, in seconds	375	150	94	63	50

(a) Plot these points on the graph and draw a smooth curve through the points.



(3 marks)

(b) The time taken for the purple colour to disappear when the concentration of the glycerol is 10 % is 150 seconds.

(i) Use your graph to estimate the time it would take for the purple colour to disappear when the concentration of glycerol is 20 %.

Time = ... seconds

(1 mark)

(ii) If the concentration of glycerol is doubled, what happens to the **rate** of reaction?

.....

.....

(1 mark)

(iii) Explain, in terms of particles, why increasing the concentration of glycerol increases the rate of this reaction.

.....

.....

.....

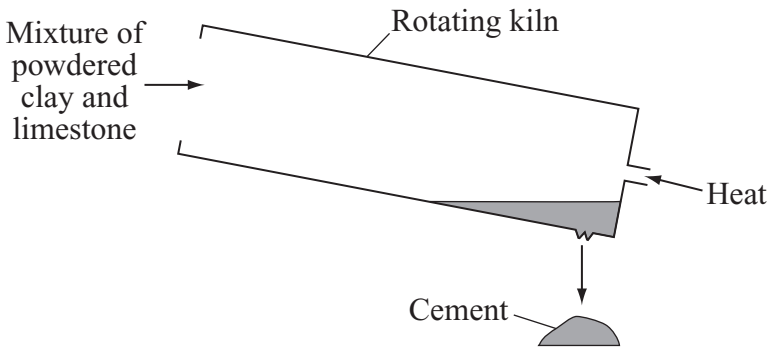
.....

(2 marks)

7

Turn over for the next question

6 (a) Limestone is an important raw material in the manufacture of cement.



In this process:

- powdered limestone and clay are mixed in a rotating kiln;
- *thermal decomposition* of the limestone takes place to produce calcium oxide;
- the calcium oxide then reacts with the clay to make cement.

(i) Explain what is meant by the term *thermal decomposition*.

.....

.....

.....

(2 marks)

(ii) Thermal decomposition of calcium carbonate also produces a gas which turns limewater milky.

Name this gas. .....

(1 mark)

(iii) Suggest why a rotating kiln is used.

.....

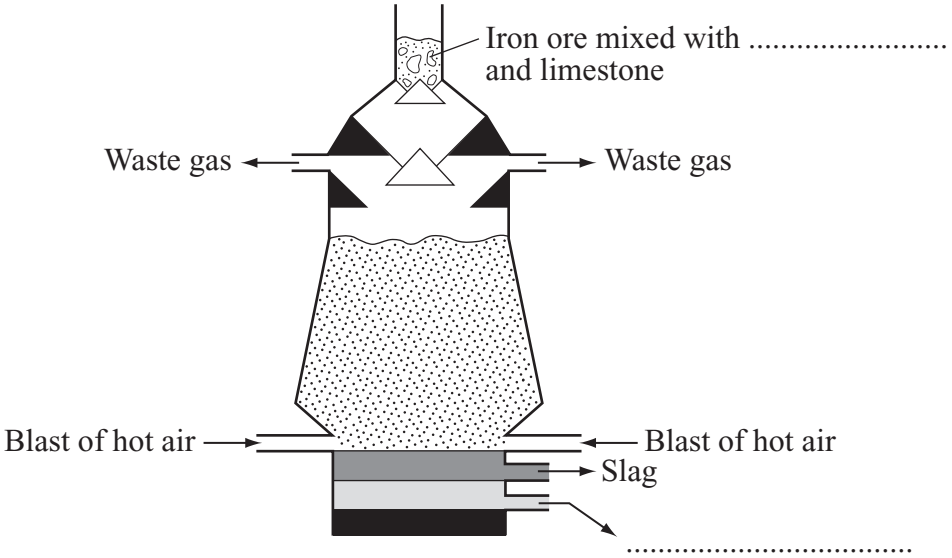
.....

(1 mark)

(b) Limestone is also used in the extraction of iron in the blast furnace.

The diagram shows a blast furnace.

(i) Complete the diagram by adding the **two** missing labels.



(2 marks)

(ii) The iron ore (iron oxide) is *reduced* in the furnace.

Explain what is meant by the term *reduced*.

.....

.....

(1 mark)

(iii) The slag obtained from the blast furnace can be ground up and used to make a type of cement.
This is different from the method described in part (a) of this question.

Suggest and explain **one** advantage of using blast furnace slag to make cement.

.....

.....

.....

.....

(2 marks)

9

Turn over for the next question

7 Read the information about plastic-tar and then answer the questions.

Plastic-Tar Roads!

A town in India has made a road from plastic-tar. The town mayor is quoted as saying, 'using plastic-tar will reduce the problem of plastic waste'.

Roads are usually made from a mixture of bitumen and gravel. Plastic-tar is made by mixing the bitumen and gravel with plastic. This plastic is obtained from household waste material.

Plastic-tar is harder and more waterproof than ordinary tar. This helps it to last longer.

(a) Use your knowledge of plastics to explain why the disposal of plastic waste is difficult, making it a problem for the environment.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

.....

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.....

.....

.....

.....

.....

.....

(4 marks)

(b) Suggest **two** advantages of using waste plastic to make plastic-tar.

.....

.....

.....

.....

(2 marks)

6

END OF QUESTIONS