



Centre Number

71

Candidate Number

General Certificate of Secondary Education  
2009–2010

## Science: Single Award (Modular)

Chemical Patterns and our Environment  
Module 3

Higher Tier

[GSC32]



THURSDAY 20 MAY 2010, MORNING

### TIME

45 minutes.

### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.  
Answer **all six** questions.

### INFORMATION FOR CANDIDATES

The total mark for this paper is 45.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

A Data Leaflet is provided for use with this paper.

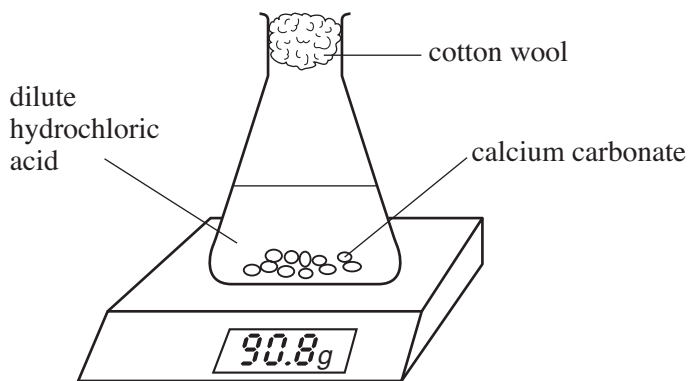
For Examiner's  
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	

Total  
Marks



- 1 Mary investigated the reaction between hydrochloric acid and excess calcium carbonate.

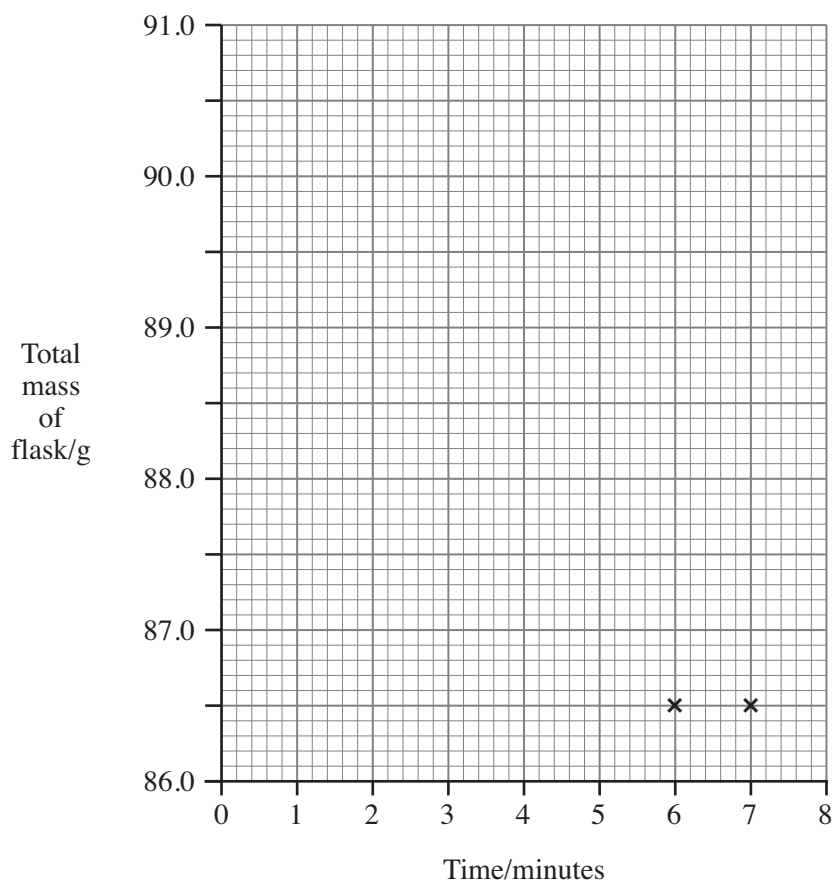


She measured the mass of the flask and its contents every minute.

- (a) Complete the graph by plotting the remaining points and draw a line of best fit.

Time/ minutes	0	1	2	3	4	5	6	7
Total mass of flask/g	90.8	88.9	87.5	87.0	86.7	86.6	86.5	86.5

[3]



Examiner Only	
Marks	Remark
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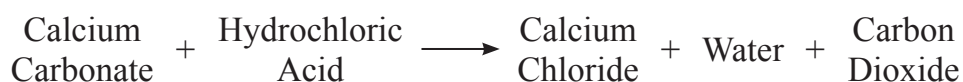
(b) What is the trend shown by these results?

\_\_\_\_\_  
\_\_\_\_\_ [2]

(c) Which reactant was completely used up during the reaction?

\_\_\_\_\_ [1]

(d) The equation for this reaction is shown below.



Use the equation to fully explain why there was a decrease in the mass of the flask and its contents.

\_\_\_\_\_  
\_\_\_\_\_ [2]

(e) Give two reasons why cotton wool was used to plug the flask instead of using a rubber bung.

1. \_\_\_\_\_
2. \_\_\_\_\_ [2]

(f) How could Mary ensure that her results were reliable?

\_\_\_\_\_ [1]

Examiner Only

Marks Remark

- 2 The table below gives information about the numbers of electrons in an atom of each of the elements A, B, C, D and E.

Element	No. of electrons in 1st shell	No. of electrons in 2nd shell	No. of electrons in 3rd shell
A	2	1	
B	2	4	
C	2	8	
D	2	8	1
E	2	6	

Use this information and your Data Leaflet to answer the following questions.

- (a) Which element A, B, C, D or E has an atomic number of 6?

\_\_\_\_\_ [1]

- (b) Which element A, B, C, D or E is a Noble gas?

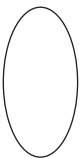

\_\_\_\_\_ [1]

- (c) Which two elements A, B, C, D or E are in the same Group of the Periodic Table?

\_\_\_\_\_ and \_\_\_\_\_ [1]

- (d) Give the name of element D.

\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark
	

3 (a) There are different theories on the age of the Earth.  
One of these is based on radiometric dating.  
Another theory was written by a local man from Armagh who based his theory on information in the Book of Genesis.

(i) Name the person who is known to have based his theory on the information in the Book of Genesis.

\_\_\_\_\_ [1]

(ii) What information in the Book of Genesis did he use to calculate the age of the Earth?


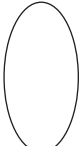
\_\_\_\_\_  
\_\_\_\_\_ [1]

(iii) What is the age of the Earth calculated by this theory?

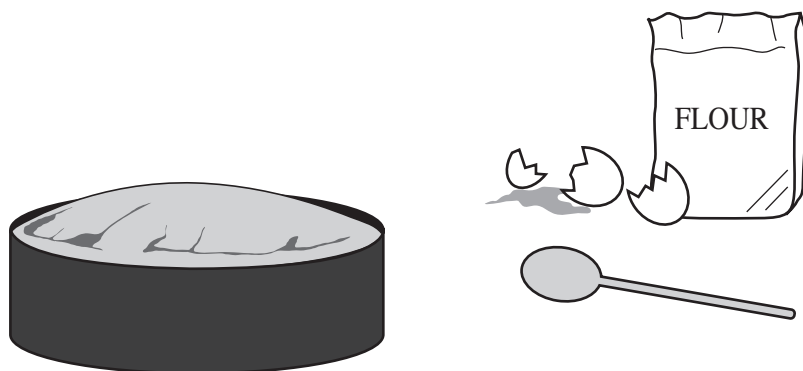
\_\_\_\_\_ [1]

(b) Scientists use the method of radiometric dating to find the age of the Earth. Describe the method of radiometric dating.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [3]

Examiner Only	
Marks	Remark
	

4 Baking soda is used to make cakes rise.



(a) What is the chemical name for baking soda?

\_\_\_\_\_ [1]

(b) Baking soda undergoes a chemical reaction when it is put into an oven at 200°C.

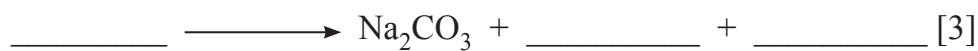
What name is given to this type of chemical reaction?

\_\_\_\_\_ [2]

(c) Explain fully what causes the cake to rise.

\_\_\_\_\_  
\_\_\_\_\_ [2]

(d) Complete and balance the **symbol** equation below for this reaction.



Examiner Only	
Marks	Remark
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5 The table below gives information about four solutions into which strips of metal were placed.

After several hours the following observations were made.

Test tube	Metal	Solution	Observation
1	zinc	copper sulphate	Solution turned colourless, reddish brown deposit appeared
2	zinc	lead nitrate	Solution remained colourless, grey solid appeared
3	copper	lead nitrate	Solution remained colourless, copper strip remained shiny No deposit
4	copper	silver nitrate	Solution turned blue, shiny deposit appeared

Use this information and your knowledge to answer the following questions.

(a) In which test tubes (1, 2, 3 or 4) did a displacement reaction occur?

\_\_\_\_\_ [1]

(b) Why did the solution lose its colour in test tube 1?

\_\_\_\_\_ [1]

(c) Explain fully the results for test tube 3.

\_\_\_\_\_  
\_\_\_\_\_ [2]

(d) Which of the metals involved is the most reactive?  
Circle the correct answer.

**lead**        **copper**        **zinc**        **silver**        [1]

(e) Complete the symbol equation:

$\text{CuSO}_4 + \text{Zn} \longrightarrow$  \_\_\_\_\_  $+$  \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark
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(f) Describe and explain how the observations would change if sodium nitrate solution was used instead of lead nitrate in test tubes 2 and 3.

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[3]

Examiner Only	
Marks	Remark



6 The Periodic Table has been developed through the years by many scientists. Describe the role of each of the following in the development of the Periodic Table.

John Newlands

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[2]

Dimitri Mendeleev

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[2]

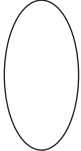

Modern Scientists

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[2]

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Marks	Remark
	

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**THIS IS THE END OF THE QUESTION PAPER**

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