



Centre Number

71

Candidate Number

General Certificate of Secondary Education  
2010–2011

**Science: Single Award (Modular)**  
Chemical Patterns and our Environment  
Module 3  
Higher Tier  
[GSC32]



TUESDAY 9 NOVEMBER 2010, AFTERNOON

**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	

<b>Total Marks</b>	
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1 (a) In February 2008 there was a small earthquake in the south of England. It happened at one o'clock in the morning.

Suggest **two** reasons why it could injure more people so early in the morning.

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 [2]

(b) The table below shows the effects of different strengths of earthquakes.

Number on Richter Scale	Effect of earthquake
2	Trees sway, ponds ripple, doors swing slowly. People cannot tell that it is an earthquake.
4	Buildings shake, dishes rattle, windows rattle.
6	Furniture moves, plaster can fall, walls may crack.
8	Buildings fall down, bridges collapse, lives are lost.

Earthquakes are quite common in the UK, but most are less than 2 on the Richter Scale.  
Suggest one reason why most are not reported and explain your answer.

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 [2]

(c) Given below are some comments from BBC reporters just after the 2008 earthquake.

**“Everything started wobbling. The windows were rattling and the blinds were moving.”**

**“I went outside in my dressing gown to see if the roof had collapsed.”**

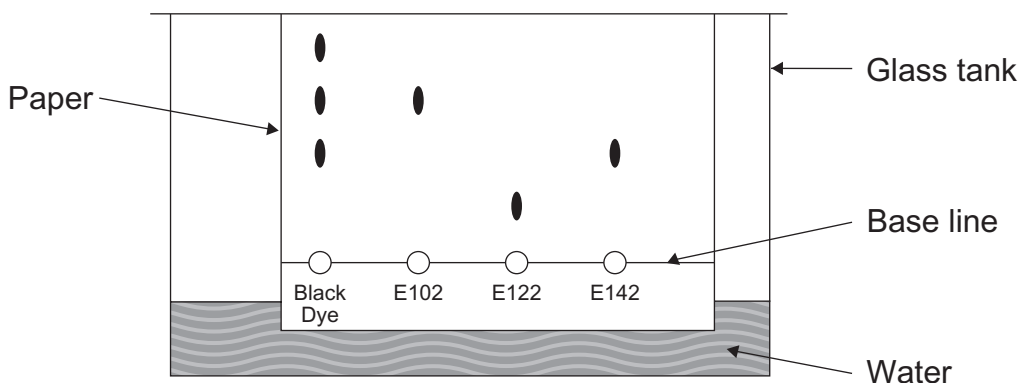
**“Cracks appeared in the ceiling and some plaster fell. All the cupboard doors flew open.”**

Examiner Only	
Marks	Remark



2 A student set up an experiment to investigate the dyes in a black food colouring.

He wanted to compare the dyes with the permitted colours E102, E122 and E142 and to find out if any other dyes were present. His results are shown below.



(a) Name this method of separation.

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

(b) Describe fully what the student discovered as a result of this experiment.

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

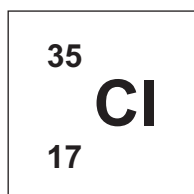
(c) Food colourings are tested on animals.

Give one advantage and one disadvantage of animal testing.

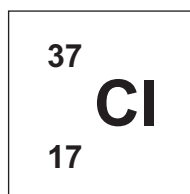
\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

3 Chlorine has two different types of atoms (A and B).



A



B

- (a) (i) Give the atomic number of chlorine.  
You may find your Data Leaflet helpful.

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

- (ii) What is meant by the term atomic mass?

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

- (b) Name the particle in an atom which has the smallest mass.

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

- (c) How many neutrons are present in each of the chlorine atoms (A and B) represented above?

A \_\_\_\_\_ B \_\_\_\_\_ [2]

- (d) Draw a diagram to show how all the electrons are arranged in an atom of chlorine.

[2]

Examiner Only	
Marks	Remark

- 4 Yellow Man can be made by adding baking soda to a hot mixture of sugar and golden syrup.



© Ruth Wilson - Scotproof

- (a) (i) What is the chemical formula for baking soda?

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

- (ii) Describe fully the chemical reaction which takes place when baking soda is added to the mixture of sugar and golden syrup.

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

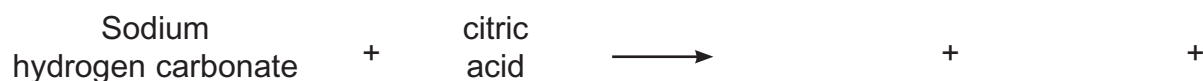
- (b) Some recipes include the addition of vinegar.  
 Why would this help to produce more bubbles in the Yellow Man?

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

- (c) Give the name of another type of sweet that can be made using baking soda, sugar and citric acid.

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

- (d) Complete the word equation for this reaction.



[3]

Examiner Only	
Marks	Remark

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5 (a) Indigestion tablets usually contain one of the following chemicals.

Magnesium hydroxide  $\text{Mg(OH)}_2$

Calcium carbonate  $\text{CaCO}_3$

Aluminium oxide  $\text{Al}_2\text{O}_3$

(i) Name the element which is present in all of these compounds.

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

(ii) Explain fully why calcium carbonate is described as a compound.

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

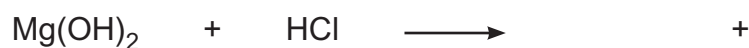
Image of a bottle  
of Milk of  
Magnesia

(b) When Milk of Magnesia is added to stomach acid a chemical reaction takes place.

(i) What name is given to this type of reaction?

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

(ii) Complete and balance the symbol equation for this reaction.



[3]

Examiner Only

Marks Remark

- 6 Mendeleev was one of the chemists who helped to develop the Periodic Table.



The first attempt to classify elements was by the Greeks, who had just four elements.

John Newlands attempted to put the chemical elements into a table. He had noticed a repeating pattern.

Mendeleev arranged the elements in order of increasing atomic weight. He tried to put elements with similar properties in the same group. Sometimes he left spaces and he did not always follow the order of increasing atomic weight.

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

You may find your Data Leaflet useful.

- (a) Name the four 'elements' described by the Greeks.

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

- (b) What was the repeating pattern noticed by John Newlands?

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

- (c) Why did Mendeleev leave gaps in his table?

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

Examiner Only

Marks Remark



(d) Suggest why Mendeleev put tellurium (atomic weight 128) before iodine (atomic weight 127).

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[1]

(e) Much more is now known about the atomic structure of atoms.  
Explain how the modern Periodic Table takes account of this.

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[2]

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

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Examiner Only	
Marks	Remark





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