



General Certificate of Secondary Education  
2011–2012

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



MONDAY 21 MAY 2012, 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.

Centre Number

71

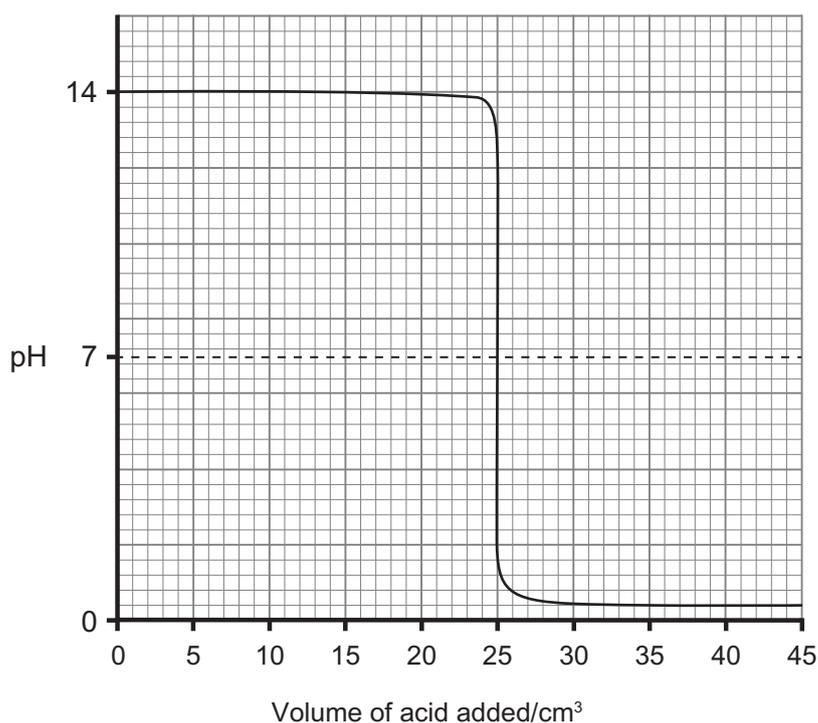
Candidate Number

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	

**Total Marks**



- 1 Jane measured the pH changes during a reaction using a pH probe. The following graph was produced.



She measured 25cm<sup>3</sup> of sodium hydroxide into a conical flask and then slowly added hydrochloric acid.

- (a) Name a piece of apparatus that she could have used to add the hydrochloric acid.

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

- (b) What was the pH value of the liquid in the flask at the start of the experiment?

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

- (c) What volume of acid was needed to cause a sharp fall in the pH value?

\_\_\_\_\_ cm<sup>3</sup> [1]

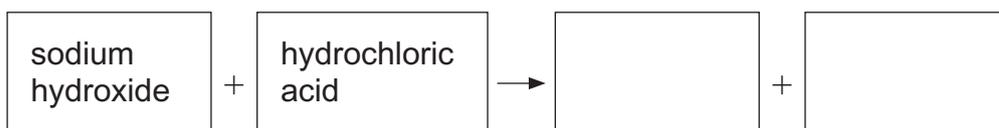
- (d) What name is given to reactions in which acids react with alkalis?

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

Examiner Only

Marks Remark

(e) Complete the word equation for this reaction.



[2]

Examiner Only	
Marks	Remark

- 2 Tartrazine is a yellow colouring which is added to some foods. In Europe all food additives have to be tested many times before they can be used. Some scientists have linked tartrazine to hyperactivity in children. It has also been linked to allergies, migraines and even cancer.

The British Nutrition Foundation (BNF) believes that more research is needed before any link is proved between additives and allergies.

One scientist said, "The public should not be worried because the additives have been tested before they were added to food." Another scientist said, "Many additives should be avoided on health grounds".

- (a) Why is tartrazine added to food?

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

- (b) Give **two** health problems which have been linked to tartrazine.

1. \_\_\_\_\_

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

- (c) Explain fully why the public may be confused about the safety of food additives.

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

- (d) Many parents are worried about particular food additives. Explain fully what action they can take when shopping.

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

Examiner Only	
Marks	Remark

- 3 (a) Fluorine is an element with nine electrons. Draw the electronic structure of fluorine in the box below.

[1]

- (b) Complete the table below about the particles in an atom.

Particle	Mass	Charge
proton		+1
electron	1/1840	
neutron		

[4]

- (c) Use your Data Leaflet to write formulae for the following compounds.

(i) calcium oxide \_\_\_\_\_

(ii) magnesium carbonate \_\_\_\_\_

(iii) potassium sulphate \_\_\_\_\_ [3]

Examiner Only

Marks

Remark

4 (a) There are different theories on the age of the Earth. One of these theories is based on the Book of Genesis in the Bible. It involves counting the generations of ancestors.

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

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

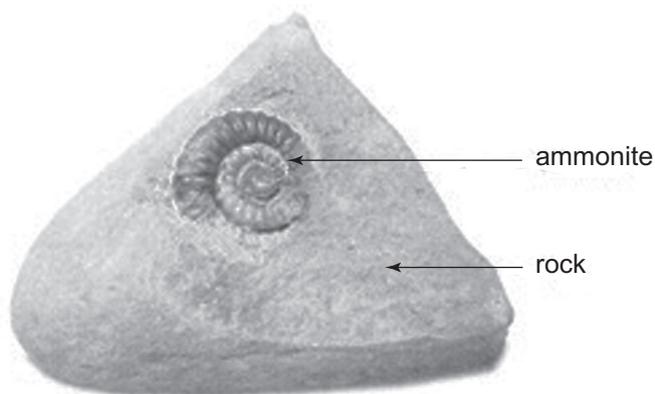
(ii) What is the age of the Earth calculated from this method?

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

(b) Scientists measure the age of the Earth using radiometric dating. Describe how radiometric dating is used to find the age of the Earth.

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

(c) The image below shows a rock containing a fossil.



© Junior Geo Ltd

Explain how fossils helped Alfred Wegener to form his theory of continental drift.

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

Examiner Only	
Marks	Remark

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

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

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

Calcium carbonate  $\text{CaCO}_3$

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

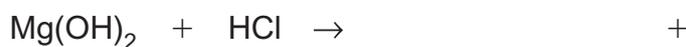
\_\_\_\_\_ [1]

(ii) Explain fully why aluminium oxide is described as a compound.

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

(b) Milk of Magnesia is a well known product that can be used to cure excess acid in the stomach.

Complete and balance the symbol equation for the chemical reaction which takes place in the stomach after taking this medicine.



[3]

Examiner Only	
Marks	Remark

- 6 Baking soda is a most useful substance to have in the home. It can be used to make sweets, cakes and can also be used to cure indigestion.

Sherbet is a mixture of baking soda, citric acid and sugar. When it is moistened in the mouth it produces a pleasant fizzing sensation.



© Tangerine Confectionery Ltd

- (a) Name the gas which causes the fizzing sensation.

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

- (b) Complete the word equation.



[3]

- (c) When baking soda is mixed with tartaric acid it forms baking powder.

- (i) Explain fully how these chemicals react to make cakes rise.

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

- (ii) During this reaction a salt is formed. What is the name of this salt?

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

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

- (d) When baking soda is used to cure indigestion it reacts with hydrochloric acid in the stomach. Complete the symbol equation below for this reaction.



[3]

Examiner Only

Marks	Remark

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

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