



General Certificate of Secondary Education  
2013–2014

## Science: Single Award

Unit 2 (Chemistry)

Higher Tier

[GSS22]



THURSDAY 15 MAY 2014, MORNING

Centre Number

71

Candidate Number

### TIME

1 hour 15 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 nine** questions.

### INFORMATION FOR CANDIDATES

The total mark for this paper is 75.

Quality of written communication will be assessed in Questions **3(a)** and **9**.

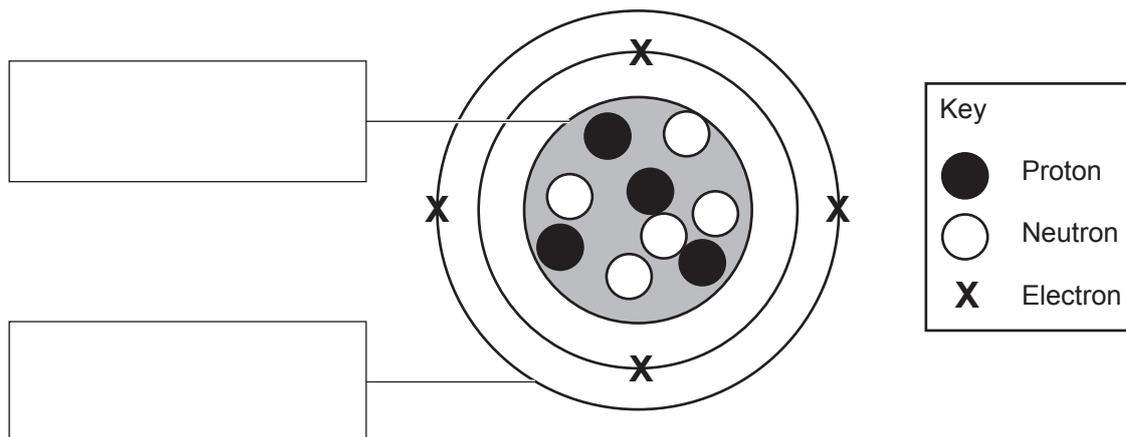
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question. A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

For Examiner's  
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

Total  
Marks

1 The diagram below shows an atom of an element.



(a) Complete the diagram above by adding labels to the two boxes. [2]

(b) What is the **atomic number** of this element?

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

(c) What is meant by the term **mass number**?

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

(d) To which group of the Periodic Table does this element belong?  
 Explain your answer in terms of its electronic structure.

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

Examiner Only

Marks Remark



- 2 The table below shows the percentage of the most common elements found in the igneous rocks in the Earth's crust.

Element	Percentage
Aluminium	8.1
Calcium	3.6
Iron	5.0
Magnesium	2.1
Oxygen	47.0
Phosphorus	0.1
Potassium	2.6
Silicon	28.0
Sodium	2.9
Titanium	0.6

Use the information in the table and your knowledge to answer the following questions.

You may find your Data Leaflet helpful.

- (a) Igneous rocks are only one **type** of rock. Name the other two types.

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

- (b) Name the most common **metal** in the Earth's crust.

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

- (c) Calculate the total percentage of alkaline earth metals in the Earth's crust.

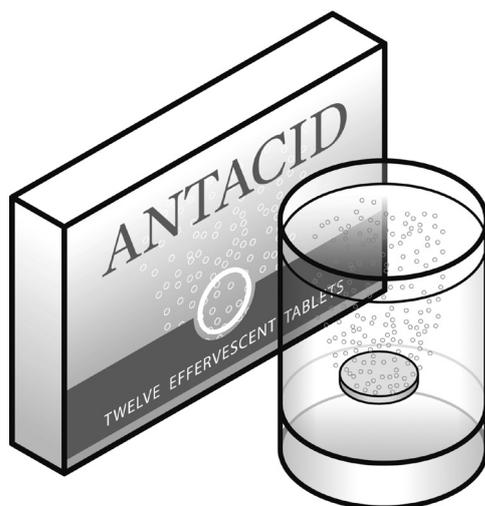
\_\_\_\_\_ % [1]

Examiner Only

Marks Remark



- 4 Acid indigestion is caused by excess hydrochloric acid in the stomach. It can be treated using antacid tablets which contain sodium hydrogencarbonate.



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- (a) Complete the word equation for the reaction between stomach acid and the antacid tablet.



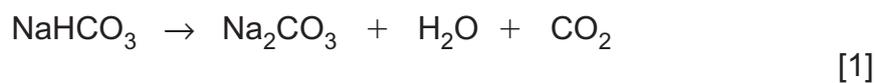
[3]

- (b) Suggest one reason why antacid tablets do **not** contain sodium hydroxide.

\_\_\_\_\_

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

- (c) Sodium hydrogencarbonate is also found in baking soda. The symbol equation showing the effect of heat on sodium hydrogencarbonate is given below. Balance this equation.



Examiner Only	
Marks	Remark

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- 6 (a) Aquavol is bottled natural spring water. The label from a bottle is shown below.

Aquavol Analysis	
Bottle contents in 0.25 litres	
<b>Ions</b>	<b>mg</b>
calcium	2.5
magnesium	1.0
sodium	1.6
potassium	1.75
chlorides	2.0
nitrates	1.0
sulfates	1.5
Aquavol is suitable for a low sodium diet	
	

- (i) Calculate the mass of sodium ions you would consume if you drank **one** litre of Aquavol water.

(Show your working out.)

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

- (ii) Name two metal ions from the label that are responsible for hard water.

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

Examiner Only

Marks Remark

(b) (i) What is meant by the term hard water?

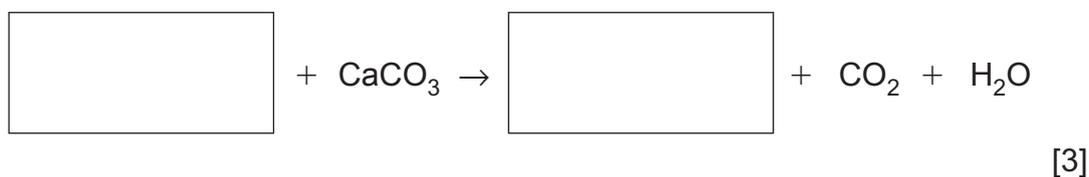
\_\_\_\_\_  
\_\_\_\_\_ [1]

(ii) Give two ways that **permanent** hard water can be softened.

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

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

(c) Temporary hard water can form undesirable deposits of calcium carbonate on shower doors. This can be removed by cleaning products containing a dilute solution of hydrochloric acid. Complete the balanced symbol equation below to show this reaction.



Examiner Only

Marks

Remark

- (d) A student conducted a fair test to investigate the hardness of different samples of water.  
The results are shown below.

Sample	Height of lather before boiling/mm	Height of lather after boiling/mm
A	8	8
B	15	24
C	28	28

- (i) What can be concluded about the type of water in sample **B**?  
Explain your answer.

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 [2]

- (ii) Suggest how the student could have carried out this investigation.

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 [3]

- (iii) Describe how the student could have ensured this investigation was valid (fair).

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 [2]

Examiner Only

Marks

Remark



8 (a) The table shows some information about different plastics.

Plastic	Density kg/m <sup>3</sup>	Maximum usable temperature/°C	Solubility in oil
low density polyethene	920	85	insoluble below 80 °C
high density polyethene	960	120	insoluble below 110 °C
polystyrene	1050	65	soluble
polychloroethene	1390	60	soluble
polypropene	900	150	soluble above 80 °C

- (i) The boiling point of water is 100 °C. Explain which type of polyethene is most suitable to be used to make a kettle.

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

- (ii) Which plastic would be the most suitable to make a pipe to carry oil at 90 °C? Explain your choice fully.

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

- (b) Scientists are trying to make more plastics that are biodegradable. Explain fully why it is important to the environment to make such plastics.

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

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Marks Remark

(c) Polyethene is made from ethene.

(i) Name and explain fully the process used.

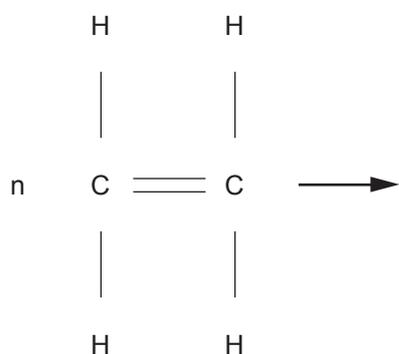
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

(ii) Complete the balanced symbol equation below for the reaction involved.



[3]

(d) Many useful chemicals can be extracted from crude oil.

What name is given to the method of separating useful chemicals from crude oil?

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

Examiner Only	
Marks	Remark



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

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