



General Certificate of Secondary Education  
2015–2016

Centre Number

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Candidate Number

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# Science: Single Award

Unit 2 (Chemistry)  
Foundation Tier



[GSS21]

**THURSDAY 12 NOVEMBER 2015, MORNING**

## TIME

1 hour, plus your additional time allowance.

## 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 eight** questions.

## INFORMATION FOR CANDIDATES

The total mark for this paper is 60.

Quality of written communication will be assessed in Question 6.  
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 for your use.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	

<b>Total Marks</b>	
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- 1 (a) Three materials and some possible uses are shown below. Draw lines to match each material to **one** of its main uses.

<b>Material</b>	<b>Use</b>
<div style="border: 1px solid black; width: 150px; height: 40px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">                     plastic                 </div>	 <p>© Okea/ iStock/ Thinkstock aeroplane wings</p>
<div style="border: 1px solid black; width: 150px; height: 40px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">                     copper                 </div>	 <p>© rgbdigital/ iStock/ Thinkstock bottom of saucepans</p>
<div style="border: 1px solid black; width: 150px; height: 40px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">                     wool                 </div>	 <p>© digitalgenetics/ iStock/ Thinkstock clothing</p>
	 <p>© WestLight/ iStock/ Thinkstock shopping bags</p>

[3]

Examiner Only	
Marks	Remark

- (b) Some materials come from living things. These are called natural materials. Other materials are man-made.  
Write the names of the materials below in the correct column of the table.

<b>wool</b>	<b>silk</b>	<b>cotton</b>	<b>nylon</b>
<b>Natural</b>		<b>Man-made</b>	

[2]

- (c) Most modern glasses' frames are made from plastic.



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Write down **two** reasons why plastic is better than metal for glasses' frames.

Choose from:

**lighter** : **better conductor** : **heavier** : **cheaper**

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

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

2 (a) Many household substances contain an acid or an alkali.

(i) Complete the following sentences.

Indigestion is caused by too much \_\_\_\_\_ in the stomach. Milk of Magnesia contains an alkali and can be used to cure indigestion in the stomach in a reaction called \_\_\_\_\_.

[2]

(ii) What is the chemical name for Milk of Magnesia?

Draw a circle around the correct answer.

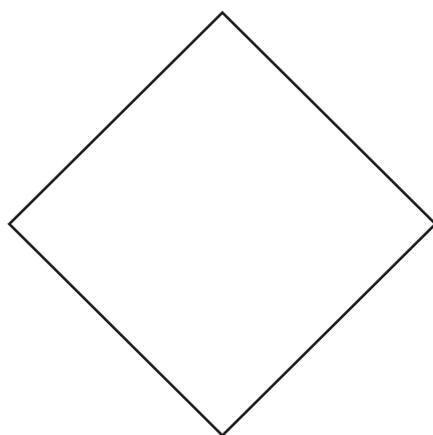
**sodium hydrogencarbonate** : **magnesium chloride**

**magnesium hydroxide**

[1]

(b) Sodium hydroxide is a corrosive substance found in oven cleaner.

(i) Draw the hazard symbol you would see on a bottle of oven cleaner. Do this in the box below.



[1]

(ii) Universal Indicator is added to oven cleaner. What colour will the Universal Indicator be now?

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

Examiner Only	
Marks	Remark

- (c) Look at the photograph below. It shows a way of finding the pH of a solution.



© Martyn F. Chillmaid / Science Photo Library

- (i) What is this piece of equipment called?

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

- (ii) Why is this method of measuring pH better than using Universal Indicator?

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

- (iii) The equipment in the photograph above shows a pH reading of 8.77.  
What does this tell you about the solution that has been tested?

Tick (✓) the correct answer.

It is a weak acid

It is a weak alkali

It is a strong acid

[1]

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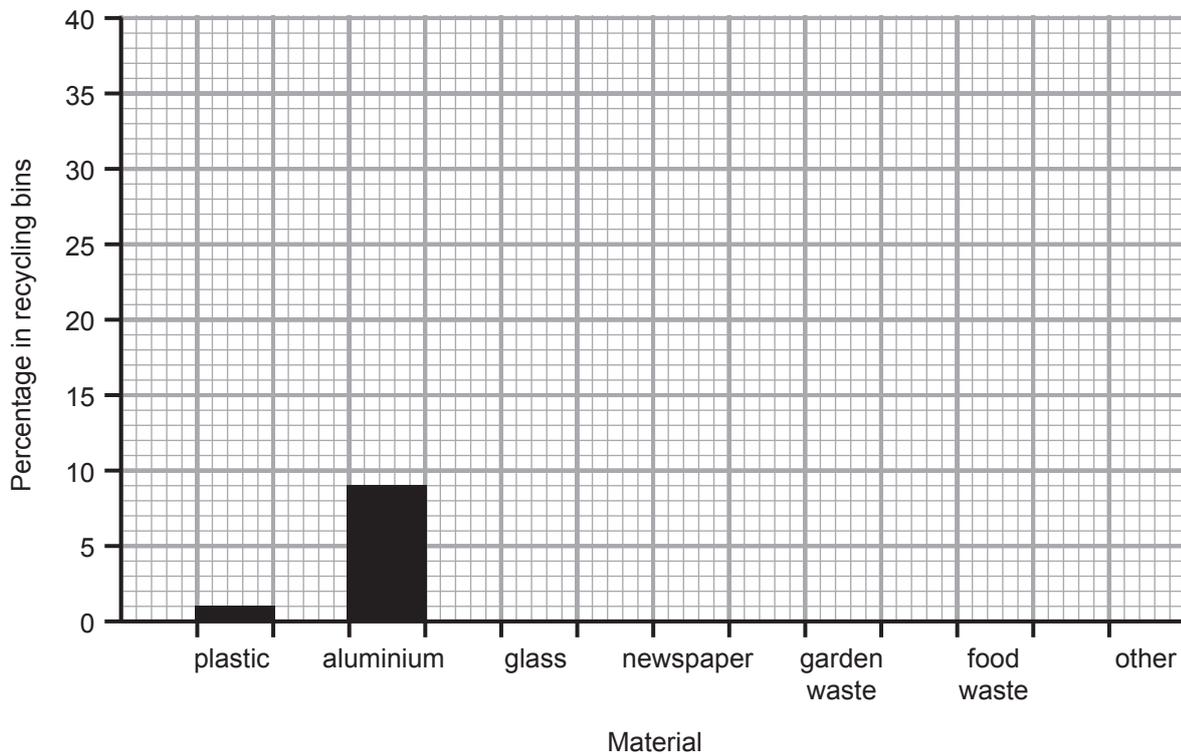
Marks Remark

3 Look at the table below. It shows the percentage of different materials that are in household recycling bins.

Material	Percentage in recycling bins
plastic	1
aluminium	9
glass	11
newspaper	22
garden waste	36
food waste	12
other	9

Examiner Only	
Marks	Remark

(a) Use the information in the table to complete the bar chart below.



[2]

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(b) (i) What does **non-biodegradable** mean?

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

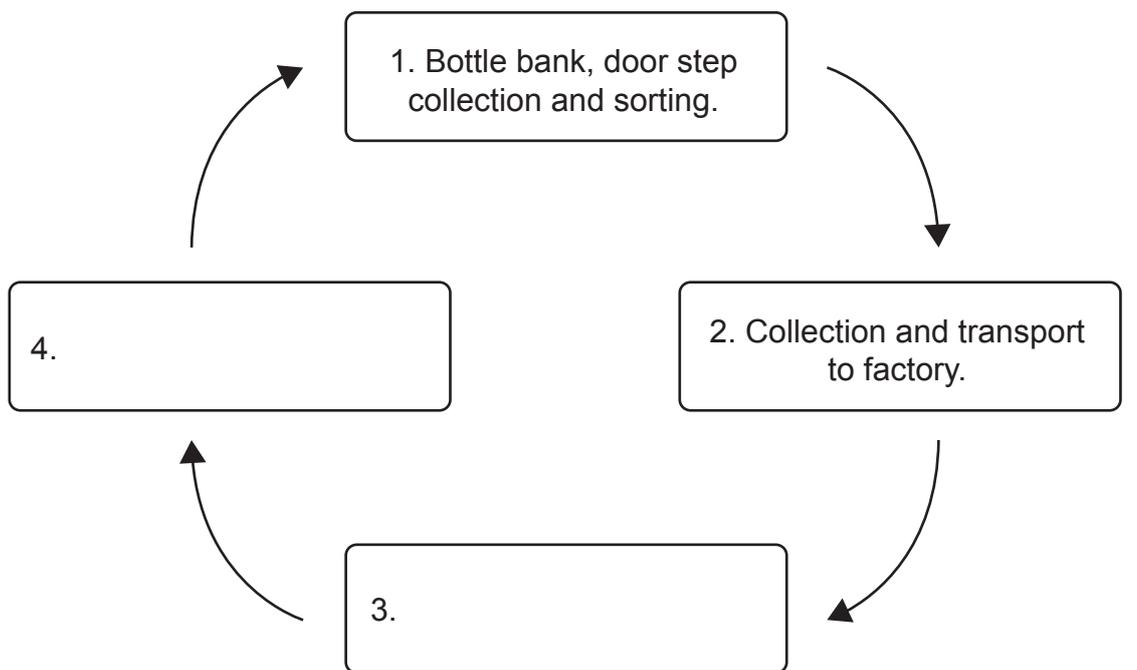
(ii) Write the names of **two** non-biodegradable materials shown in the table on page 6.

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

(c) Local authorities want people to recycle. Write down **one** reason why.

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

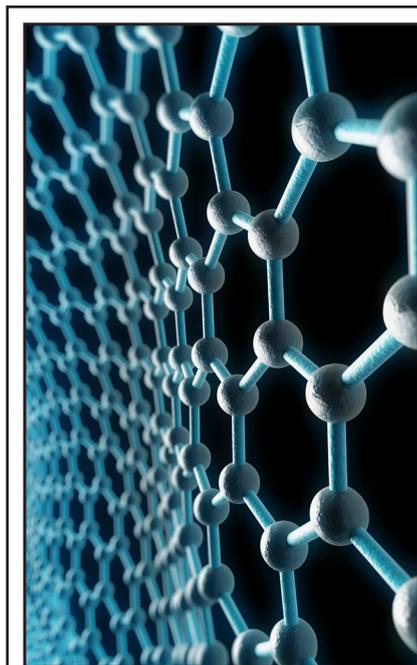
(d) Look at the flow diagram below. It is about glass recycling. Fill in boxes 3 and 4 to complete the diagram.



[2]

Examiner Only	
Marks	Remark

4 Read the article below. It is from a science magazine.



### Graphene – A new wonder material?

Graphene is a nano material. It is a sheet of carbon, only one atom thick, arranged in a honeycomb structure.

Graphene has amazing properties: it is one hundred times stronger than steel, a better conductor than copper and more flexible than rubber. These properties would be useful if graphene was used in the making of a composite material.

A new light bulb made with graphene is due to go on sale soon. Using graphene allows it to conduct electricity and heat better. The light bulb will use less energy and last longer.

© Science Picture Co / Science Photo Library

(a) What size is a nanoparticle?

Draw a circle around the correct answer.

$10^{-9}$  m                       $10^9$  m                       $10^{19}$  m                      [1]

(b) What are the names of **two** elements written about in the article above?

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

(c) Write down **one** property of graphene that would be useful in making mobile phone covers.

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

(d) Write down **one** advantage of using graphene in a household light bulb.

Explain your answer fully.

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

Examiner Only

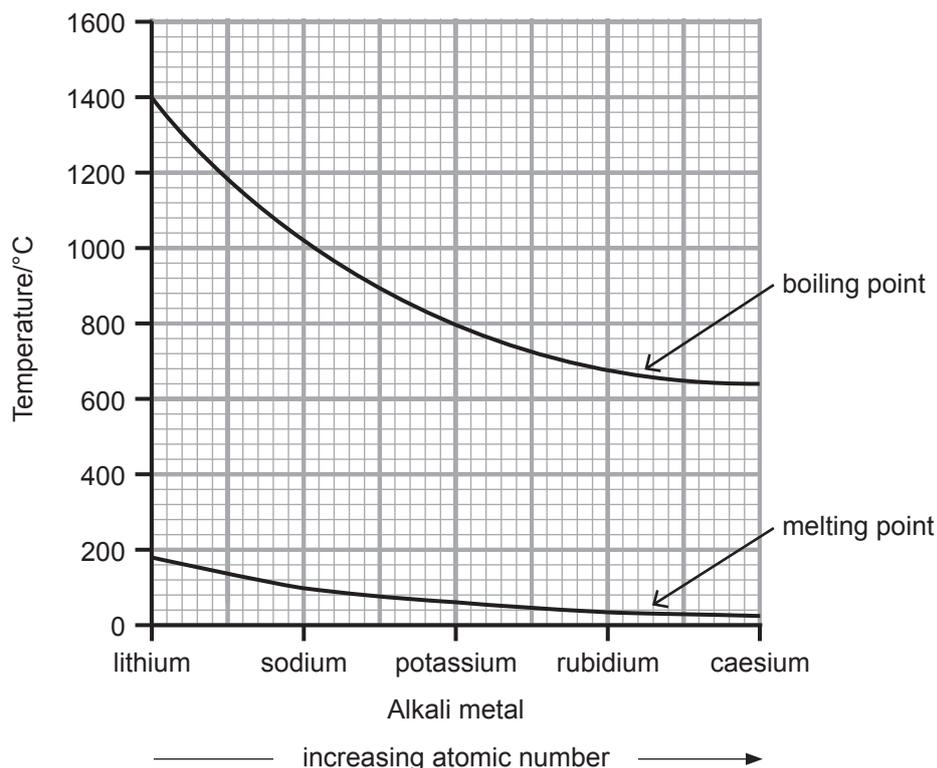
Marks Remark

(e) Another nano material is silver. Write down **one** medical use of silver nanoparticles.

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

Examiner Only	
Marks	Remark

- 5 Look at the graph below. It has information about the melting and boiling points of some Group 1 (alkali) metals.



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

- (a) Complete the following sentence to describe the trend in boiling points of the alkali metals.

As the atomic number of the alkali metals \_\_\_\_\_  
 \_\_\_\_\_ [1]

- (b) Francium is below caesium in Group 1 of the Periodic Table. Predict the boiling point of francium.

\_\_\_\_\_ °C [1]

- (c) Find the metal with the biggest difference between its melting point and its boiling point. Calculate the difference between its melting point and its boiling point.

(Show your working out.)

\_\_\_\_\_ °C [2]

Examiner Only	
Marks	Remark

(d) Name the gas that is formed when the alkali metals react with water.

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

(e) Potassium reacts vigorously with water. Compared to potassium, how would lithium react with water?

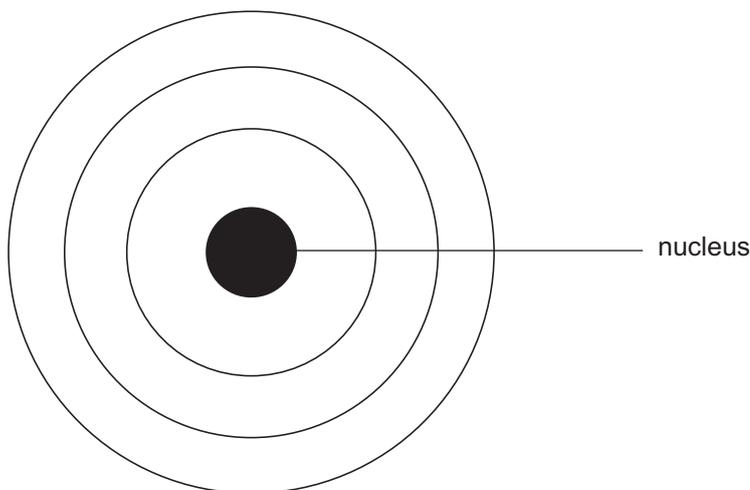
\_\_\_\_\_  
\_\_\_\_\_ [1]

(f) You need to wear safety goggles when adding potassium to water. Write down **two** other safety precautions needed.

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

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

(g) (i) A sodium atom has 11 electrons. Complete the diagram below to show how the electrons are arranged in a sodium atom.



[1]

(ii) Why are sodium and other alkali metals put in Group 1 of the Periodic Table? Think about the arrangement of electrons.

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

Examiner Only	
Marks	Remark



7 Look at the table below. It gives information about some plastics.

Plastic	Properties	Colours available	Cost
PVC	hard, keeps its shape, weather resistant	wide range of colours	medium
nylon	hard, long lasting	white or cream	high
polythene	soft, flexible, good electrical insulator	wide range of colours but they fade easily	medium
plasticised PVC	soft, flexible, good electrical insulator	wide range of colours	medium
polystyrene	does not keep its shape, good heat insulator	white	low
acrylic	stiff, weather resistant, good electrical insulator	wide range of colours	high

Use the information in the table to answer the questions below.

(a) Which **two** plastics would be best for covering electrical cables?

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

(b) A manufacturer is going to produce cheap, green buckets to sell at large DIY stores.



© AlexandrGryzlov / iStock / Thinkstock

Which plastic should the manufacturer choose? Write down **two** reasons for your answer.

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

(c) Write down **one** reason why polystyrene is **not** used to make garden chairs. Explain your answer fully.

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

Examiner Only

Marks Remark

- 8 Look at the table below. It gives information about the reactions of some metals with their metal salt solutions.

Examiner Only	
Marks	Remark

	Tin sulfate	Zinc sulfate	Copper sulfate	Magnesium sulfate
Tin		no reaction	reaction	no reaction
Zinc	reaction		reaction	no reaction
Copper	no reaction	no reaction		no reaction
Magnesium	reaction	reaction	reaction	

- (a) Write down the names of the metals in order of decreasing reactivity. Use the information from the table to help you.

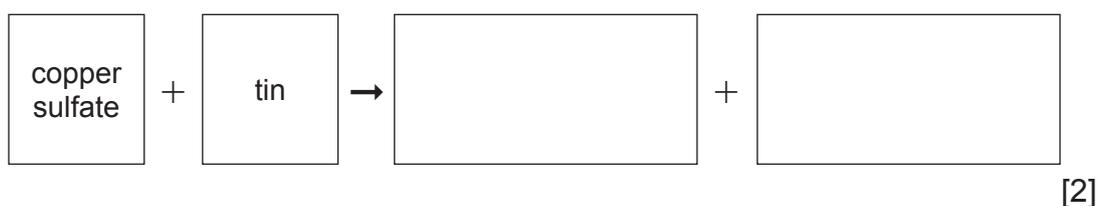
\_\_\_\_\_ most reactive

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ least reactive [2]

- (b) (i) Complete the word equation for the reaction between tin and copper sulfate.



- (ii) What is this type of reaction called?

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

(c) Draw lines to match each metal reaction with **one** expected observation.

Metal reaction	Expected observation
zinc + copper sulfate	bubbles of gas
magnesium + acid	blue solution fades
	silver coloured solid forms
	solution turns milky

[2]

Examiner Only	
Marks	Remark

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

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Sources: Q1(a)

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