



General Certificate of Secondary Education
2014–2015

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--

Science: Single Award

Unit 2 (Chemistry)

Higher Tier



[GSS22]

GSS22

THURSDAY 14 MAY 2015, MORNING

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.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in blue or black ink only. **Do not write with a gel pen.**

Answer **all eleven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75.

Quality of written communication will be assessed in Questions **5** and **11**.

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.

10100



20GSS2201

1 The table below shows some information about different metals.

Metal	Melting point/ °C	Density/ g/cm ³	Strength	Cost
Aluminium	661	2.7	medium	medium
Copper	1083	9.0	medium	high
Gold	1065	19.3	medium	very high
Lead	328	11.4	very low	low
Iron	1535	7.9	very high	low
Tungsten	3407	19.4	very high	high

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

(a) Iron is used to make bridges. State **two** reasons why it is suitable for building bridges.

1. _____
2. _____ [2]



(b) Overhead power cables carry electricity from power stations to homes and factories.

overhead
power cable



© Jorgefontestad / iStock / Thinkstock

Gold is a very good conductor of electricity. Apart from cost, give **one** reason why gold is **not** used to make overhead power cables. Explain your answer.

[2]

(c) Name a metal from the table that would be most suitable for making aeroplanes. Explain your choice, giving only the **most important** reason.

[2]

[Turn over





BLANK PAGE
DO NOT WRITE ON THIS PAGE
(Questions continue overleaf)

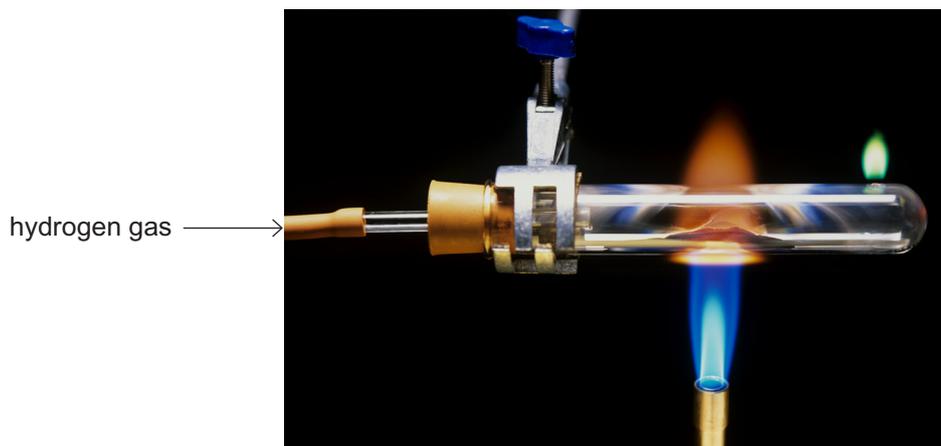
10100

[Turn over



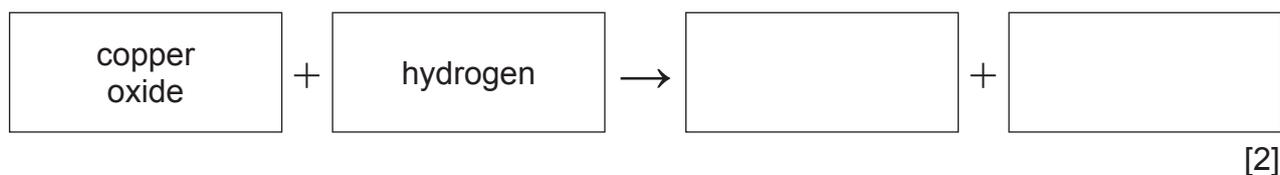
20GSS2205

- 3 (a) A student heated some copper oxide with hydrogen using the apparatus shown below.



© Martyn F Chillmaid / Science Photo Library

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

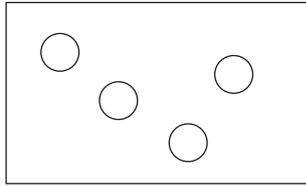


- (ii) What name is given to this type of reaction?

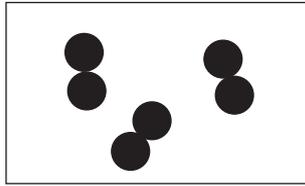
_____ [1]



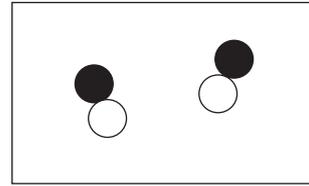
(b) Shown below are some particle diagrams that represent elements or compounds.



X



Y



Z

Which diagram **X**, **Y** or **Z** represents hydrogen (H_2)? Explain your answer.

[2]

(c) The chemical formula for potassium hydrogencarbonate is $KHCO_3$.

How many atoms are represented in this formula?

[1]



- 4 (a) Bone is a natural composite material. It contains calcium phosphate, collagen and water. Calcium phosphate is hard but very brittle. Collagen is softer but more flexible.

Using bone as an example, explain what is meant by the term 'composite material'.

[3]

- (b) (i) Calcium phosphate contains two non-metal elements, phosphorus and oxygen.

Complete the table below showing the numbers of protons and neutrons in the atoms of each element.

You may find your Data Leaflet helpful.

Element	Number of protons	Number of neutrons
Phosphorus		16
Oxygen	8	

[2]

- (ii) The electron is another particle in an atom.

Complete the following sentence.

An electron has a relative mass of _____ and a

relative charge of _____.

[2]

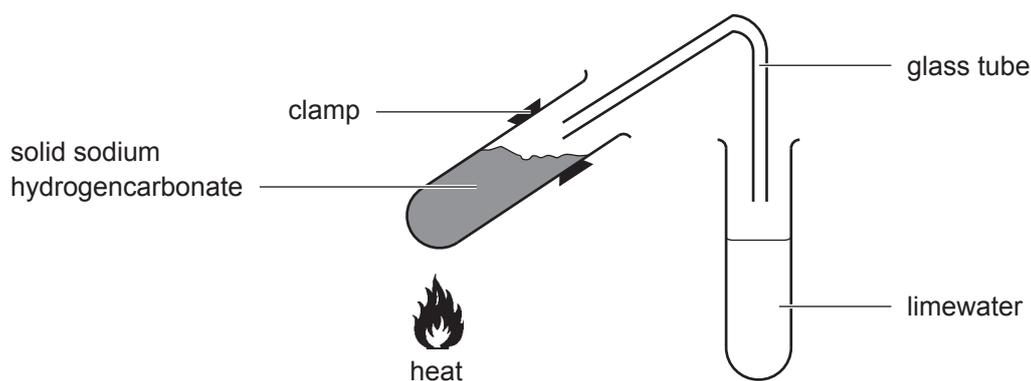


6 When baking soda (sodium hydrogencarbonate) is heated strongly it breaks down releasing carbon dioxide.

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

_____ [1]

(b) The carbon dioxide released during this reaction can be tested by bubbling it through limewater. However, the apparatus shown below has been set up incorrectly and will not work.



(i) Suggest two reasons why the apparatus will **not** work.

1. _____

2. _____ [2]

(ii) Describe how the limewater will change if carbon dioxide is present.

_____ [1]

(iii) State how the mass of the sodium hydrogencarbonate changes during this reaction and explain why this happens.

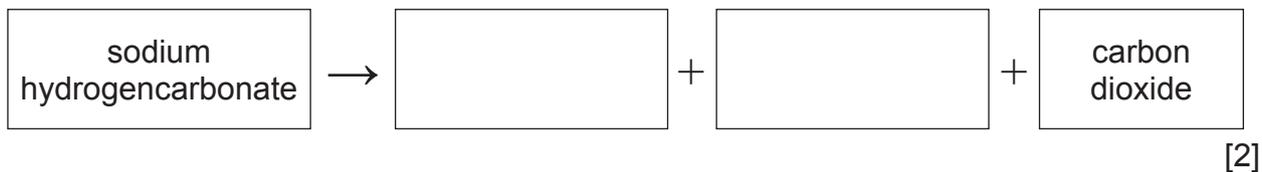
_____ [2]



(iv) How would you know when the reaction had finished?

_____ [1]

(v) Complete the word equation below for the breaking down of sodium hydrogencarbonate.



(c) Name the chemical added to baking soda to make baking powder.

_____ [1]

[Turn over

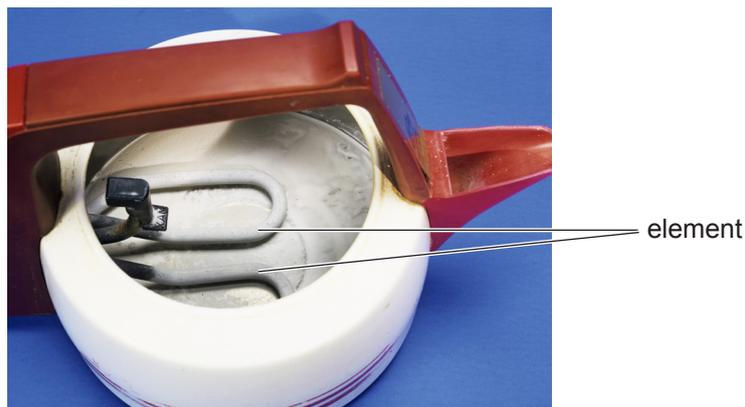


7 David lives in London, a hard water region.

(a) What is meant by the term 'hard water'?

_____ [1]

(b) David noticed his kettle had a build up of 'fur' on the element.



© Andrew Lambert Photography / Science Photo Library

(i) What does this suggest about the **type** of hard water in London?

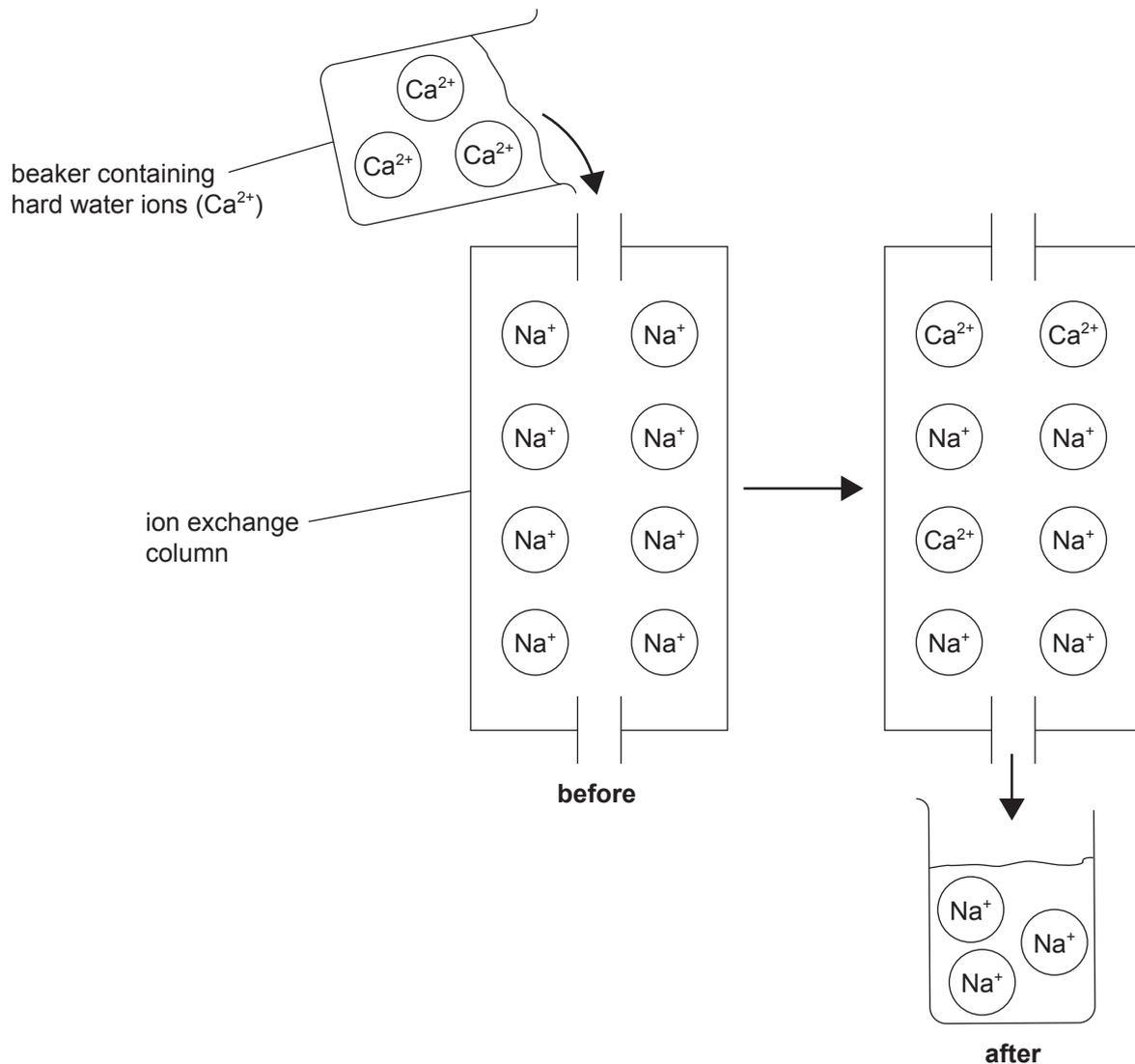
_____ [1]

(ii) What is the chemical name for 'fur' in a kettle?

_____ [1]



- (c) Hotels in London will often pass hard water through an ion exchange column as represented by the diagram below.



Using the diagram and your knowledge, explain how an ion exchange column produces soft water.

[3]

[Turn over]



- 8 Sophie investigated the reaction between zinc and sulfuric acid.



The mass of hydrogen gas lost was measured using the apparatus shown below.



cotton wool

conical flask with
sulfuric acid and zinc

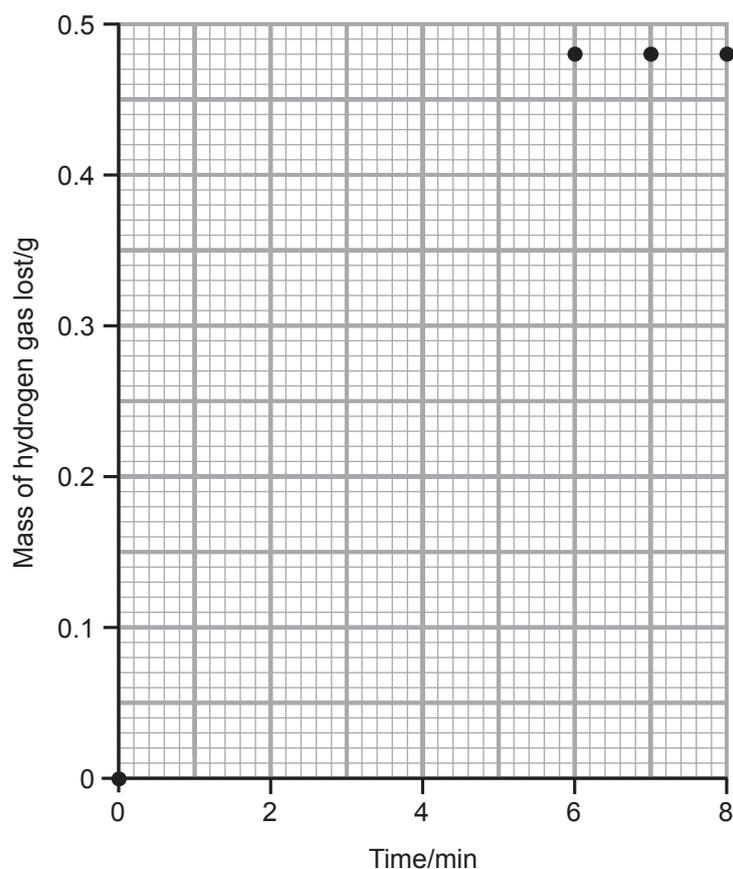
© Andrew Lambert Photography / Science Photo Library

Her results are shown below.

Time/min	0	1	2	3	4	5	6	7	8
Mass of hydrogen gas lost/g	0	0.23	0.34	0.41	0.45	0.47	0.48	0.48	0.48



(a) On the grid below complete the graph for these results.



[3]

(b) Use your graph to find the:

(i) mass of hydrogen lost at 3.5 minutes.

_____ g [1]

(ii) time the reaction finished.

_____ min [1]

(c) Name a metal which could be safely used in this investigation to produce hydrogen gas faster.

_____ [1]

[Turn over



- 9 Alfred Wegener believed that all continents on Earth were once joined together as a 'supercontinent'. He suggested that they gradually moved apart over millions of years.

(a) What name did Wegener give to this theory?

_____ [1]

A volcano can occur at the boundary of two tectonic plates.



© Ria Novosti / Science Photo Library

(b) Name **one** other natural event that can occur at the boundary of tectonic plates.

_____ [1]

(c) Name the **type** of rock formed by the lava from a volcano.

_____ [1]



The table below gives the percentage of each gas produced during a typical volcanic eruption.

Name of gas	Formula	Percentage
carbon dioxide	CO ₂	15.00
hydrogen	H ₂	1.00
helium	He	0.25
methane	CH ₄	0.75
sulfur dioxide	SO ₂	3.00
water vapour	H ₂ O	80.00

- (d) Using the information above, calculate the percentage of gases that are compounds.

_____ % [1]

- (e) Using radiometric dating, scientists have found that the Earth is 4500 million years old.

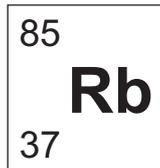
Describe the method of radiometric dating.

[3]

[Turn over



- 10 Potassium is in Group One of the Periodic Table and it reacts vigorously with water. Rubidium (Rb) is also a Group One element.



- (a) Suggest how rubidium will react with water compared to potassium and explain your answer.

[2]

- (b) (i) In terms of electrons, explain why sodium is also placed in Group One.

[1]

- (ii) Write a balanced symbol equation for the reaction between sodium and water.

[3]

- (c) Sodium reacts with chlorine to form the compound sodium chloride. Describe, in terms of electrons, how the bond in sodium chloride is formed.

[3]



DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	

Total Marks	
--------------------	--

Examiner Number

Permission to reproduce all copyright material has been applied for.
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA will be happy to rectify any omissions of acknowledgement in future if notified.

10100

