



Rewarding Learning

General Certificate of Secondary Education  
2013

Centre Number

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Candidate Number

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## Science: Chemistry

Unit C2

Foundation Tier

[GCH21]

THURSDAY 20 JUNE, AFTERNOON



\*GCH21\*

### TIME

1 hour 30 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 box, around each page or on blank pages.**

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

Answer **all** questions.

### INFORMATION FOR CANDIDATES

The total mark for this paper is **90**.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in question **3(c)**.

A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.





- (c) Oxidisers provide the oxygen needed to allow fireworks to burn effectively. A common oxidiser is potassium nitrate.

Write the formula for potassium nitrate.

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

- (d) Sparklers are hand held fireworks which contain a fuel, an oxidiser and iron powder. Often the iron powder is mixed with linseed oil to prevent it rusting.

- (i) What conditions are required for iron to rust?

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

- (ii) Explain why rusting is an oxidation reaction.

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

- (iii) State one observation you would make which would indicate that rusting is a chemical reaction.

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

Examiner Only

Marks Remark

[Turn over

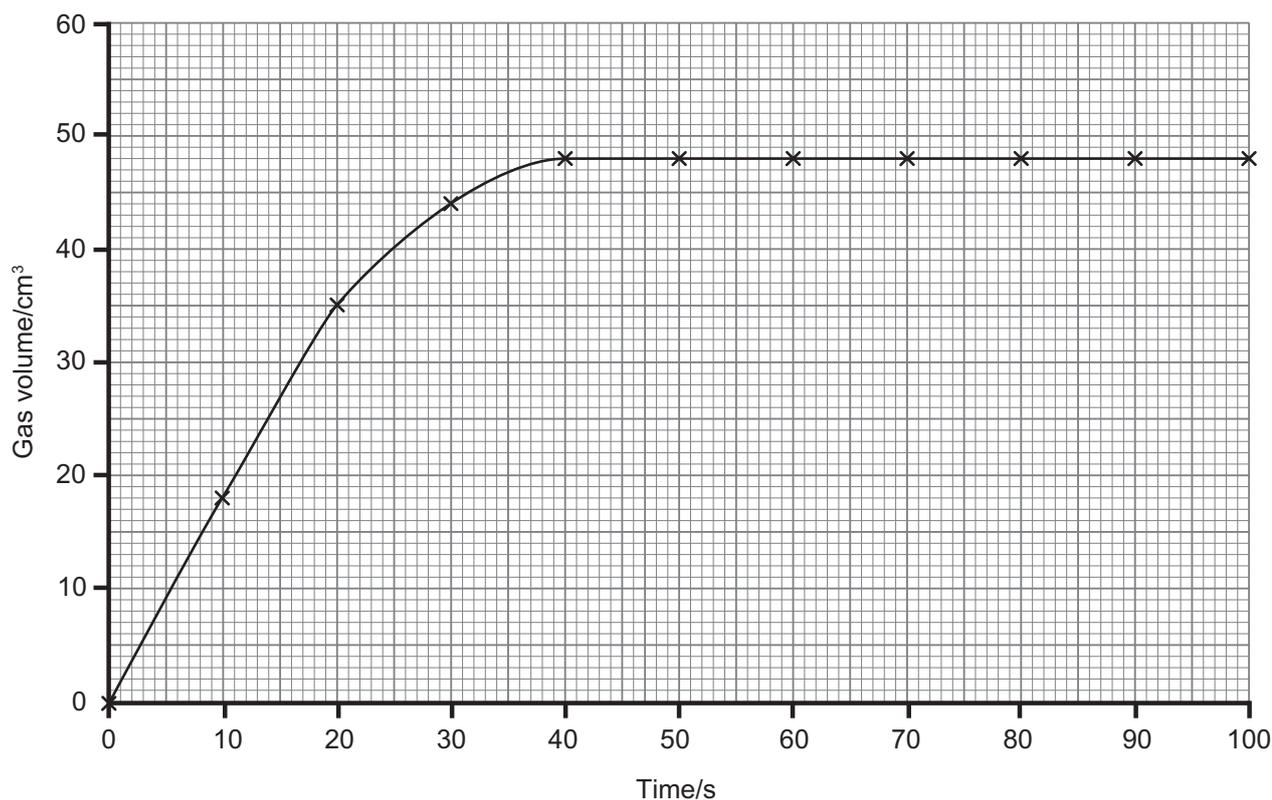








(b) The graph below shows a set of data obtained.



(i) Apart from the apparatus shown in the diagram in part (a), name one other piece of equipment which would be required to collect the results used to draw the graph.

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

(ii) What volume of gas was collected at 25 seconds?

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

(iii) What was the total volume of gas collected?

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

(iv) At what time did the reaction finish?

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

Examiner Only

Marks	Remark
Total Question 2	

[Turn over





- (iii) Like all hydrocarbons, myrcene ( $C_{10}H_{16}$ ) undergoes combustion. Complete the balanced symbol equation for the **complete** combustion of myrcene.



- (iv) Calculate the relative molecular mass (RMM) of myrcene ( $C_{10}H_{16}$ ).

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

- (v) Calculate the percentage of carbon present in myrcene ( $C_{10}H_{16}$ ).

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

- (b) Ethene can be used to manufacture the solvent used in perfumes. Complete the table below to give information about ethene.

Name	Molecular formula	Structural formula	State at room temperature and pressure
Ethene			

[3]

Examiner Only

Marks Remark

[Turn over







4 Bauxite is an ore of aluminium, named after the village La Baux in France where it was first discovered.

(a) Aluminium is obtained from purified bauxite by electrolysis.

(i) What is meant by the term electrolysis?

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

(ii) Bauxite contains aluminium oxide. Write the formula for aluminium oxide.

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

(iii) During the electrolysis of purified bauxite the ions present are attracted to the electrodes. Complete the table below.

Name of ion	Formula of ion (including charge)	Name of electrode to which ion is attracted
aluminium		
	$O^{2-}$	

[4]

(iv) Explain why the carbon anodes need to be replaced periodically during this electrolysis.

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







(iv) Name a metal which does not react when heated with steam.

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

(c) X is an unknown metal. The table below gives details of some reactions of the three metals X, sodium and zinc.

Metal	Reaction when heated in oxygen	Reaction with cold water	Reaction with dilute hydrochloric acid
X	Black coating forms on metal without burning	No reaction	No reaction
Sodium	Burns very vigorously with a yellow flame		Dangerous reaction not carried out in school laboratory
Zinc	Burns forming a yellow solid which changes to white on cooling	No reaction	Reacts steadily

(i) Suggest the name of metal X.

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

(ii) Describe what you would observe when sodium reacts with cold water.

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

(iii) Write a balanced symbol equation for the reaction of sodium with water.

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

Examiner Only

Marks Remark

Total Question 5

[Turn over



- 6 (a) Fill in the blanks in the following sentences about water.

Water is a colourless liquid at room temperature and pressure and has a melting point of  $0^{\circ}\text{C}$  and a boiling point of \_\_\_\_\_  $^{\circ}\text{C}$ .

One test for water is to use cobalt(II) chloride paper which changes colour from \_\_\_\_\_ to \_\_\_\_\_ if water is present. [3]

- (b) An investigation was carried out to compare the hardness of water samples from three towns A, B and C.

$25\text{ cm}^3$  of each water sample were placed into three separate conical flasks and labelled A, B and C. A sample of deionised water was also tested.

Soap solution was added  $1\text{ cm}^3$  at a time to each conical flask with shaking until a lasting lather formed. The total volume of soap solution added to each flask was recorded.

The experiment was repeated with fresh samples of A, B and C which had been boiled and allowed to cool, before adding the soap solution.

The results are shown in the table below.

Water sample	Volume of soap solution required to form a lather	
	before boiling ( $\text{cm}^3$ )	after boiling ( $\text{cm}^3$ )
Deionised water	2	2
A	6	6
B	8	2
C	11	7

Examiner Only

Marks

Remark



- (i) Name a piece of apparatus which could be used to measure the 25 cm<sup>3</sup> samples of water.

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

- (ii) Which of the three water samples (A, B or C) is the hardest water?

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

- (iii) Which of the three water samples (A, B or C) contains **only** temporary hardness?

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

- (iv) Which of the three water samples (A, B or C) contains both temporary and permanent hardness?

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

- (c) State two disadvantages of hard water.

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

\_\_\_\_\_

2. \_\_\_\_\_

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

Examiner Only	
Marks	Remark
Total Question 6	

[Turn over







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

<b>Total Marks</b>	
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Examiner Number

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