



Centre Number

71

Candidate Number

General Certificate of Secondary Education  
2013–2014

## Double Award Science: Chemistry

Unit C1

Higher Tier

[GSD22]

ML

THURSDAY 15 MAY 2014, 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 70.

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

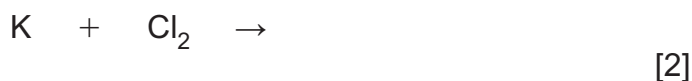
Quality of written communication will be assessed in Question 7.  
A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

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

<b>Total Marks</b>	
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1 Potassium is a soft metal that can be cut with a knife. It reacts violently with chlorine to form potassium chloride.

(a) Complete and balance the symbol equation below for the reaction of potassium with chlorine.



(b) Describe the appearance of a piece of freshly cut potassium.

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

(c) What happens to the freshly cut potassium when it is left in the air for a few minutes?

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

(d) Why is potassium stored under oil in the laboratory?

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

(e) Before reacting Group 1 elements with water a risk assessment is carried out.

Wearing safety glasses is one safety precaution that must be included in the risk assessment.

Write down two other safety precautions.

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

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

Examiner Only

Marks Remark

- (f) Equal sized pieces of three Group 1 metals are added to separate troughs of water that contain universal indicator.  
The observations made are recorded in the table below.

Name of Group 1 metal	Observation when the metal is added to water	Colour of universal indicator
potassium	<ul style="list-style-type: none"> <li>catches fire</li> <li>burns with a lilac flame on the surface of the water</li> <li>quickly disappears</li> </ul>	<ul style="list-style-type: none"> <li>changes colour from green to blue</li> </ul>
lithium	<ul style="list-style-type: none"> <li>floats</li> <li>moves about the surface of the water</li> <li>eventually disappears</li> </ul>	<ul style="list-style-type: none"> <li>changes colour from green to blue</li> </ul>
sodium	<ul style="list-style-type: none"> <li>melts into a silvery ball on the surface of the water</li> <li>disappears</li> </ul>	<ul style="list-style-type: none"> <li>changes colour from green to blue</li> </ul>

Read the information in the table carefully.

- (i) What happens to the reactivity of the Group 1 elements as the Group is descended? You may find your Data Leaflet helpful.

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

- (ii) Explain fully why the universal indicator changed colour from green to blue.

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

- (iii) Write down one more observation which could be added to the table for **all three** reactions.

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

- (iv) Write a **word** equation to describe the reaction between sodium and water.

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

Examiner Only

Marks Remark



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**(Questions continue overleaf)**





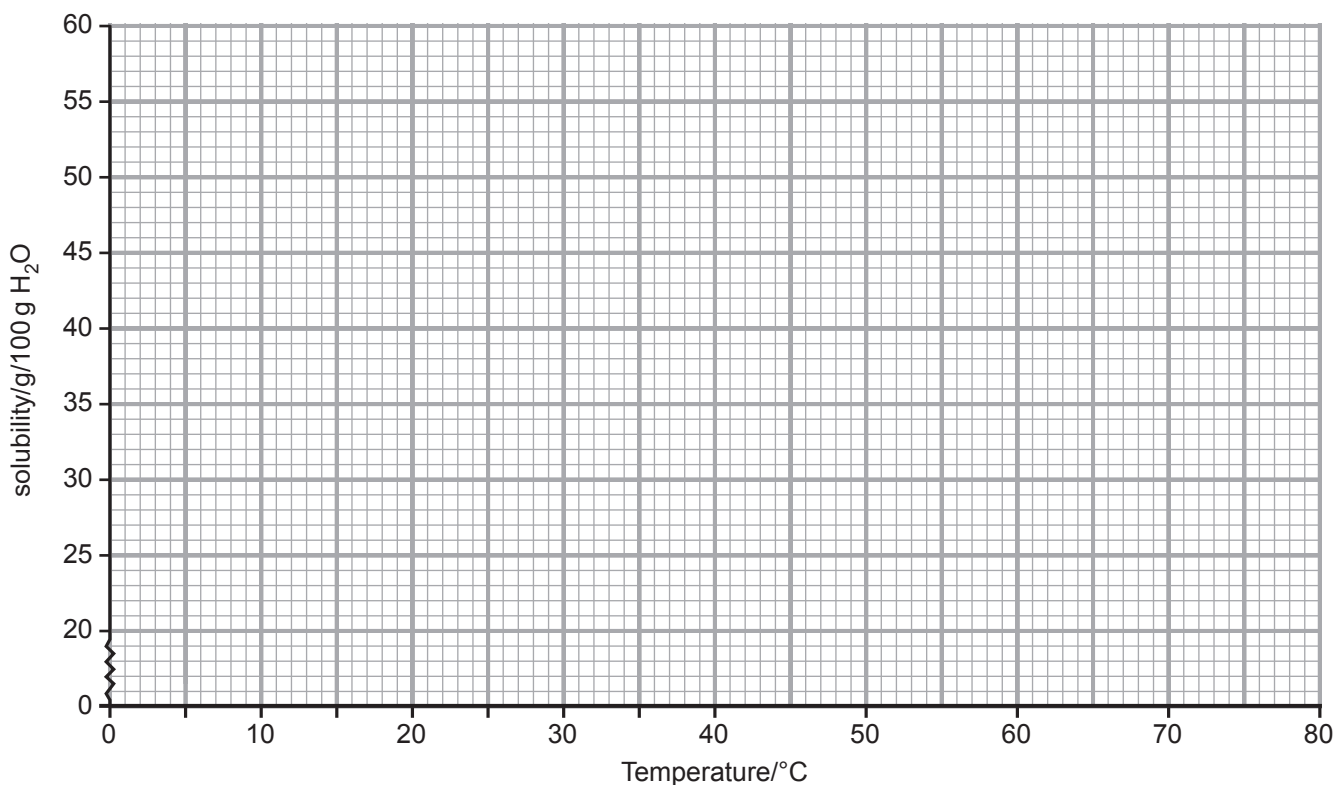
- 4 (a) An investigation was carried out to find the solubility (g/100 g H<sub>2</sub>O) of potassium chloride at different temperatures. The results are given in the table below.

Temperature (°C)	0	10	20	30	40	50	60	80
Solubility (g/100 g H <sub>2</sub> O)	27.8	30.9	34.0	37.1	40.0	42.9	45.8	51.2

- (i) At 70 °C, 12.1 g of potassium chloride will saturate 25 g of water. Calculate the solubility of potassium chloride at 70 °C. (You must show your working out.)

\_\_\_\_\_ g/100 g H<sub>2</sub>O [1]

- (ii) Draw the solubility curve for potassium chloride. Do this on the grid below. [3]



Examiner Only	
Marks	Remark



(b) Look at the table below. It gives the solubility (g/100 g H<sub>2</sub>O) at different temperatures for four **solid** compounds, A, B, C and D.

Solid	Solubility (g/100 g H <sub>2</sub> O)						
	0 °C	10 °C	20 °C	30 °C	40 °C	60 °C	80 °C
A	60.0	66.7	73.9	81.8	88.7	106.0	132.0
B	12.3	16.4	18.6	25.0	31.6	40.4	49.0
C	0.22	0.24	0.25	0.26	0.26	0.24	0.23
D	79.2	85.4	94.2	105.0	119.0	158.0	187.0

(i) Use the data in the table to complete the following general rule.

For most solids the solubility \_\_\_\_\_ as the temperature \_\_\_\_\_.

[1]

(ii) One of the compounds in the table does not follow this solubility rule.

Describe fully what happens to the solubility of this solid as the temperature is increased from 0 °C to 80 °C.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

(iii) Calculate the mass of solid B which will crystallise when a saturated solution of B, in 50 g of water, is cooled from 60 °C to 10 °C.

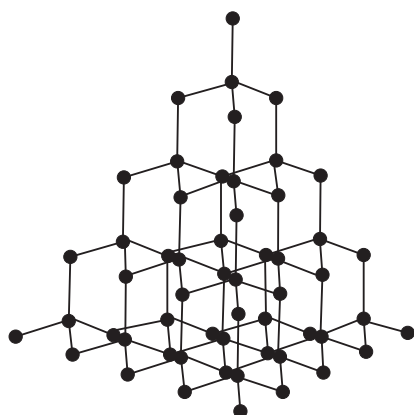
**(You must show your working out.)**

Answer \_\_\_\_\_ g [2]

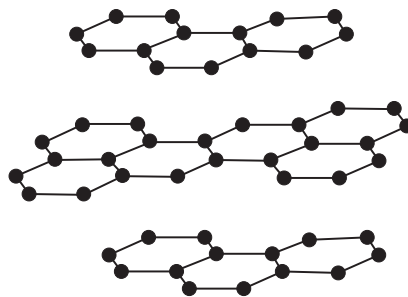
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Marks	Remark



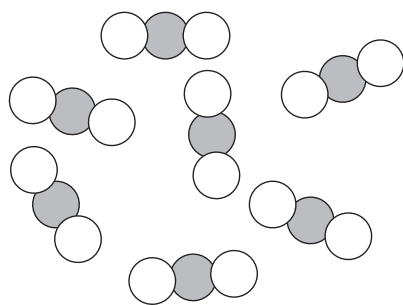
- 6 Look at the diagrams below. They show the structures of two allotropes of carbon, diamond and graphite, and of carbon dioxide. The atoms of each substance are held together by covalent bonds.



diamond



graphite



carbon dioxide

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- (a) What are **allotropes**?

Allotropes are \_\_\_\_\_

\_\_\_\_\_

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

- (b) Explain how a **covalent bond** is formed.

\_\_\_\_\_

\_\_\_\_\_

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

Examiner Only

Marks Remark





8 Metals, such as lead, conduct electricity in the solid state. Electrolytes, such as lead(II) bromide, conduct electricity when molten.

(a) Fill in the missing information in the table below to show how lead and lead(II) bromide conduct electricity.

Substance	Name of particle which moves and carries the charge	Effect on the substance due to the passage of electricity
lead		
lead(II) bromide		

[4]

(b) The following questions are about the reaction that happens at the anode during the electrolysis of molten lead(II) bromide.

(i) What is an anode?

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

(ii) Write a half equation to describe the reaction at the anode.

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

(iii) What can be observed at the anode?

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

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

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