



Rewarding Learning

General Certificate of Secondary Education  
2015–2016

Centre Number

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Candidate Number

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# Double Award Science: Chemistry

Unit C1  
Foundation Tier

[GSD21]



THURSDAY 25 FEBRUARY 2016, MORNING

## TIME

1 hour.

## 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 ten** 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 9.  
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	
10	
<b>Total Marks</b>	

- 1 (a) When copper is mixed with other metals new substances are produced which have particular properties.

Use lines to link each substance to the use you think is best.

Substance		Use	
<p style="text-align: center;"><b>Brass</b> Copper, zinc</p> <p>Strong, can be polished to look shiny</p>		<p style="text-align: center;"><b>coins</b></p>  <p style="text-align: center;"><small>© moodboard / Thinkstock</small></p>	
<p style="text-align: center;"><b>Duralumin</b> Copper, aluminium</p> <p>Strong and very light</p>		<p style="text-align: center;"><b>candlesticks</b></p>  <p style="text-align: center;"><small>© Zoonar RF / Zoonar / Thinkstock</small></p>	
<p style="text-align: center;"><b>Cupronickel</b> Copper, nickel</p> <p>Light and cheap. Can be easily carried</p>		<p style="text-align: center;"><b>aircraft bodies</b></p>  <p style="text-align: center;"><small>© Purestock / Thinkstock</small></p>	
<p style="text-align: center;"><b>Bronze</b> Copper, tin</p> <p>Resists corrosion. Lasts a long time</p>		<p style="text-align: center;"><b>statues</b></p>  <p style="text-align: center;"><small>© William Perry / iStock / Thinkstock</small></p>	[3]

- (b) How many different **elements** are named in these four substances? Circle the correct answer.

4                      5                      6                      8

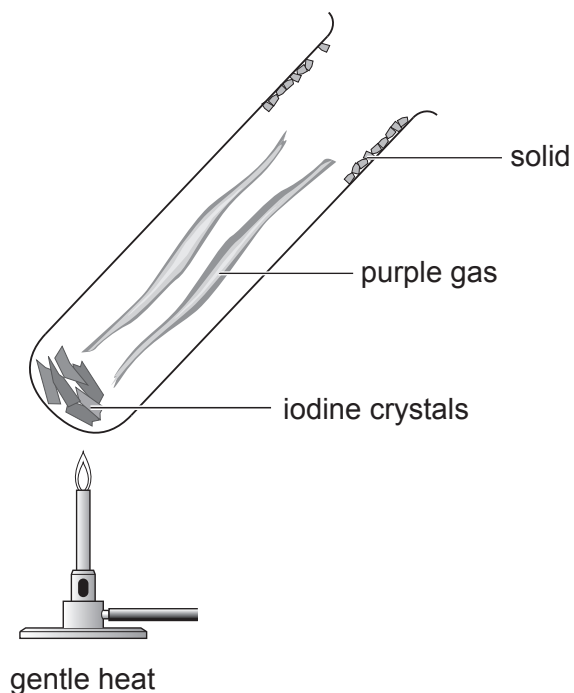
[1]

- (c) The substances above are mixtures which each include at least one metal. What name is given to this type of mixture?

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

Examiner Only	
Marks	Remark
○	○

2 The diagram below shows the apparatus used to heat iodine crystals.



Source: Principal Examiner

(a) What name is given to the process in which a solid changes to a gas without forming a liquid?

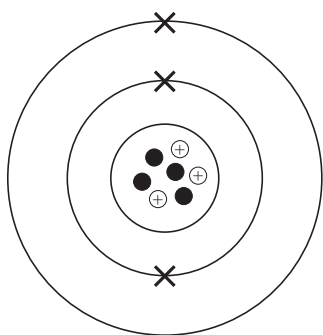
\_\_\_\_\_ [1]

(b) Name the solid formed near the top of the boiling tube.

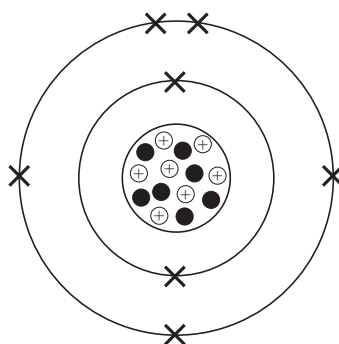
\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark
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3 The diagrams below show the structures of two different atoms.



**A**



**B**

(a) Complete each of the sentences below by choosing one of the words from the list below.

**molecule      nucleus      electrons      protons      shells      core**

(i) The centre of an atom is called the \_\_\_\_\_. [1]

(ii) The particles in the centre of an atom are called neutrons and \_\_\_\_\_. [1]

(iii) The electrons are arranged in \_\_\_\_\_. [1]

(b) What is the **atomic number** of atom **B**?

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

(c) What is the **mass number** of atom **A**?

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

(d) Explain fully why diagram **A** represents an **atom** and not an **ion**.

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

Examiner Only	
Marks	Remark
○	○

4 Many chemical elements are used in making smart phones.



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Read the passage and answer the questions which follow.

The screen on a smart phone is made of indium oxide mixed with tin oxide and is strengthened using potassium. The batteries have lithium oxide anodes and carbon cathodes. The wiring is made of copper. The alloys which are used for the outer casing include magnesium.

(a) Name an alkali metal compound used in making smart phones.

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

(b) Name a **Group II** element used in making smart phone cases.

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

(c) What **Group IV** element is used in the battery?

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

(d) Name a **transition** element used in wiring the phone.

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

(e) Indium is an element in Group III of the Periodic Table.

(i) How many electrons would you expect it to have in its outer shell?

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

(ii) Suggest the formula for indium oxide.

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

Examiner Only	
Marks	Remark



- 6 The table below gives information about five compounds, A, B, C, D and E which dissolve in water to give either acidic, neutral or alkaline solutions.

compound	produces H <sup>+</sup> ions in water	produces OH <sup>-</sup> ions in water	pH	colour of universal indicator in the solution
A	no	yes	9	dark green
B			1	red
C	no	yes	14	
D	no	no	7	green
E	yes	no	4	orange

- (a) Complete the table above by writing the missing words in the spaces. [3]

- (b) Use the information given in the table to identify each of the compounds A, B, C, D and E from the list given below.

sodium hydroxide      sodium chloride      ammonia  
ethanoic acid      hydrochloric acid

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

D \_\_\_\_\_

E \_\_\_\_\_

[4]

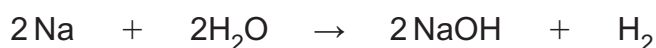
- (c) What units are used to measure the concentration of acids?  
Circle the correct answer.

mol/dm      mol<sup>3</sup>/dm      mol/dm<sup>3</sup>      mol<sup>3</sup>/dm<sup>3</sup>

[1]

Examiner Only	
Marks	Remark
○	○

7 The symbol equation below shows the reaction between sodium and water.



(a) Choose the following from the equation:

(i) A **reactant** which is an element: \_\_\_\_\_ [1]

(ii) A **product** which is a compound: \_\_\_\_\_ [1]

(iii) A **diatomic** element: \_\_\_\_\_ [1]

(b) Complete the word equation for the reaction between potassium and water.

potassium + water  $\rightarrow$  \_\_\_\_\_ + \_\_\_\_\_ [2]

(c) How is sodium stored in the laboratory?

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

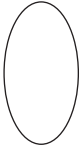

(d) Describe the appearance of sodium

when freshly cut: \_\_\_\_\_ [1]

when left in air for a period of time: \_\_\_\_\_ [1]

(e) When sodium is added to hydrochloric acid, sodium chloride is formed. Explain why this reaction is not demonstrated in the school laboratory.

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

Examiner Only	
Marks	Remark
	



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**(Questions continue overleaf)**

8 (a) Give an accurate definition of the term **solubility**.

Solubility is \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [4]

The table below gives information on whether some salts are soluble (S) or insoluble (I) in water.

<b>cation \ anion</b>	<b>nitrate</b>	<b>carbonate</b>	<b>chloride</b>	<b>sulfate</b>
<b>magnesium</b>	S	I	S	S
<b>potassium</b>	S	S	S	S
<b>lead</b>	S	I	I	I
<b>calcium</b>	S	I	S	S
<b>ammonium</b>	S	S	S	S

(b) Use the information in the table to deduce rules for the solubility of salts by completing the sentences:

(i) **Cations:** All \_\_\_\_\_ and \_\_\_\_\_ salts are soluble.

**Anions:** Most sulfates are \_\_\_\_\_ except for \_\_\_\_\_.



All **metal** \_\_\_\_\_ are soluble. [5]

(ii) Predict whether each of the following salts is soluble (S) or insoluble (I) in water.

potassium iodide \_\_\_\_\_

lead bromide \_\_\_\_\_

copper nitrate \_\_\_\_\_ [3]

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Marks	Remark
	

(c) The chemical formula for ammonium sulfate is  $(\text{NH}_4)_2\text{SO}_4$ .

(i) How many elements are present in ammonium sulfate?

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

(ii) How many oxygen atoms are present in the formula  $(\text{NH}_4)_2\text{SO}_4$ ?

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

(iii) How many atoms are present in the formula  $(\text{NH}_4)_2\text{SO}_4$ ?

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

(iv) Give the formula of a molecular ion present in ammonium sulfate.

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

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Marks Remark









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