



General Certificate of Secondary Education
2014–2015

Double Award Science: Chemistry

Unit C1

Foundation Tier

[GSD21]

THURSDAY 13 NOVEMBER 2014, MORNING

Centre Number

71

Candidate Number



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 nine** 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	
9	

Total
Marks

1 The list below contains the name of five substances.

aluminium

copper

diamond

graphite

magnesium

(a) Choose two **metals** from the list.

[2]

(b) Choose a substance from the list above which can be used:

(i) as a pencil lead _____ [1]

(ii) for flares _____ [1]

(iii) to make coins _____ [1]

(iv) in cutting tools _____ [1]

(c) What is the chemical symbol for aluminium?
Circle the correct answer.

AL al Al Al₂ [1]

Magnesium and graphite can be used to produce a useful alloy.

(d) Complete the sentence below to explain what is meant by the term **alloy**.

An **alloy** is a _____ of elements, at least one
of which is a _____ . [2]

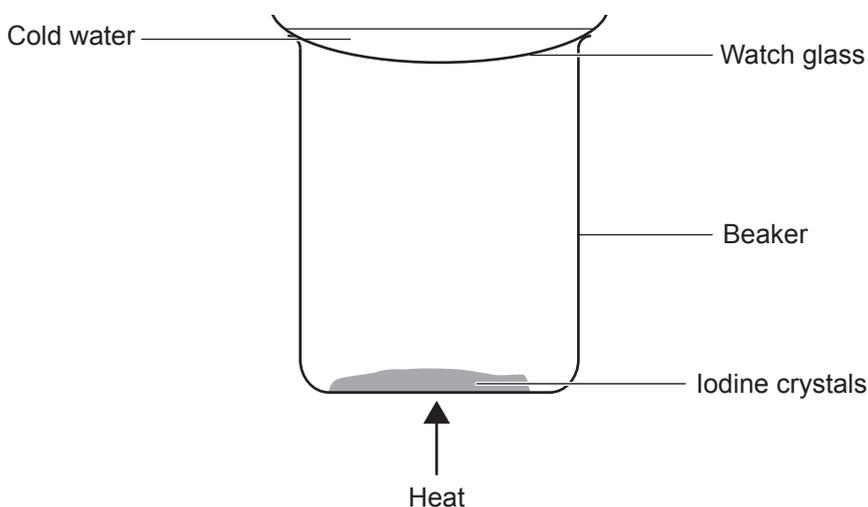
Examiner Only	
Marks	Remark
	

2 Crystals of iodine sublime when heated.

(a) Complete the sentence below to explain what is meant by the term **sublime**.

When iodine is heated it changes from a _____
to a _____ without becoming
a _____. [3]

(b) Describe what you would observe when crystals of iodine are heated using the apparatus below. Your answer should include the colour of the iodine crystals.



_____ [3]

(c) Iodine is an element in Group 7 of the Periodic Table. What is the name given to Group 7 elements?

_____ [1]

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Marks	Remark
○	○

3 The element hydrogen is a gas at room temperature. It is flammable and lighter than air.

(a) Explain what is meant by the term **element**.

[1]

(b) Choose **two** phrases from the list below which could be used to describe hydrogen gas.

Place a tick (✓) in the two correct boxes.

Hydrogen gas has a constant volume.

Hydrogen gas floats on water.

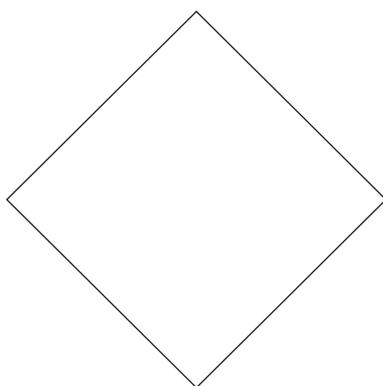
Hydrogen gas can be compressed.

Hydrogen gas takes the volume of the container it is in.

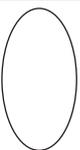
Hydrogen gas takes the shape of the bottom of the container it is in.

[2]

(c) Draw the hazard symbol which should be placed on a cylinder of hydrogen.



[1]

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Marks	Remark
	

4 Testing acidity is an important part of commercial beer production.

(a) The method below can be used to find the acidity of the brewing mixture at different stages in the brewing process.

Step 1 **Filter** a sample of the brewing mixture into a test tube.

Step 2 Test the **filtrate** with an indicator.

(i) Draw a labelled diagram, in the space below, of the assembled apparatus used to carry out Step 1.

[3]

(ii) Label the **filtrate** on your diagram.

[1]

(b) (i) Name an indicator which could show that the brewing mixture is a **weak** acid.

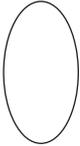
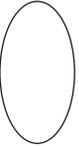
_____ [1]

(ii) Name an indicator which would **only** show that the brewing mixture is acidic.

_____ [1]

(iii) Explain how you would use an indicator to find out the pH of the mixture.

_____ [2]

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Marks	Remark
	

(c) A pH meter can be placed directly into the brewing mixture.

Which of the following could be a reading from a pH meter used to find the acidity of beer?

Circle the correct reading.

pH = 2–6

pH = 11.42

pH = 5

pH = 8–12

pH = 5.34

[2]

Examiner Only	
Marks	Remark

5 The scientists Mendeleev and Newlands were involved in the development of the Periodic Table.

(a) Mendeleev and Newlands arranged the elements in order of:
Place a tick (✓) in the box beside the correct answer.

increasing atomic number

increasing atomic mass

increasing mass number

increasing reactivity

[1]

(b) Complete the sentence below to describe Newlands' Law of Octaves.

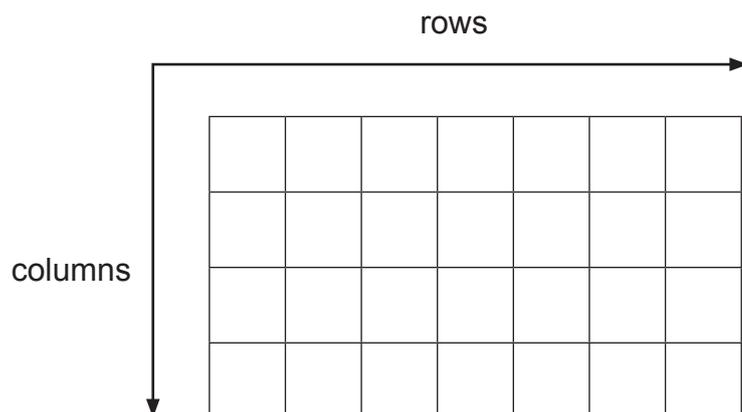
Every 8th element as arranged by Newlands has

similar _____ properties.

[1]

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Marks	Remark
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Mendeleev further arranged the elements into rows and columns as shown in the diagram below.



(c) Which **two** of the following statements apply to the Periodic Table developed by Mendeleev?

Place a tick (✓) in the boxes beside the two correct statements.

Gaps were left for undiscovered elements.

A separate row for transition metals was included.

Elements in each row were chemically similar.

There were no noble gases.

All the metals were placed on the right hand side of the table.

[2]

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Marks

Remark

6 Magnesium reacts with fluorine to form a solid white compound.

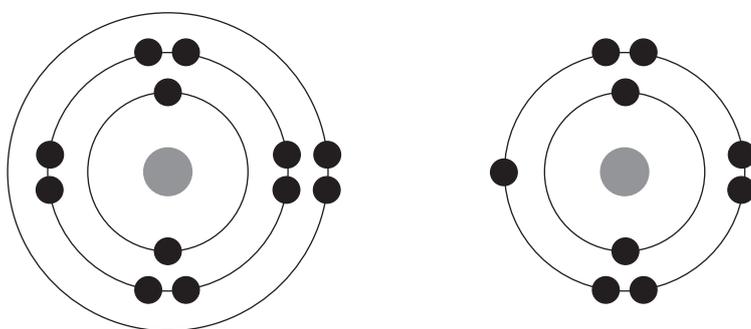
(a) Name the solid formed when magnesium reacts with fluorine.

_____ [1]

The diagrams below represent the electronic structures of two atoms of magnesium and two atoms of fluorine.

(b) Use arrows in the diagrams below, to show the movement of electrons when magnesium and fluorine react.

Although two magnesium atoms and two fluorine atoms are shown, you will need to work out whether you have to use 2, 3 or all 4 diagrams in order to answer the question.



magnesium atoms

fluorine atoms

[3]

(c) Name the **type** of particles present in the compound formed when magnesium reacts with fluorine.

_____ [1]

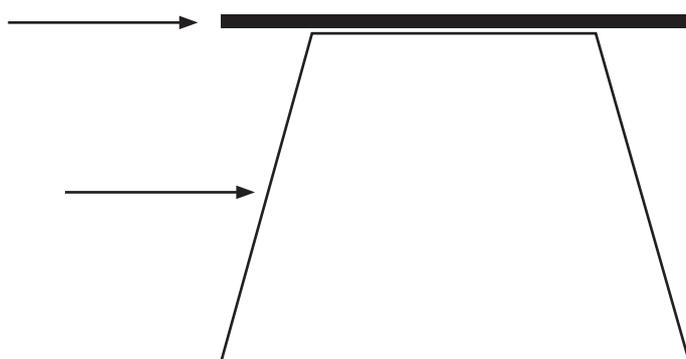
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8 Lead(II) bromide, PbBr_2 , is a white powder with a low solubility in water. It will conduct electricity when molten, but not as a solid.

(a) Complete, below, a **labelled** diagram of the **assembled** apparatus that can be used to show that lead(II) bromide conducts electricity when molten. Two pieces of the apparatus have already been drawn, but not labelled.

Your diagram must include:

- an electric circuit
- a crucible
- a method of heating and
- at least 5 labels.



[5]

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Marks	Remark

- (b) Complete the sentence below **to explain why** the lead(II) bromide will only conduct electricity when it is molten.
Circle the correct answers.

The

electrons
molecules
ions

 in the molten lead(II) bromide

are

charged
delocalised
free to move

 and carry the

charge
liquid
compound

.

[3]

- (c) Complete the table below which shows the products of electrolysis of molten lead(II) bromide and of molten lithium chloride.

electrolyte	products	
	at the anode	at the cathode
lead(II) bromide		
lithium chloride		lithium

[3]

Examiner Only	
Marks	Remark
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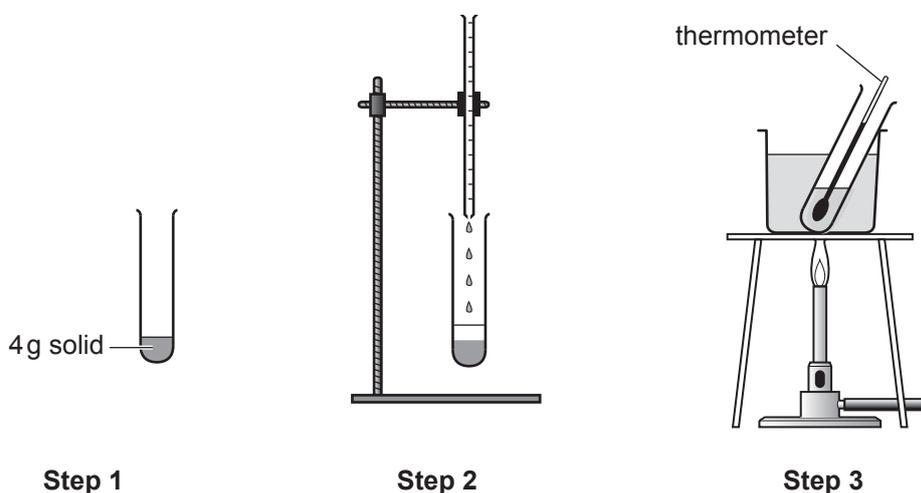
9 The solubility of a substance is defined as the maximum mass of a substance which will dissolve in 100 g of water at a given temperature.

(a) Why is it essential to state the **temperature of the water** when giving the solubility of a substance?

_____ [1]

(b) The first three steps in an investigation to find the solubility of a solid in water at different temperatures are shown in the diagrams below.

Complete the instructions which set out the seven practical steps needed to carry out the investigation.



Step 1 Place 4 g of solid into a boiling tube.

Step 2 Add _____
_____ [2]

Step 3 Place the boiling tube into a water bath and heat until all the solid has dissolved.

Step 4 Remove the boiling tube from the water bath and then wait until _____
_____ [1]

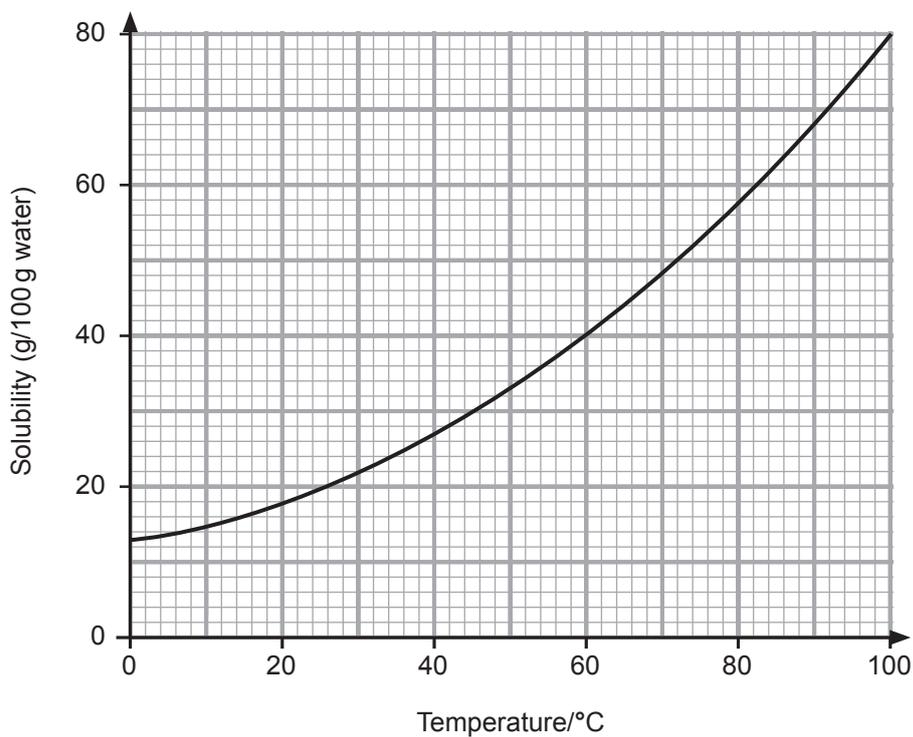
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Marks	Remark
○	○

Step 5 Record the temperature.

Step 6 Add _____
_____ [2]

Step 7 Repeat steps 3 to 6 five times.

(c) Use the solubility curve for copper(II) sulfate shown below to answer the questions which follow.



(i) What is the solubility of copper(II) sulfate at 60 °C?

_____ g/100 g H₂O [1]

(ii) State whether the following mixture contains a **saturated** or **unsaturated** solution and explain your answer.

Mixture: 18 g of copper(II) sulfate added to 50 g of water at 40 °C.

Saturated or unsaturated? _____

Explanation: _____

_____ [3]

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Marks Remark

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