New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Double Award Science: Chemistry

Unit C1

Foundation Tier

[GSD21]

GSD21

MONDAY 21 MAY 2012, 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 **8(c)**.
A Data Leaflet which includes a Periodic Table of the elements is provided.

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

Examiner Only	
Marks	Remark

1 **(a)** Ethanoic acid is a **corrosive** liquid.

(i) Draw the hazard symbol, in the box below, which should be placed on a bottle of ethanoic acid.

[1]

(ii) Give **two** reasons why a hazard symbol is used rather than printed words.

1. _____

_____

2. _____

_____ [2]

(b) Vinegar is a mixture of ethanoic acid and water.

Circle the term which describes the water in the mixture.

solute **solvent** **solution** [1]

(c) When blue litmus paper is dipped into vinegar the colour of the litmus paper changes to red.

What does this tell you about vinegar?

_____ [1]

(d) When universal indicator is dropped into vinegar the colour of the indicator changes to yellow.

What does this tell you about vinegar?

_____ [1]

Examiner Only	
Marks	Remark

2 Copper, aluminium and magnesium are very useful metals.

(a) Complete the table below which shows some of the uses of these metals. The first one is done for you.

Metal	Use		
	electrical wiring	**coins**	**aircraft alloys**
copper	✓	✓	
aluminium			
magnesium			

[3]

(b) Give **two** properties of copper which make it suitable for use in electrical wiring.

1. _____

2. _____ [2]

(c) Copper, aluminium and magnesium are elements.

Explain the meaning of the term **element**.

_____

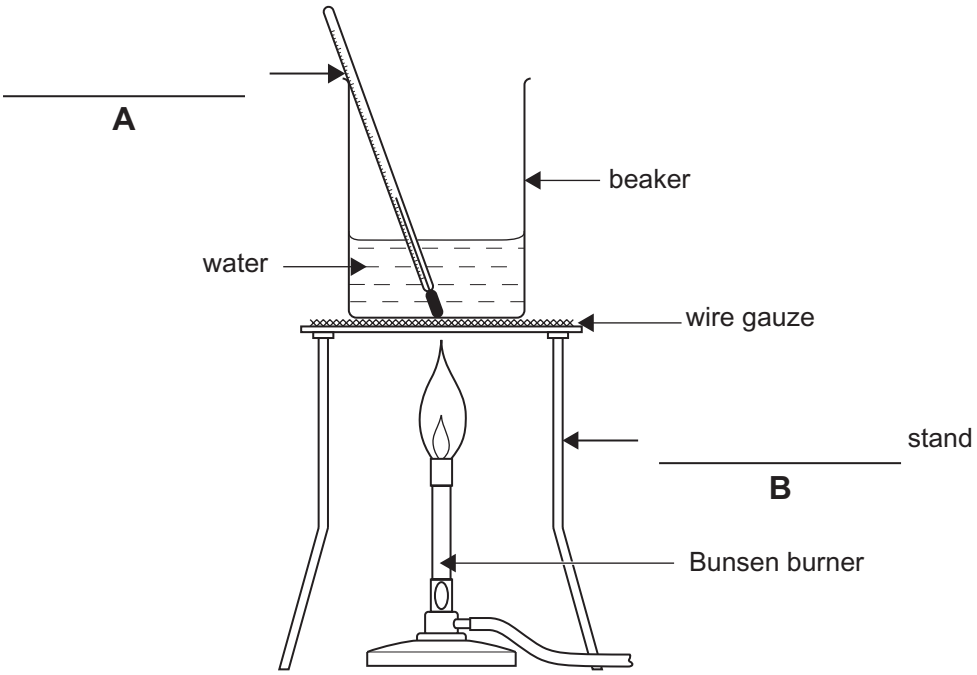
_____ [1]

(d) Circle a word from the list below which best describes an aircraft alloy.

element **mixture** **compound** **salt** [1]

Examiner Only	
Marks	Remark

3 The apparatus below can be used to find the boiling point of water.



(a) Complete the labels **A** and **B** in the diagram above. [2]

(b) Give **one** safety precaution, apart from wearing safety glasses, you would take when carrying out this experiment.

_____ [1]

(c) What is the boiling point of water?

_____ °C [1]

(d) Which of the following chemicals can be used to test for water?

Place a tick (✓) in the correct box.

sulfuric acid ☐

anhydrous copper(II) sulfate ☐

universal indicator ☐

hydrated iron(III) oxide ☐ [1]

(e) Potassium chloride is a typical ionic compound. Is potassium chloride soluble or insoluble in water?

_____ [1]

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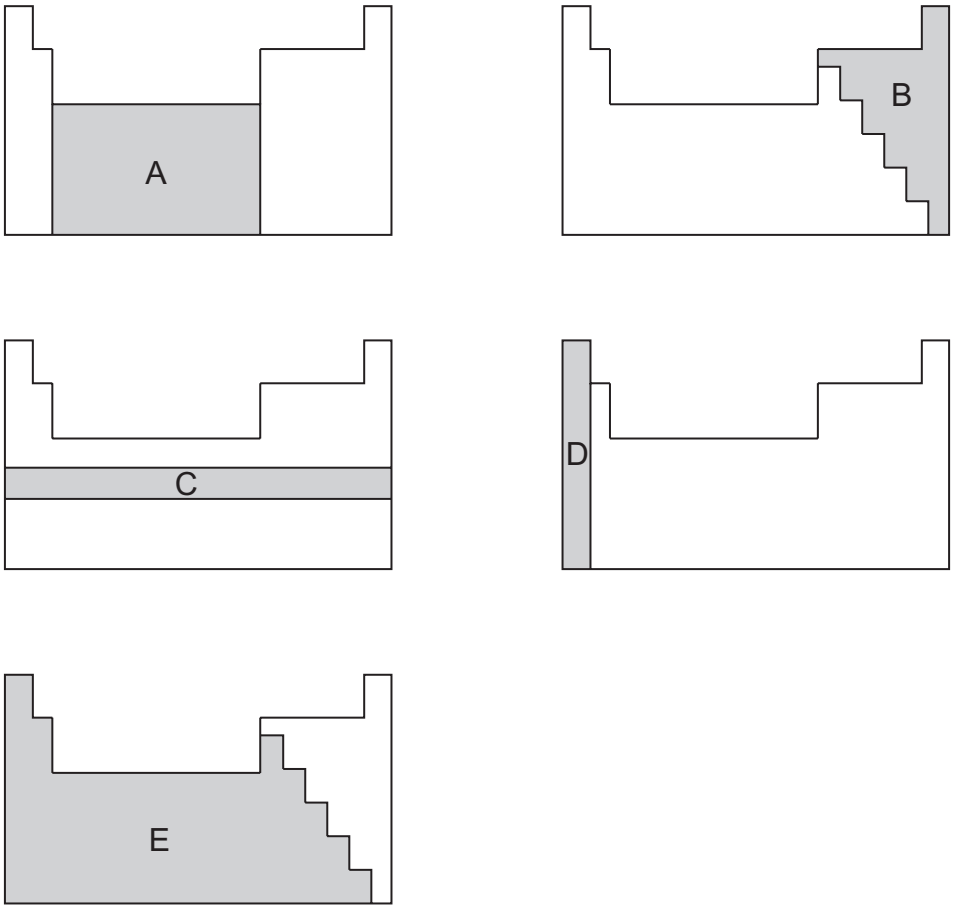
Examiner Only	
Marks	Remark

4 The diagrams below show the outline of the modern Periodic Table. A different area A, B, C, D and E, is shaded in each diagram.



(a) Choose the shaded area, A, B, C, D or E which shows

(i) a Group. _____ [1]

(ii) a Period. _____ [1]

(iii) the area where the non-metal elements are.

_____ [1]

Examiner Only	
Marks	Remark

(b) Why are the elements nitrogen and phosphorus placed in the same Group? Place a tick (✓) in the box beside the correct answer.

Nitrogen and phosphorus have the same physical appearance. ☐

Nitrogen and phosphorus have the same density. ☐

Nitrogen and phosphorus have similar chemical properties. ☐

Nitrogen and phosphorus are both non-metals. ☐ [1]

(c) The chemists John Newlands and Dmitri Mendeleev contributed ideas towards the development of the Periodic Table. John Newlands proposed the "Law of Octaves".

(i) Give **one** reason why some scientists did not accept the proposed Law of Octaves.

_____

_____ [1]

(ii) In what order did Newlands and Mendeleev arrange the elements?

_____ [1]

(iii) Give **two** other ideas used by Mendeleev in the development of the Periodic Table.

1. _____

_____

_____

2. _____

_____

_____ [2]

Examiner Only	
Marks	Remark

5 **(a)** Use the information given for the substances X, Y and Z to state whether the substance is a solid, a liquid or a gas at room temperature (20 °C).

(i) X takes the shape of the bottom of its container. It has a definite volume.

Substance X is a _____. [1]

(ii) Y has a definite shape and volume.

Substance Y is a _____. [1]

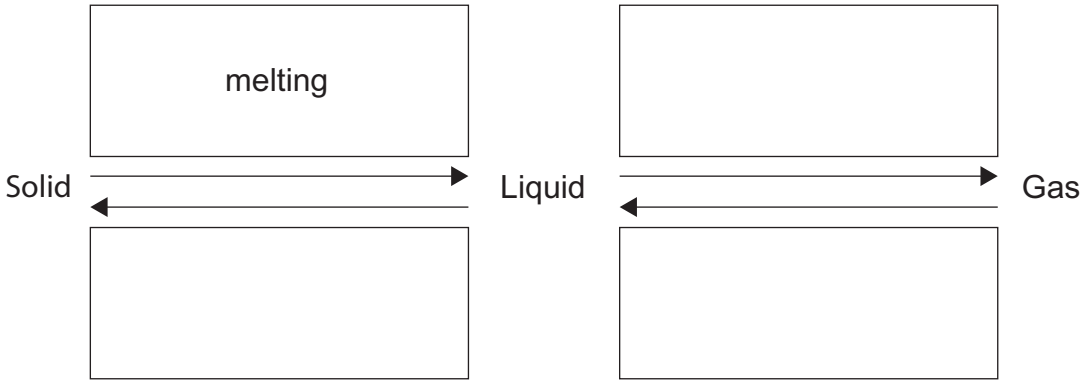
(iii) Z takes the shape and volume of the container.

Substance Z is a _____. [1]

(b) Substance B has a melting point of 16 °C and a boiling point of 118 °C. Is substance B a solid, a liquid or a gas at room temperature (20 °C)?

B is a _____. [1]

(c) Complete the diagram below by labelling the changes of state.



[3]

Examiner Only	
Marks	Remark

6 Chemists use symbols and formulae in chemical equations to give information about chemical reactions.

You may find your Data Leaflet helpful when answering this question.

(a) For each of the questions below four answers are given. Only one is correct. Circle the correct answer. The first one has been done for you.

The element with the symbol **P** is:

potassium (phosphorus) plutonium polonium

(i) **Sr** is the chemical symbol for:

silver tin strontium sulfur [1]

(ii) The compound with the formula **$Ca(OH)_2$** is:

calcium oxide hydride | calcium hydroxide | calcium oxide | calcium water [1]

(iii) The correct chemical formula for **aluminium nitrate** is:

$AlNO_3$ Al_3NO $Al(NO_3)_3$ $Al(NO)_3$ [1]

(iv) The formula **NH_3** means:

3 N atoms and 3 H atoms | 3 NH atoms | 1 N atom and 3 H atoms | 1 N atom and 1 H atom [1]

(b) Balance the chemical equation below which describes the reaction between sulfuric acid and sodium hydroxide.

$H_2SO_4 + NaOH \longrightarrow Na_2SO_4 + H_2O$ [1]

Examiner Only	
Marks	Remark

7 **(a)** Two common isotopes of chlorine are $^{35}_{17}Cl$ and $^{37}_{17}Cl$.

(i) Complete the table below to show the numbers of protons, neutrons and electrons in the $^{37}_{17}Cl$ isotope.

Isotope	Protons	Neutrons	Electrons
$^{37}_{17}Cl$			

[3]

(ii) What are isotopes?

_____

_____

_____ [2]

(b) **(i)** Complete the table below which gives information about electronic structures and their relation to the Group number of the Periodic Table.

Element	Atomic number	Electronic configuration	Group of Periodic Table
A	17		7
B	5	2,3	
C		2,8,5	5
D	6		4

[4]

(ii) What is the name of the element in Group 2 Period 3?

_____ [1]

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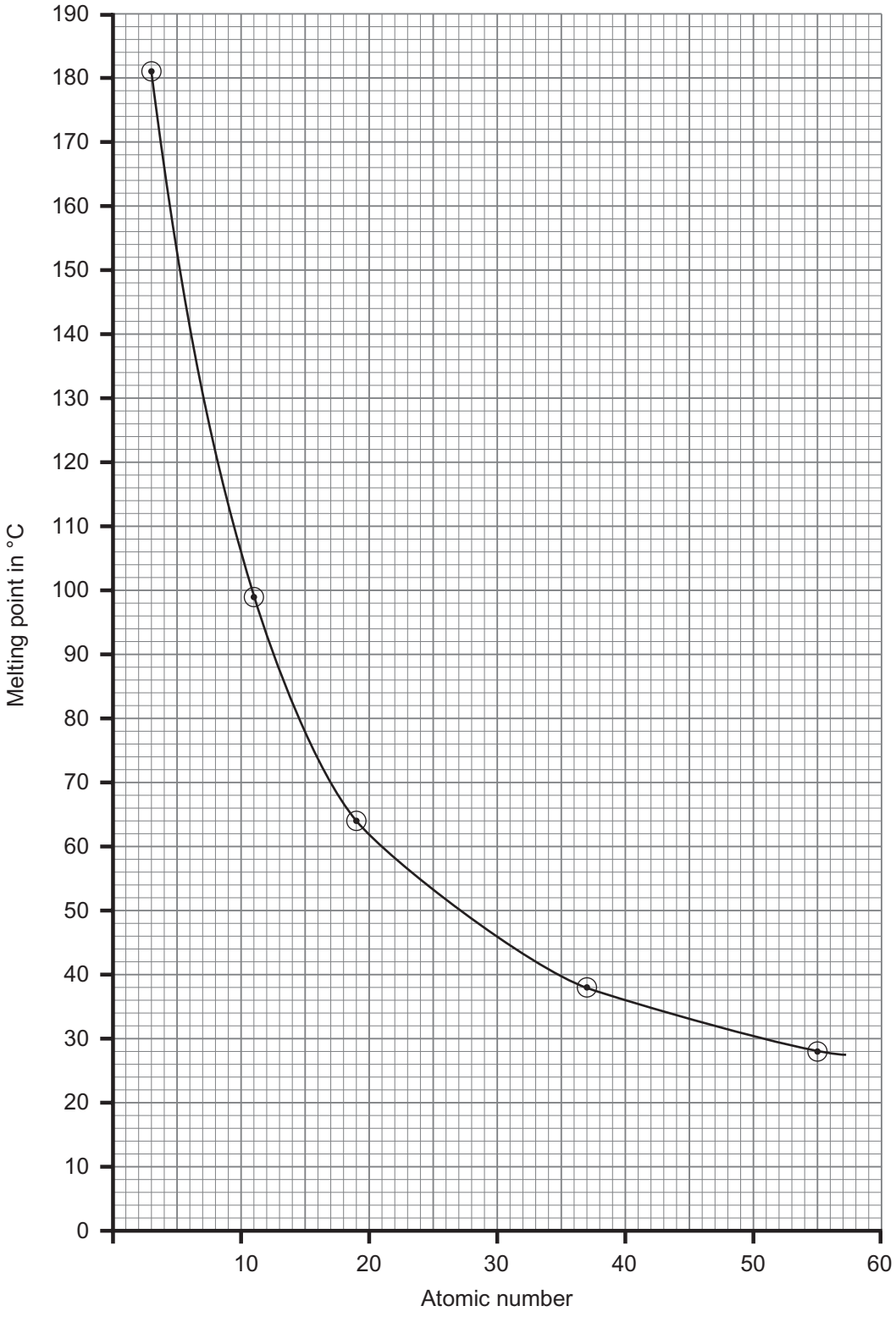
(Questions continue overleaf)

Examiner Only	
Marks	Remark

8 The graph below shows how the melting points of the alkali metals change with increasing atomic number.



(a) Name the alkali metal with the highest melting point.

_____ [1]

(b) What happens to the melting point of the alkali metals as the atoms increase in size?

_____

_____ [1]

In part (c) you will be assessed on your written communication skills including the use of specialist science terms.

(c) Describe how potassium is stored in the laboratory and the steps that need to be taken before adding it to water. Include in your answer its appearance at each stage and any safety precautions that need to be taken.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [6]

(d) **(i)** Suggest why rubidium (Rb) is **not** used in the school laboratory to show the reactions of the alkali metals.

_____ [1]

(ii) How many electrons would you expect rubidium to have in its outer shell?

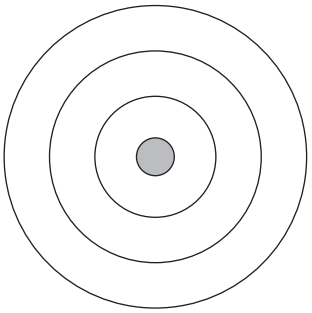
_____ [1]

Examiner Only	
Marks	Remark

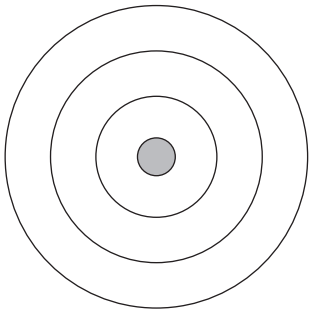
Examiner Only	
Marks	Remark

9 Magnesium reacts with chlorine to form an ionic compound, magnesium chloride.

(a) Complete the diagrams below to show **all** the electrons in a magnesium atom and a chlorine atom.



magnesium atom



chlorine atom [2]

(b) Explain how the atoms of magnesium and chlorine form **ions**.

_____

_____

_____ [2]

(c) How many chlorine atoms react with one atom of magnesium?

_____ [1]

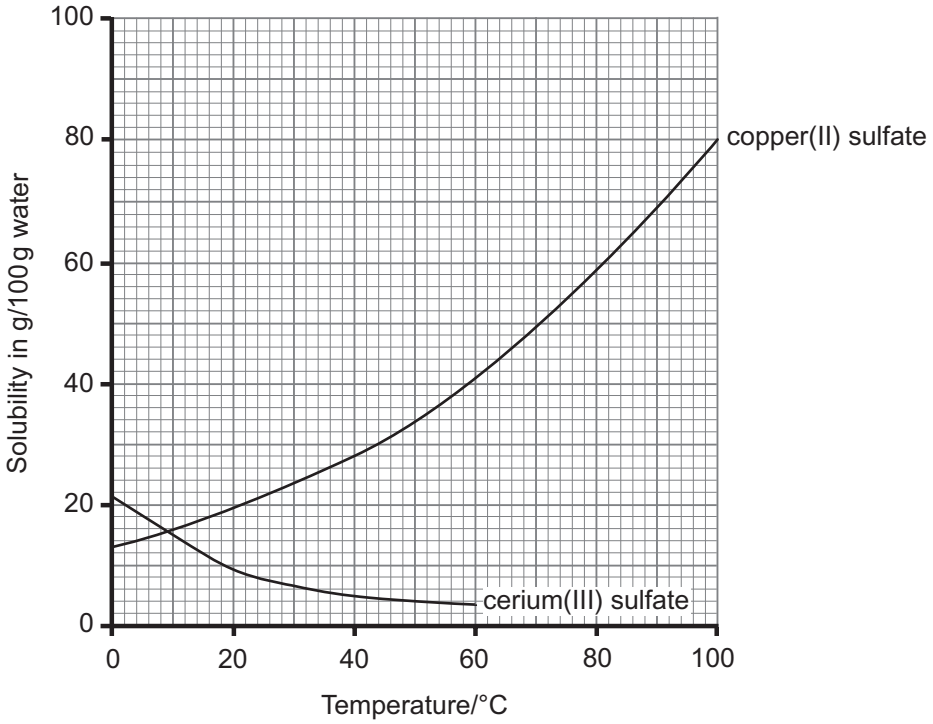
(d) How are the ions held together in the compound magnesium chloride?

_____

_____ [1]

Examiner Only	
Marks	Remark

10 The solubility curves for the solids copper(II) sulfate and cerium(III) sulfate are drawn below.



Use the solubility curves to answer the following questions.

(a) How does the solubility of the cerium(III) sulfate change as the temperature increases?

_____

_____ [1]

(b) What is the solubility of copper(II) sulfate at 26 °C?

_____ g/100 g water [1]

(c) At what temperature is the solubility of cerium(III) sulfate 8 g/100 g water?

_____ °C [1]

(d) At what temperature is the solubility of the cerium(III) sulfate equal to the solubility of copper(II) sulfate?

_____ °C [1]

(e) Name the solid which is more soluble at 0 °C.

_____ [1]

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