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

WEDNESDAY 9 NOVEMBER 2011
9.15 am–10.15 am

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 eleven** questions.

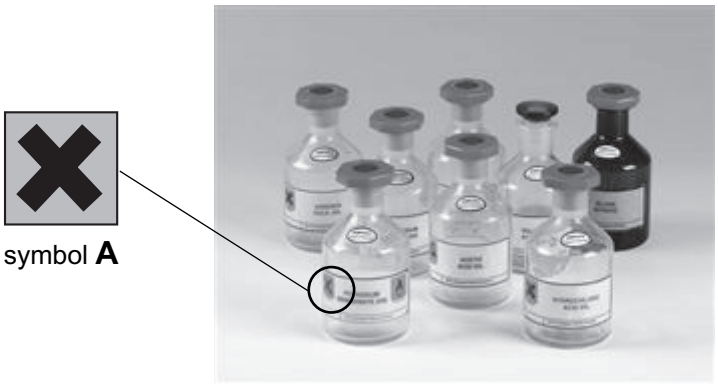
INFORMATION FOR CANDIDATES

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 **questions 6(b) and 11(b)**.
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	
11	
Total Marks	

Examiner Only	
Marks	Remark

1 Bottles of chemicals in a chemistry laboratory are shown in the photograph below. Each bottle is labelled with a symbol. One of the symbols is enlarged on the left hand side of the photograph (symbol **A**).



symbol **A**

© *Timstar Laboratory Suppliers Ltd*

(a) What are these symbols called? Circle the correct answer.

chemical symbols **danger symbols** **hazard symbols** [1]

(b) Give **two** reasons why these symbols are used on bottles of chemicals.

1. _____

_____

2. _____

_____ [2]

(c) What does symbol **A**, shown above, tell you about the chemical in the bottle?

_____ [1]

One of the bottles contains a solution of barium chloride, which is a **poisonous** chemical.

(d) Draw the symbol found on the bottle of barium chloride solution in the box below.

[1]

2 Use the information in the table below to decide if the substance is an element, a compound or a mixture. The first one has been done for you.

Description of Substance	Element	Compound	Mixture
A red–brown substance which conducts electricity and melts when heated.	✓		
A liquid which can be evaporated to give a white solid.			
A green solid forms a black powder and a colourless gas when it is heated.			
A colourless gas which burns to form water.			
A thick sticky black liquid which separates into many different gases, liquids and solids when heated.			

[4]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

3 Aeroplane wheels, similar to those in the picture below, may be made from an **alloy** of aluminium.

© ThinkQuest http://library.thinkquest.org/C004036F/parts.html

(a) Choose a word from the list to complete the sentence below.

a compound **a molecule** **an element** **a mixture**

An alloy is _____ containing at least one metal. [1]

(b) Give **two** properties, apart from strength, of the aluminium alloy which make it suitable for use as an aeroplane wheel.

1. _____

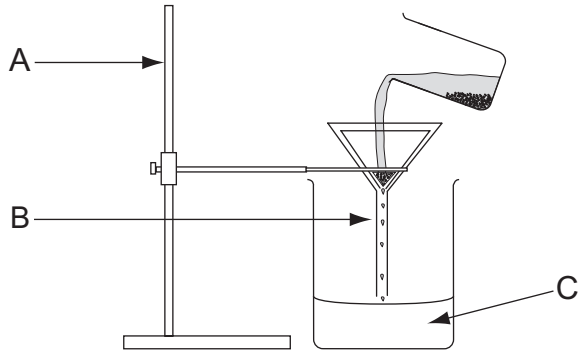
2. _____ [2]

Examiner Only	
Marks	Remark

4 A mixture of salt and sand may be easily separated using the following method:

1. Add water to the mixture and stir.

2. Filter the resulting mixture using the apparatus below.



(a) What happens to the salt and the sand when the water is added and the mixture stirred?

The salt _____

The sand _____ [2]

(b) Name the pieces of apparatus A and B.

A _____

B _____ [2]

(c) Which **two** of the terms in the list below best describe substance C? Circle the **two** correct answers.

residue	**distillate**	**solution**
filtrate	**insoluble**	**solvent** [2]

(d) Explain how you would obtain a dry sample of pure salt from substance C.

_____

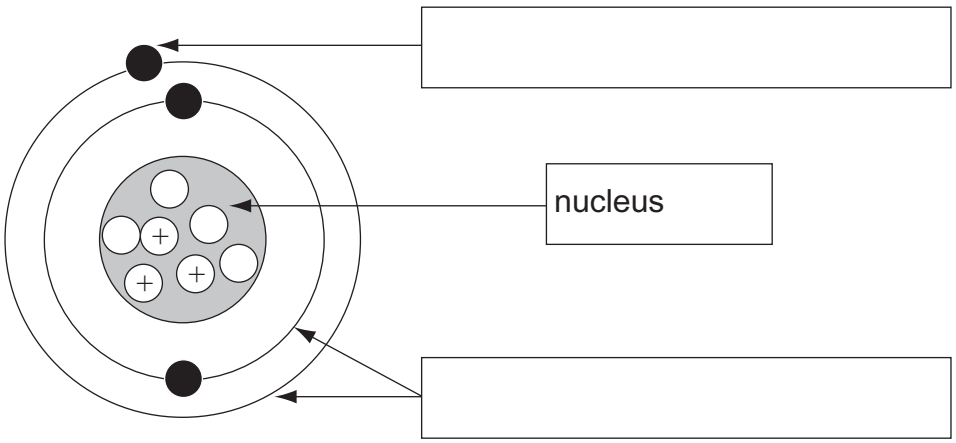
_____

_____ [2]

Examiner Only	
Marks	Remark

5 The diagram below represents an atom.

(a) Fill in the missing labels to complete the diagram.



[2]

(b) The nucleus contains two different types of particles.

(i) Name the type of particle in the nucleus which has a positive charge.

_____ [1]

(ii) What is the atomic number of this atom?

_____ [1]

Examiner Only	
Marks	Remark

6 Solid iodine undergoes a change of state known as **sublimation**.

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

_____

_____ [2]

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

(b) The result of an experiment to demonstrate the sublimation of solid iodine in the laboratory is shown in the photograph below. Describe how you would safely carry out this experiment.

© Peter Arnold/Getty Images

_____

_____

_____

_____

_____

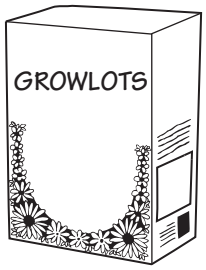
_____

_____

_____ [6]

Examiner Only	
Marks	Remark

7 Growlots plant fertiliser is sold as a blue powder. The instructions for preparing the fertiliser for use are given below.



- ➢ Place two tablespoons of the powder into a watering can.
- ➢ Add two litres of water.
- ➢ When fully dissolved the fertiliser is ready for use.

(a) (i) Give two ways in which the powder can be dissolved faster.

1. _____

2. _____ [2]

(ii) How would you know when the powder is fully dissolved?

_____ [1]

(b) The fertiliser is made up of two salts, copper(II) sulfate and iron(III) sulfate. Each salt can be made by reacting an acid with a base.

(i) Name the acid used to make the two salts in the fertiliser.

_____ [1]

(ii) What is the name given to this **type** of chemical reaction?

_____ [1]

(iii) When an acid reacts with a base, a salt and one other compound is formed. Write the **formula** for the other compound formed when an acid reacts with a base.

_____ [1]

(iv) Suggest why Growlots fertiliser is blue in colour.

_____

_____ [1]

(v) The formulae of copper(II) sulfate and iron(III) sulfate are given in the table below.

Complete the table by filling in the number of atoms of each element present in the formulae.

Formula	Number of atoms	
	sulfur	oxygen
$CuSO_4$	1	
$Fe_2(SO_4)_3$		

[3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

8 Copper(II) sulfate is a **hydrated** salt and has a high solubility in water.

(a) (i) What is meant by the term **hydrated**?
Tick (✓) the correct box.

can dissolve in water	☐
is wet to the touch	☐
contains water of crystallisation	☐
cannot absorb any more water	☐

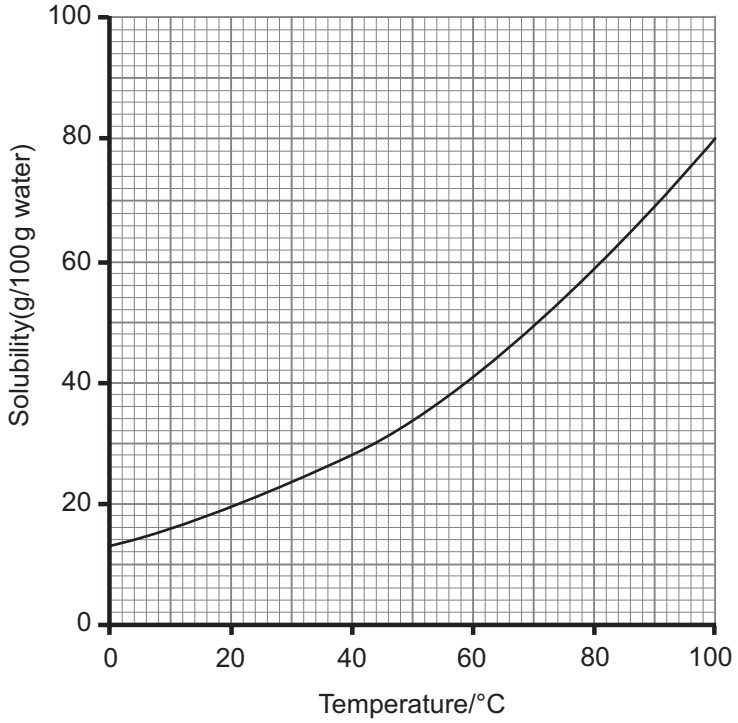
[1]

(ii) Explain what is meant by the term **solubility** by circling the correct words in the sentence below.

Solubility is the | minimum / average / maximum / total | mass of a solid which will dissolve in 100 g of water at a given | time / temperature / rate / volume | .

[2]

(b) The solubility curve for copper(II) sulfate is drawn below.



Use the solubility curve to answer the following questions.

(i) How does the solubility of copper(II) sulfate change as the temperature of the water increases?

_____

_____ [1]

(ii) What is the solubility of copper(II) sulfate at 76 °C?

_____ [1]

(iii) State whether the following copper(II) sulfate solutions are saturated or unsaturated.

Solution			Saturated/unsaturated
Mass of $CuSO_4$ (g)	**Mass of water (g)**	**Temperature °C**	
45	100	60	
20	100	30	

[2]

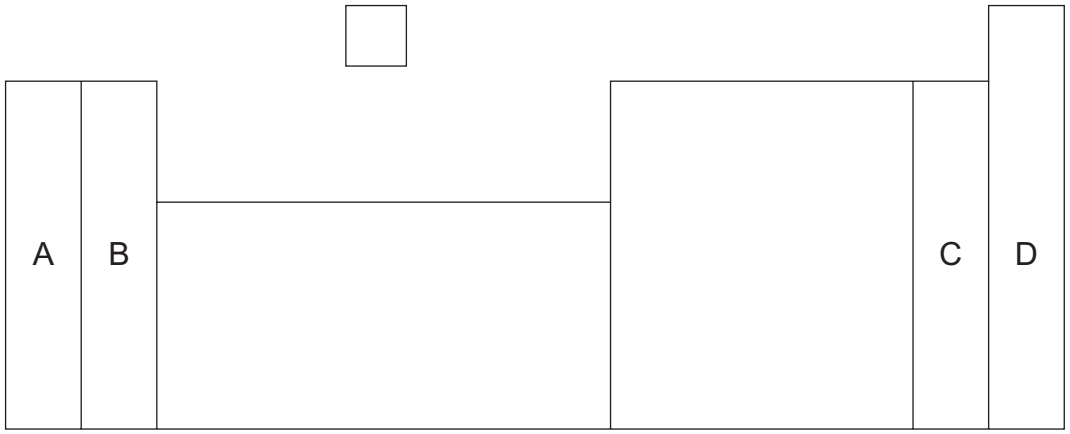
Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

9 The Periodic Table is a list of all known elements. Vertical columns called groups contain elements which react in a similar way.

The outline of the Periodic Table shown below shows four groups, labelled A, B, C and D.



(a) Which of the groups, A, B, C or D,

(i) is a group of unreactive gases? _____ [1]

(ii) contains the alkali metals? _____ [1]

The alkali metals are very reactive.

(b) How are the alkali metals stored?

_____ [1]

(c) Iron is a transition metal.

(i) Shade the area in the Periodic Table above where iron is placed. [1]

(ii) Give **one** use of iron.

_____ [1]

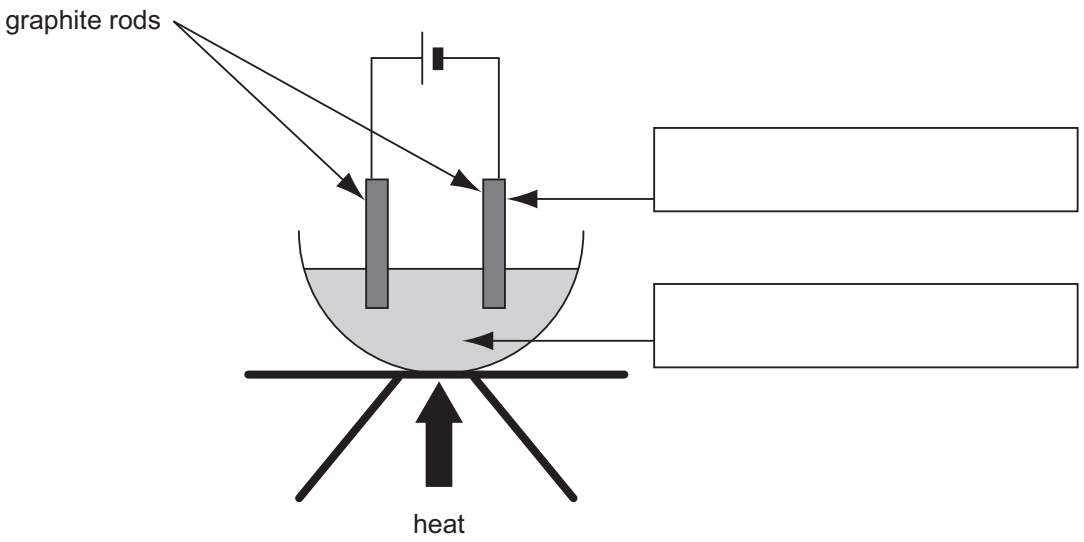
Many scientists have worked to develop the Periodic Table.

(d) Name **one** scientist who has contributed to the development of the Periodic Table.

_____ [1]

10 Reactive metals are obtained from their compounds by electrolysis.

The diagram below represents an electrolysis cell. The metal compound is heated until it melts and electricity is passed through it.



(a) Complete the labels on the diagram by using **two** of the chemical terms given below.

anode **cathode** **electrolyte** **cation** [2]

(b) What happens to the molten compound when the electricity is passed through it?

_____ [1]

(c) Give **two** reasons why the rods are made of graphite.

Tick (✓) two boxes.

Graphite is a form of carbon. ☐

Graphite is a conductor of electricity. ☐

Graphite does not react with the molten compound. ☐

Graphite is a lubricant. ☐

Graphite is a non-metal. ☐

[2]

Examiner Only

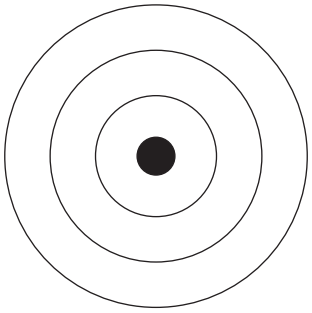
Marks	Remark

Examiner Only	
Marks	Remark

11 Sodium reacts with chlorine to form the compound sodium chloride.

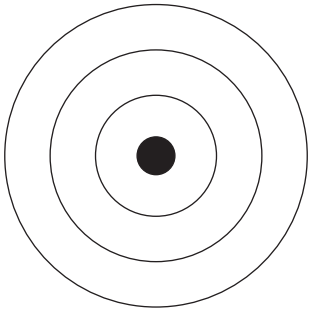
(a) Complete the diagrams below to show the arrangement of **all** of the electrons in a sodium atom and a chlorine atom.

(i) Sodium atom



[1]

(ii) Chlorine atom



[1]

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

(b) Explain, using electronic structures, how sodium and chlorine bond to form the compound sodium chloride.

[6]

(c) Sodium chloride has a high melting point. Give **two** other physical properties you would expect sodium chloride to have.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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