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New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2012–2013

Double Award Science: Chemistry

Unit C1

Foundation Tier

[GSD21]

GSD21

TUESDAY 13 NOVEMBER 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 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 **5**.
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	
Total Marks	

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Marks	Remark

1 A new type of **hazard symbol** will soon be used on containers of all dangerous substances. These symbols have been internationally agreed.

(a) Why do hazard symbols need to be internationally agreed?

_____

_____ [1]

(b) Give two **other** reasons why containers of certain substances are labelled using hazard symbols.

1. _____

_____

2. _____

_____ [2]

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2 Some golf clubs are made from steel, which is an alloy of iron and carbon, and from the metallic elements titanium and tungsten.

(a) Complete the sentence below to explain the meaning of the term alloy.

Circle the correct words.

An alloy is a

compound **mixture** **molecule**

of two or more

atoms **substances** **elements**

one of which is a

metal **non-metal** **solid**.

[3]

(b) Explain why titanium, tungsten, iron and carbon can be described as elements.

_____

_____ [1]

(c) Give **two** properties you would expect titanium, tungsten and iron to have.

1. _____

2. _____ [2]

(d) Complete the table below which gives information about an atom of iron.

Name of element	Mass number	Atomic number	Number of protons	Number of neutrons	Number of electrons
iron	56		26		

[3]

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3 Carbon dioxide (CO_2) is a gas at room temperature and is made from two different elements covalently bonded together.

(a) How many carbon atoms are there in a molecule of carbon dioxide?

_____ [1]

(b) Place a tick (✓) in the box beside the phrase which best describes a single covalent bond.

one electron shared between 2 atoms ☐

attraction between 2 atoms ☐

a shared pair of electrons ☐

the transfer of a pair of electrons ☐ [1]

(c) Carbon dioxide dissolves in water to produce an acidic solution.

Describe how you would test a solution of carbon dioxide to find the strength of the acid.

_____

_____

_____ [2]

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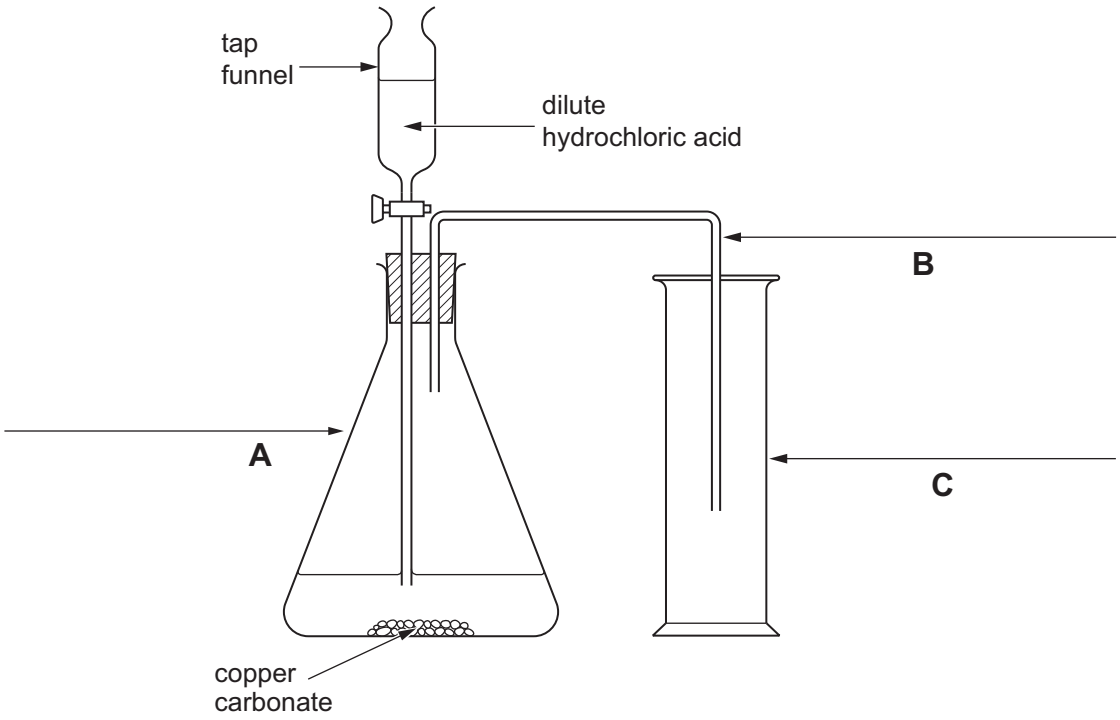
Carbon dioxide can be produced using the apparatus drawn below.



conical flask	**beaker**	**gas jar**
filter funnel	**delivery tube**	**test tube**

(d) Choose from the terms in the box above to complete the labels **A**, **B** and **C** on the diagram.

[3]

(e) Describe how you would carry out a test for carbon dioxide.

_____

_____

_____ [3]

(f) Carbon dioxide sublimes. Suggest why solid carbon dioxide is also called '**dry ice**'.

_____ [1]

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Marks	Remark

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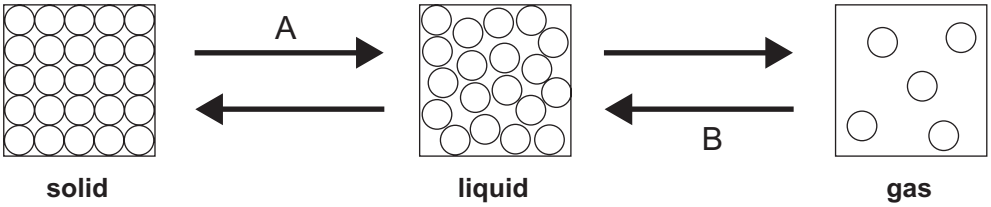
Marks	Remark

4 Zinc is a grey solid at room temperature. It has a melting point of 420 °C and a boiling point of 907 °C. The diagrams below show the arrangement of particles in zinc when it is a solid, a liquid and a gas.



(a) Name the changes of state labelled A and B.

A _____

B _____ [2]

(b) How would you produce liquid zinc from solid zinc?

_____

_____ [2]

(c) Complete the sentence below to explain what is meant by the term boiling point.

Circle the correct words.

Boiling point is the **temperature** / **time** / **volume** at which a **solid** / **liquid** / **gas** changes to a **solid** / **liquid** / **gas**.

[3]

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In Question 5 you will be assessed on your written communication skills including the use of specialist science terms.

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Marks	Remark

5 Describe **how** you would carry out the reaction between iron and sulfur in the school laboratory to form iron sulfide. You should also include:

- a description of the appearance and properties of the mixture;
- observations made during the reaction and at the end.

[6]

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6 In the 1860s, John Newlands and Dmitri Mendeleev were two of the scientists who tried to bring order to the vast amount of information known at that time about the elements.

(a) Newlands stated that when the elements were arranged in order of atomic mass similar properties occurred every 8th element.

(i) What is the name of this law stated by Newlands?

_____ [1]

(ii) Give **one** reason why this pattern was not taken seriously by many scientists.

_____

_____ [1]

Mendeleev also arranged the elements in order of atomic mass but his pattern was taken more seriously than that of Newlands.

(b) Give **two** reasons why the table of elements prepared by Mendeleev was better than the one prepared by Newlands.

1. _____

_____

2. _____

_____ [2]

The modern Periodic Table contains more elements than the Periodic Table developed by Mendeleev.

(c) Give **two** other differences between the modern Periodic Table and Mendeleev's Periodic Table.

1. _____

_____

2. _____

_____ [2]

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Part of the modern Periodic Table is shown below.

H							He
	Be				O		Ne
Na			Si		S	Cl	
K							

(d) Use **only** the elements shown above to answer the following questions.

(i) Give the **symbol** for a non-metal element which is a gas at room temperature and is green in colour.

_____ [1]

(ii) Which **two** elements are stored under oil?

_____ and _____ [1]

(iii) Name the element which has four electrons in its outer shell.

_____ [2]

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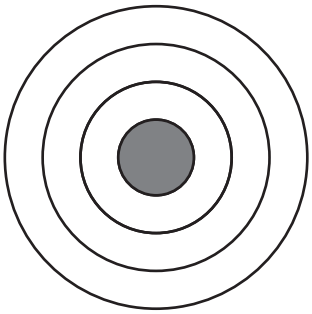
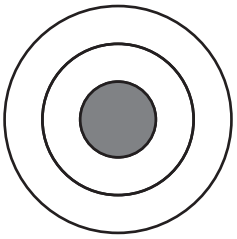
Marks	Remark

7 Sodium oxide is an ionic compound which can be formed by the reaction between sodium and oxygen.

(a) Complete the diagrams below to show **all** the electrons in a sodium atom and an oxygen atom.



sodium atom



oxygen atom [2]

(b) Explain how an oxide ion is formed from an oxygen atom.

_____

_____

_____ [2]

(c) What is the charge on a sodium ion?

_____ [1]

(d) How many sodium atoms react with one atom of oxygen?

_____ [1]

(e) Use your answer to part **(d)** to write the formula for the compound sodium oxide.

_____ [1]

(f) How are the ions held together in the compound?

_____

_____ [1]

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(g) Sodium oxide is a typical ionic solid.

Give **two** physical properties you expect sodium oxide to have.

1. _____

2. _____ [2]

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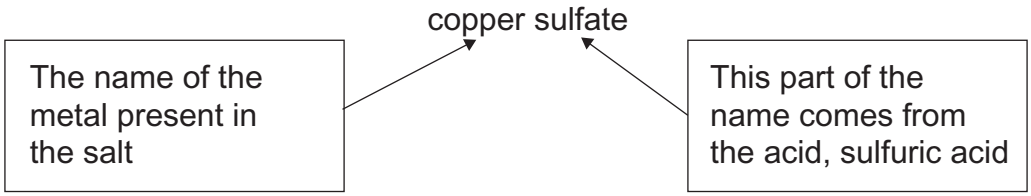
8 Read the following information carefully.

Copper oxide, a black solid, reacts with sulfuric acid and ethanoic acid to form two different salts. Salt is a general name given to one of the compounds formed when an acid is neutralised. The salt formed between copper oxide and sulfuric acid is called copper sulfate.



Name of acid	Name of salt produced when the acid reacts
hydrochloric acid	chloride
nitric acid	nitrate
sulfuric acid	sulfate
phosphoric acid	phosphate
ethanoic acid	ethanoate

(a) Name the salt formed when copper oxide reacts with ethanoic acid.

_____ [1]

(b) What is the name given to the type of reaction between an acid and a base to form a salt and water only?

_____ [1]

(c) Write a balanced symbol equation for the reaction between copper oxide and sulfuric acid.

_____ [2]

(d) Describe what you would observe when copper oxide reacts with sulfuric acid.

_____

_____

_____ [2]

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(e) Name the acid which will react with copper oxide to form copper nitrate.

_____ [1]

Copper oxide reacts faster with 1 mol/dm^3 of sulfuric acid than with 1 mol/dm^3 of ethanoic acid.

(f) What does this tell you about the strength of sulfuric acid and ethanoic acid of the same concentration?

_____

_____ [2]

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9 Lithium chloride conducts electricity when it is molten but sulfur does not.

(a) Draw a labelled diagram of apparatus that can be used in a school laboratory to test if a molten compound conducts electricity.

[4]

(b) Why can molten lithium chloride conduct electricity?

_____ [1]

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THIS IS THE END OF THE QUESTION PAPER

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