

New
Specification

Rewarding Learning

General Certificate of Secondary Education
2012–2013

Centre Number

71

Candidate Number

Double Award Science: Chemistry

Unit C1

Higher Tier

[GSD22]

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 seven** 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 4.
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	

Total
Marks

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1 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]

Examiner Only	
Marks	Remark

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.

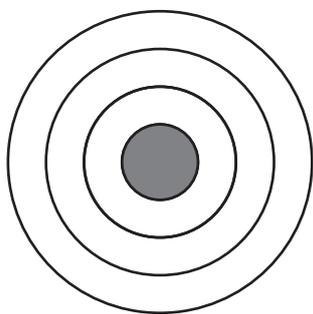
_____ [2]

Examiner Only

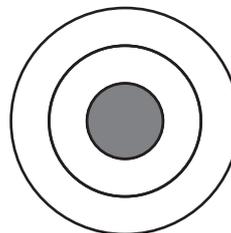
Marks Remark

2 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) Sodium oxide is a typical ionic solid.

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

1. _____

2. _____ [2]

Examiner Only

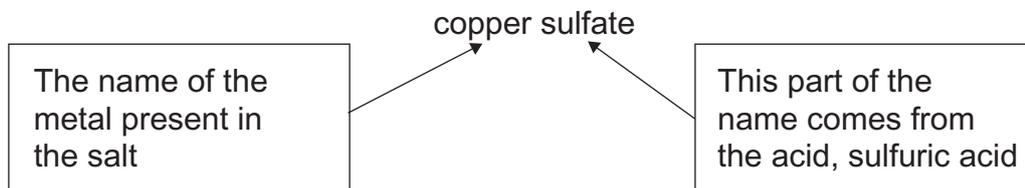
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Remark

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3 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]

Examiner Only

Marks Remark

- (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.

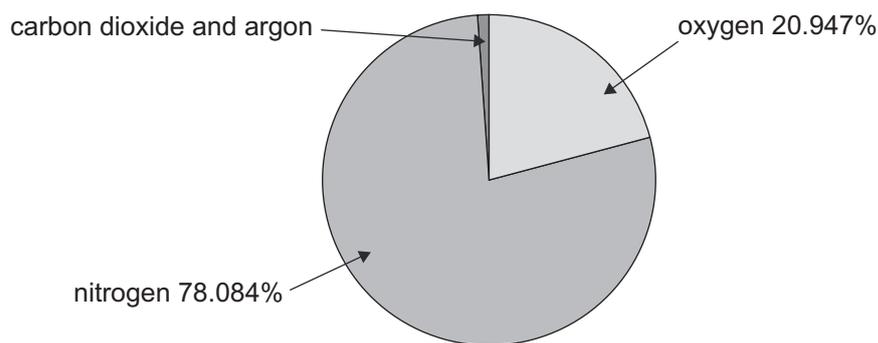
- (f) What does this tell you about the strength of sulfuric acid and ethanoic acid of the same concentration?

_____ [2]

Examiner Only	
Marks	Remark

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- 5 The pie chart below shows the percentage (%) of the different gases in a sample of dry air.



- (a) Calculate the percentage (%) of carbon dioxide and argon in this sample of dry air.

_____ % [2]

- (b) Carbon dioxide, oxygen and nitrogen are present as **diatomic** molecules with multiple bonds. Argon is present as an atom.

- (i) What is meant by the term diatomic?

 _____ [1]

- (ii) Explain, in terms of electrons, why argon is present as an atom.

 _____ [2]

Examiner Only	
Marks	Remark

(iii) Using a dot and cross diagram draw a molecule of nitrogen. Show the **outer electrons** only.

[3]

(iv) Label a lone pair of electrons on your diagram in **b(iii)** above.

[1]

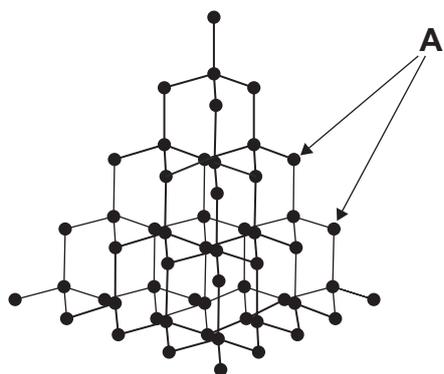
Molecules of water are present in damp air.

(c) Draw a dot and cross diagram of a molecule of water. Show the **outer electrons** only.

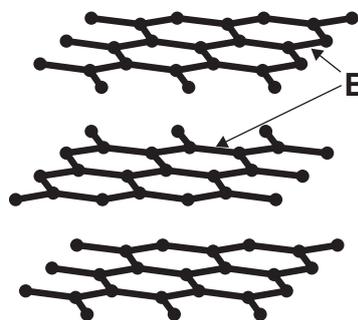
[3]

Examiner Only	
Marks	Remark

- 6 The diagrams below show the structure of two **allotropes** of carbon, diamond and graphite. Diamond is a hard substance which is used in cutting tools. Graphite is a soft shiny grey substance which is used as pencil lead.



diamond



graphite

- (a) What are allotropes?

[2]

- (b) What is represented on the diagrams by:

- (i) the black dots labelled **A**?

[1]

- (ii) the solid lines labelled **B**?

[1]

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Marks

Remark

(c) Using the structure of diamond and graphite explain why:

(i) diamond is used in cutting tools

[2]

(ii) graphite is used in pencil lead.

[2]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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