Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015–2016

Double Award Science: Chemistry

Unit C1
Foundation Tier

[GSD21]

GSD21

THURSDAY 19 MAY 2016, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in blue or black ink only. **Do not write with a gel pen.**
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 **9**.
A Data Leaflet, which includes a Periodic Table of the elements is provided.

10177.05**R**

1 Many chemical compounds are white but some are not.
Draw a line to match each chemical compound to its colour.

chemical compound	colour
hydrated copper sulfate	black
aluminium oxide	white
copper oxide	red
copper carbonate	green
	blue

[4]

BLANK PAGE

DO NOT WRITE ON THIS PAGE

(Questions continue overleaf)

2 Sulfuric acid is a strong acid.

(a) What pH would you expect for sulfuric acid?
Circle the correct value.

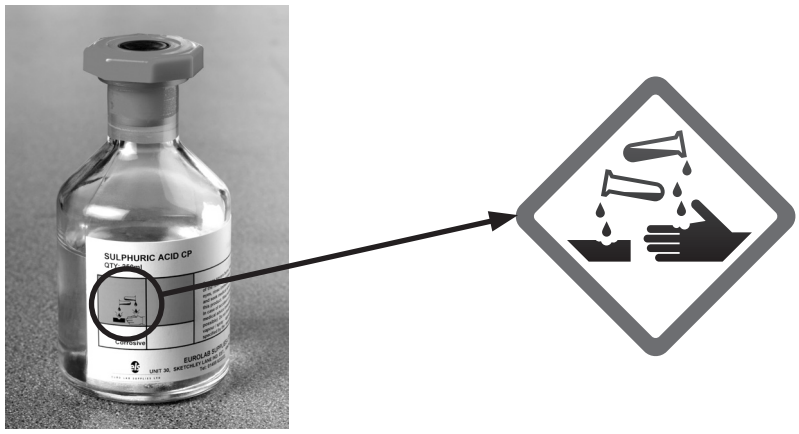
1 5 7 9 10

[1]

(b) Four drops of universal indicator are placed into a sample of sulfuric acid.
What colour will be seen?

_____ [1]

(c) Bottles of sulfuric acid are labelled with the hazard symbol as shown in the photograph below.



© Martyn F. Chillmaid / Science Photo Library

(i) Name the hazard symbol shown.

_____ [1]

(ii) Give two reasons why hazard symbols are shown on bottles of chemicals.

1. _____

_____

2. _____

_____ [2]

(d) A molecule of sulfuric acid contains 4 oxygen atoms, 2 hydrogen atoms and 1 sulfur atom.
What is the formula for sulfuric acid?
Circle the correct formula.

HSO_4 $H_2(SO_2)_2$ H_2SO_4 $H_2S(O_2)_2$

[1]

[Turn over

3 Four sets of apparatus, **A**, **B**, **C** and **D** are given below.

A beaker, stirring rod, thermometer	**B** filter paper, filter funnel, conical flask
C tripod stand, heatproof mat, wire gauze, evaporating dish	**D** separating funnel, retort stand, clamp

(a) Which set of apparatus, **A**, **B**, or **D**, would be used to separate sand from water?

_____ [1]

(b) A student selects apparatus set **C** to evaporate water from a mixture of sand and water.
Name one other piece of apparatus which would be needed to make the evaporation happen quickly.

_____ [1]

(c) Water is a compound containing the elements hydrogen and oxygen.

(i) What is meant by the term **element**?

_____

_____ [1]

(ii) Why can water be described as a **compound**?

_____

_____ [2]

(iii) Write the formula for water.

_____ [1]

(d) Complete the sentence below which describes the test for carbon dioxide.

When carbon dioxide gas is bubbled through _____,

the solution changes from _____ to

a _____ colour. [3]

[Turn over

4 This question is about electrolysis.

Circle the correct answer to each part.

(a) In electrolysis the electrodes are sometimes made out of:

graphite polythene sulfur

[1]

(b) Electrodes need to be inert. This means that they are:

light colourless unreactive

[1]

(c) In electrolysis the particles which move and carry the charge are called:

ions electrons atoms

[1]

(d) When molten lithium chloride undergoes electrolysis the products are lithium and:

chloride chlorine water

[1]

(e) When aluminium is extracted by electrolysis the metal forms at:

the anode the cathode both electrodes

[1]

5 This question is about atomic structure.

(a) Complete the table below to show the relative charge and mass of the different particles found in an atom and whether or not each particle is found in the nucleus.

Particle	Relative Charge	Relative Mass	Found in nucleus Yes or No?
electron	–1		
neutron			Yes
proton		1	

[6]

(b) Complete the table below about the atomic structure of three elements, by filling in the missing information. You may find your Data Leaflet helpful.

Element	Number of protons	Number of neutrons	Number of electrons	Electronic configuration
carbon	6	6		2,4
	11	12	11	
aluminium		14	13	2,8,3

[4]

[Turn over

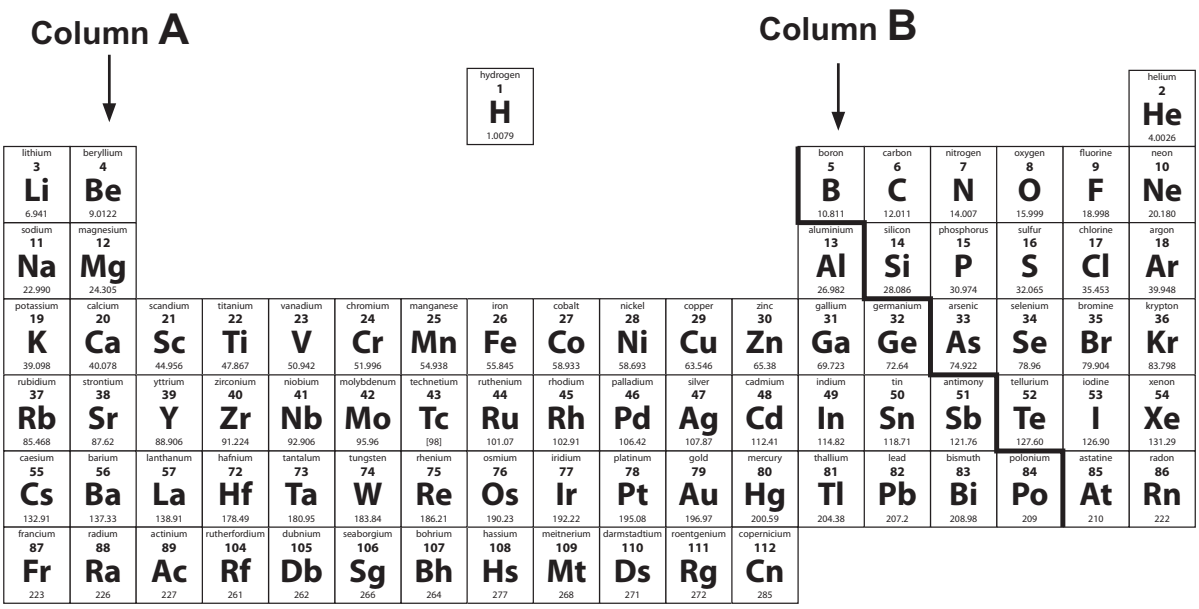
6 Many chemists contributed to the modern Periodic Table including Newlands and Mendeleev.

(a) Complete the table below to show the contribution of each chemist. Place a tick (✓) in each correct box.

Contribution	Newlands ***only***	Mendeleev ***only***	***Both*** Newlands and Mendeleev	***Neither*** Newlands nor Mendeleev
stated the Law of Octaves				
arranged elements in order of relative atomic mass				
included noble gases				
left gaps for undiscovered elements				

[4]

(b) A student is given a Periodic Table.



For each of the five questions below three answers are given. Only one is correct. Circle the correct answer.

(i) The elements in **Column A** are:

alkali metals Group 2 Period 2

[1]

(ii) The physical state at room temperature of all the elements in **Column B** is:

solid liquid gas

[1]

(iii) The elements N, O, F, Cl, Br and I are all:

gases diatomic inert

[1]

(iv) The elements in **Column B** all have:

only 3 electrons 3 electrons in outer shell 3 electrons in first shell

[1]

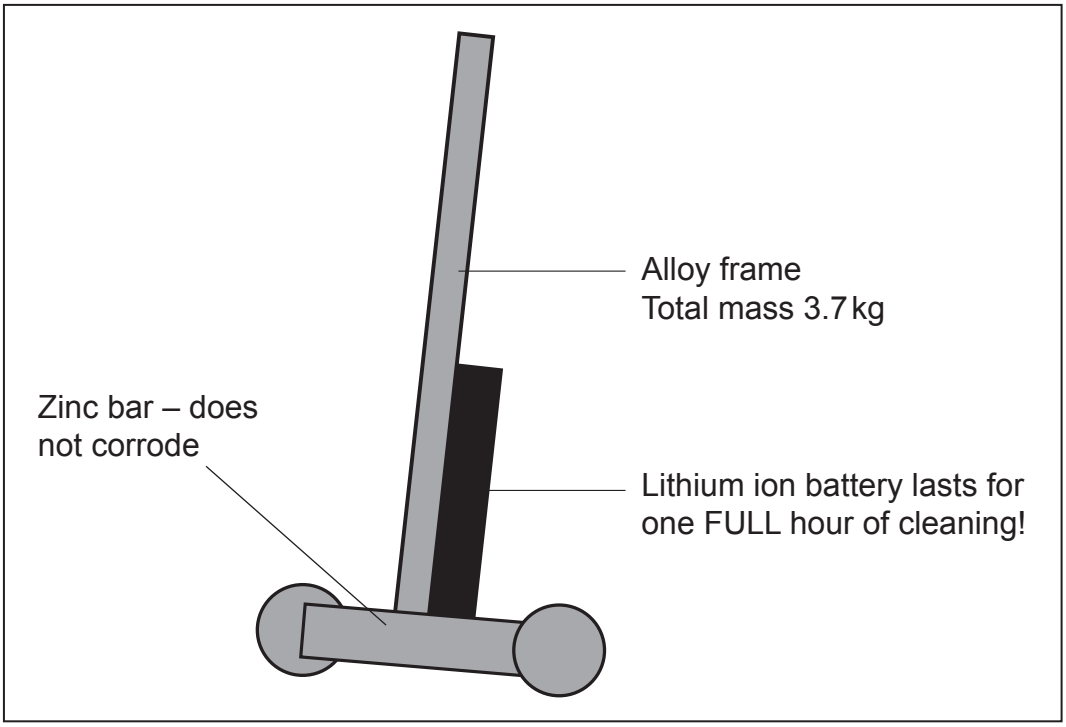
(v) The solid black line separates:

metals and gases solids and liquids metals and non-metals

[1]

[Turn over

7 A labelled diagram, used in an advertisement for a cordless vacuum cleaner, is shown below.



(a) Give the symbol for a lithium ion.

_____ [1]

(b) What is an alloy?

_____

_____ [2]

(c) Give one property needed for the alloy used in the frame of the vacuum cleaner.

_____ [1]

BLANK PAGE

DO NOT WRITE ON THIS PAGE

(Questions continue overleaf)

8 Water has a melting point of 0 °C and is an excellent solvent.

(a) What is meant by the chemical terms:

(i) solvent?

_____

_____ [1]

(ii) melting point?

_____

_____

_____ [2]

(b) Give two physical properties of water apart from the fact that it has a melting point of 0 °C and is an excellent solvent.

1. _____

2. _____ [2]

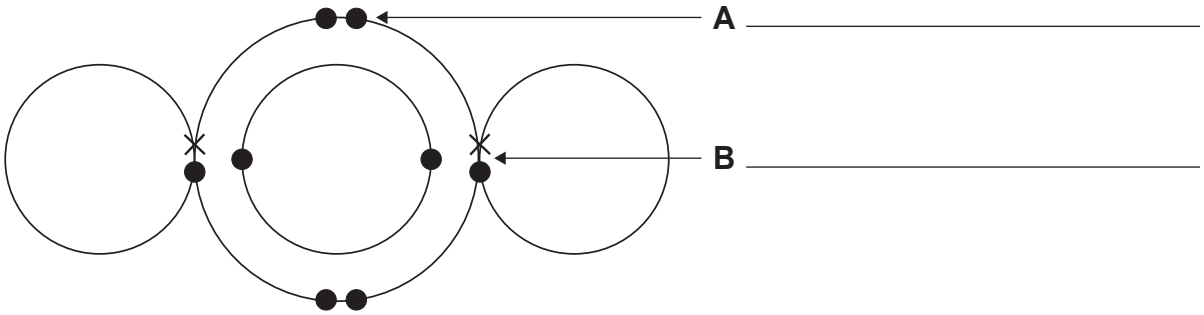
Compound A is soluble in water. It has a solubility of 2.9 g/100 g of water at 20 °C.

(c) Why must the temperature be stated when giving the solubility of a substance in water?

_____

_____ [1]

(d) A dot and cross diagram of the bonding in water is shown below.



(i) Fill in the correct labels for the pairs of electrons labelled **A** and **B**. [2]

(ii) Name the type of bonding in water.

_____ [1]

(iii) Choose two compounds from the list below which have the same type of bonding as water.

Tick (✓) the two correct boxes.

potassium iodide ☐

carbon dioxide ☐

copper sulfate ☐

calcium carbonate ☐

hydrogen sulfide ☐

[2]

[Turn over

9 In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

Magnesium forms a 2^+ ion and oxygen forms a 2^- ion.
Compare and contrast the Mg^{2+} ion and the O^{2-} ion.

You should include information about:

- the number and type of the particles present in each ion
- the electron configuration of each ion and
- how the ions are formed from their atoms.

[6]

10 Metal oxides and metal carbonates will react with acids to form salts.

(a) Complete the word equation for the reaction between copper oxide and sulfuric acid.

copper oxide + sulfuric acid → + [2]

(b) Balance the symbol equation below.

$HCl + CuO \rightarrow CuCl_2 + H_2O$ [1]

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

_____ [3]

THIS IS THE END OF THE QUESTION PAPER

BLANK PAGE

DO NOT WRITE ON THIS PAGE

BLANK PAGE

DO NOT WRITE ON THIS PAGE

DO NOT WRITE ON THIS PAGE

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

Examiner Number