Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017–2018

Double Award Science: Chemistry

Unit C1

Foundation Tier

[GSD21]

GSD21

THURSDAY 17 MAY 2018, 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 black ink only. **Do not write with a gel pen.**
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 **7(b)**.
A Data Leaflet, which includes a Periodic Table of the elements is provided.

11664

1 Lists of substances and statements are given below. Draw a line from each substance to the correct statement about this substance.

Substance	Statement
carbon dioxide	Bleaches litmus paper
water	Is a base that reacts with acids to form salts
magnesium sulfate	Turns limewater milky white
hydrogen	Is a white solid at room temperature
copper oxide	Turns anhydrous copper sulfate from white to blue
	Makes a popping sound when tested with a lit splint

[5]

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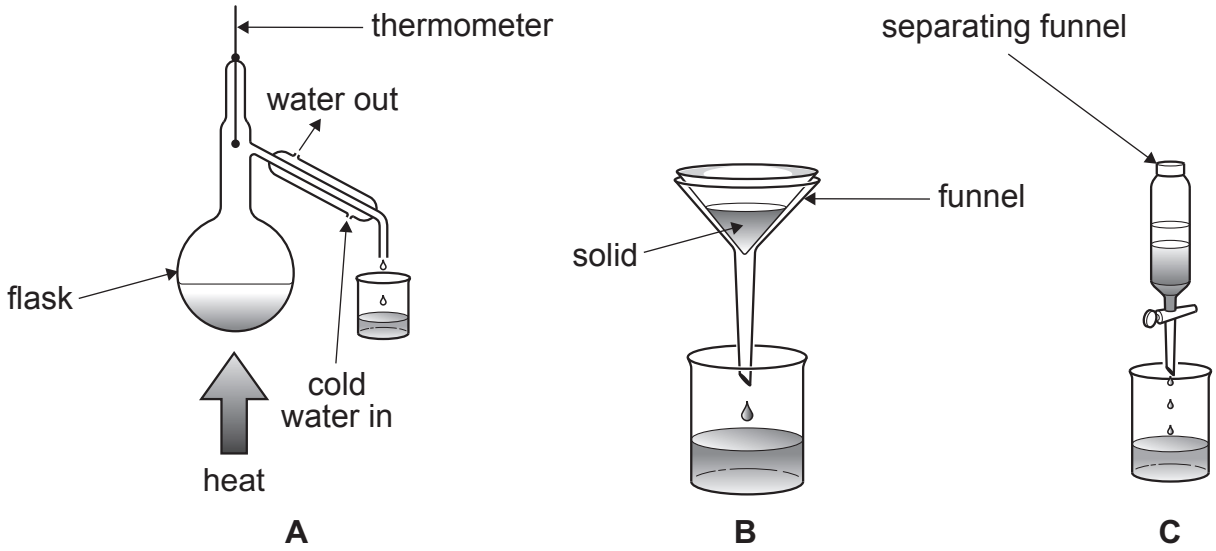
(Questions continue overleaf)

2 The diagrams **A**, **B** and **C** below show three different ways of separating mixtures.



Source: CCEA

Complete the sentences below by circling the correct answers:

(i) The method of separation in diagram **A** is

evaporation.
filtration.
distillation.

[1]

(ii) The liquid in the beaker of diagram **B** is the

distillate.
filtrate.
residue.

[1]

(iii) The solid in the funnel in diagram **B** is the

distillate.
filtrate.
residue.

[1]

(iv) The liquids in the separating funnel in diagram **C** are

immiscible.
miscible.
soluble.

[1]

(v) A

solute
solvent
solution

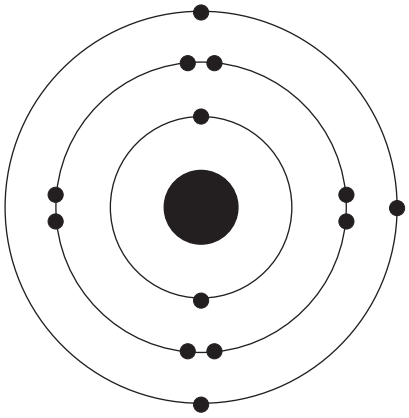
of salt and water will pass through the funnel in diagram **B**. [1]

3 **(a)** Complete the table below that shows the relative charge and relative mass of the three particles found in an atom.

Particle	Relative mass	Relative charge
proton		+1
electron	$\frac{1}{1840}$	
neutron	1	

[3]

(b) The diagram shows the electronic structure of an atom of aluminium which has an atomic number of 13 and a mass number of 27.



(i) Complete the table below to show the number of electrons, protons and neutrons in an atom of aluminium.

Particle	Number present in an atom of aluminium
proton	
electron	
neutron	

[3]

(ii) How many electron shells are there in an atom of aluminium?

_____ [1]

(iii) Why does an aluminium atom not have a charge?

_____ [1]

[Turn over

4 **(a)** Complete the following sentences about the development of the Periodic Table.

(i) The Law of Octaves was written by _____. [1]

(ii) Newlands and Mendeleev both arranged the chemical elements according to their atomic _____. [1]

(iii) Elements with similar properties are placed in the same _____ of the Periodic Table. [1]

(b) Complete the sentence below by circling the correct answer.

All noble gases have

seven outer electrons.
eight outer electrons.
full outer shells.

[1]

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(Questions continue overleaf)

5 **(a)** The table below gives information about five solutions, A, B, C, D and E.

(i) Complete the table by adding the missing colours.

Solution	pH	Colour with universal indicator	Colour with red litmus	Colour with blue litmus
A	1	red	red	
B	10	blue		blue
C	7		red	blue
D	4	orange		
E	14		blue	blue

[3]

(ii) Identify solutions A, B, C, D and E using the information in the table.
Write the correct letter in the space provided.

Chemical name	Solution
ethanoic acid	
sodium hydroxide	
ammonia	
sodium chloride	
sulfuric acid	

[4]

(b) The word equation for the reaction between hydrochloric acid and copper(II) oxide is given below:

hydrochloric acid + copper(II) oxide → copper(II) chloride + water

If some warm dilute hydrochloric acid is added to a beaker containing copper(II) oxide what would you **see** happening in the beaker?

_____

_____

_____ [3]

(c) Complete the word equation for the following reaction.

sodium hydroxide + sulfuric acid → [ ] + [ ]

[2]

(d) What are the units of concentration of acids?
Circle the correct answer.

mol/dm^3 grams/litre dm^3/mol mol/cm^3

[1]

[Turn over

6 Read the passage about lithium and some of its uses. Then use this information along with your own knowledge and understanding to answer the questions that follow.

Lithium is a very light, soft Group 1 metal and is an excellent conductor of electricity. It can be extracted by electrolysis of molten lithium chloride. Lithium is used in making batteries for mobile phones and golf trolleys. Lithium–aluminium alloys are used in the manufacture of aircraft, bicycle frames and high speed trains.

(a) (i) What name is given to the Group 1 elements?

_____ [1]

(ii) How are lithium and the other Group 1 elements stored in the laboratory?

_____ [1]

(b) (i) What is meant by the term electrolysis?

_____

_____ [2]

(ii) Apart from lithium, what else is produced during the electrolysis of molten lithium chloride?

_____ [1]

(c) Why is lithium used in batteries for mobile phones and golf trolleys?

_____ [1]

(d) Give two main advantages of using lithium–aluminium alloys.

1. _____

2. _____ [2]

(e) Some people are concerned that we may run out of lithium. Suggest why this might be the case and how might the problem be reduced.

Reason why we might run out of lithium:

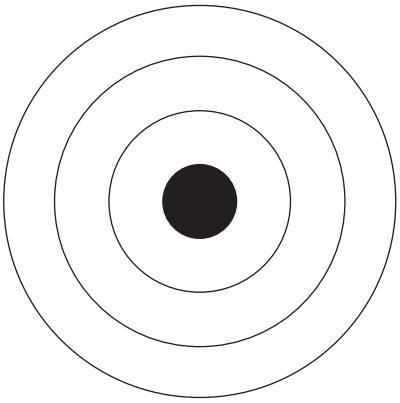
_____

How the problem might be reduced:

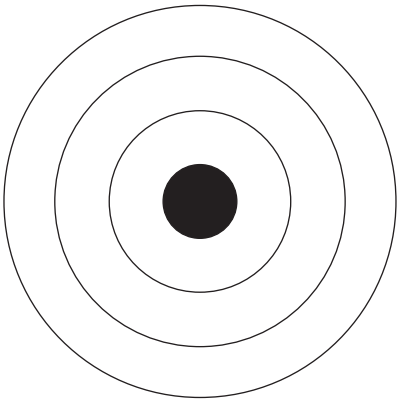
_____ [2]

7 Sodium reacts with sulfur to form a compound called sodium sulfide.

(a) Complete the diagrams below to show the electronic structures of:



a sodium **atom**



a sulfur **atom**

[2]

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

Describe in words:

1. how the electronic structures of both the sodium atom and the sulfur atom change in order to form sodium sulfide. Your answer should include the charges on the ions formed, and the formula of the compound produced.

2. at least two physical properties you would expect sodium sulfide to have.

[6]

[Turn over

8 **(a)** What is a covalent bond?

_____ [1]

(b) In the space below draw a dot and cross diagram to show how covalent bonding occurs in a chlorine molecule, Cl_2. Show all the electrons.

[3]

(c) Complete the three sentences below by adding the missing words:

Covalent bonding is typical of _____ elements and compounds.

The term diatomic means that there are _____ atoms

covalently bonded in a _____.

Covalent bonds are _____ and _____

amounts of _____ are needed to break them. [6]

9 The table below gives information on whether or not some salts are soluble (S) or insoluble (I) in water.

anion / cation	carbonate	chloride	nitrate	sulfate
sodium	S	S	S	S
lead	I	I	S	I
magnesium	I	S	S	S
ammonium	S	S	S	S
calcium	I	S	S	S

(a) Use the information in the table to complete the sentences which follow:

(i) For the **cations**:

All _____ and _____

salts are soluble. [2]

(ii) For the **anions**:

All chlorides are _____ except

for _____. [1]

(b) Predict whether sodium bromide and zinc nitrate are soluble (S) or insoluble (I) in water.

sodium bromide _____ zinc nitrate _____ [2]

(c) A student mixed a colourless sodium chloride solution with a colourless lead nitrate solution. Why did the mixture turn white?

_____

_____

_____ [2]

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For Examiner's use only	
Question Number	Marks
1	
2	
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