Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education

Double Award Science: Chemistry

Unit C1

Foundation Tier

[GDW21]

GDW21

Assessment

Assessment Level of Control:
Tick the relevant box (✓)

Controlled Conditions	
Other	

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

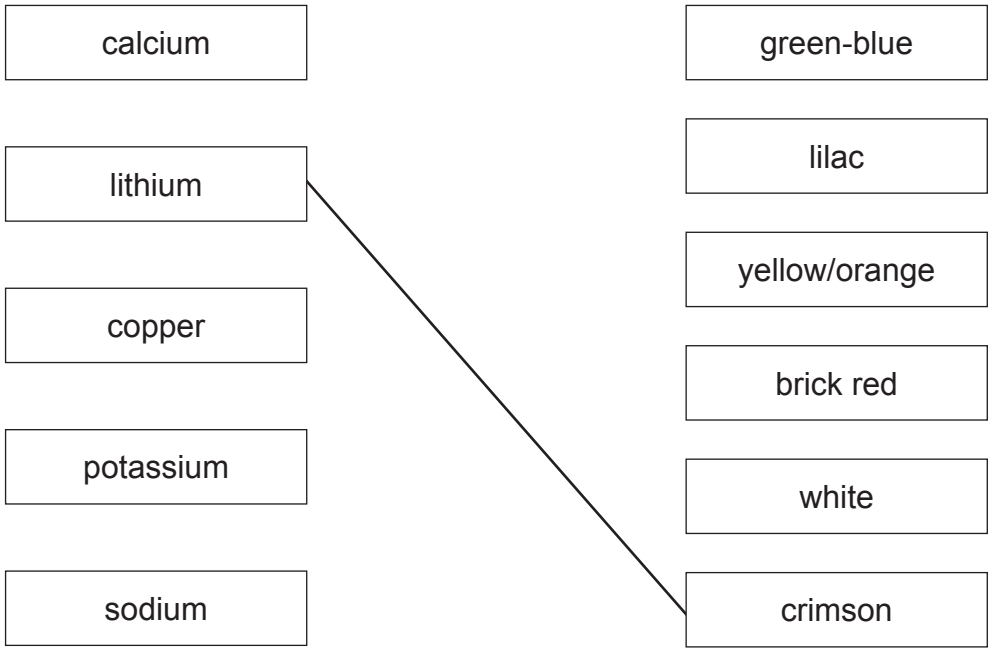
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
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 **6(c)**.
A Data Leaflet, which includes a Periodic Table of the elements is provided.

12786

1 **(a)** The following list gives the colours of the flames of different metal ions. Match each colour to the correct metal ion by drawing straight lines. One has been done for you.



[4]

(b) Use the words from the list to complete the sentences about carrying out a flame test.

copper **nichrome** **concentrated** **sulfuric** **blue**

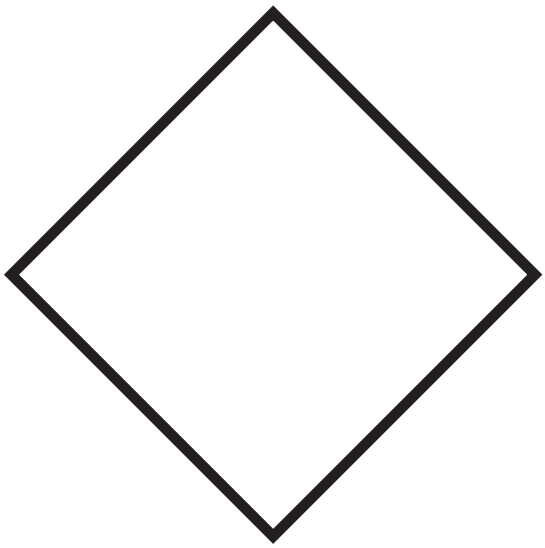
dilute **hydrochloric** **yellow** **cool**

Clean a _____ wire by dipping it in

_____ _____ acid.

Use the wire to pick up crystals and hold it in a _____ Bunsen flame. [4]

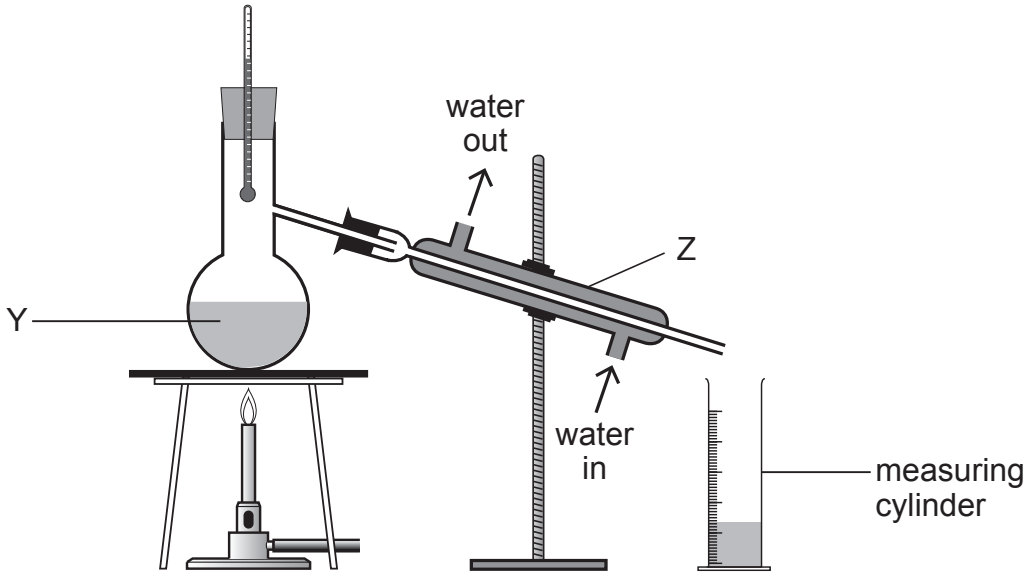
(c) Some chemicals are toxic. In the box below draw the hazard symbol you would expect to see on a bottle containing a toxic chemical.



[1]

[Turn over

2 The diagram below shows apparatus used in simple distillation.



(a) Name the piece of apparatus labelled Z.

_____ [1]

(b) Choose words from the list to complete the sentences that follow.

distillate **sublimes** **evaporates** **freezes**

condenses **solution** **solvent** **solid** **filtrate**

Y is a _____ containing a solute dissolved in

a _____.

When Y boils it _____ and becomes a gas.

The liquid that collects in the measuring cylinder is called

the _____. [4]

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(Questions continue overleaf)

[Turn over

3 Complete each of the following statements by drawing a circle around the correct answers.

(a) Ionic bonding involves the | transfer / joining / sharing | of electrons and it is found in | chlorine. / sodium. / sodium chloride. | [2]

(b) Graphene is an | alloy / allotrope / isotope | of carbon. Its structure is a single | atom / molecule / compound | thick layer of graphite. [2]

(c) Van der Waals' forces are [weak / strong / hard] and exist between [metallic / ionic / covalent] molecules. [2]

(d) Nanoparticles are structures that are about [1 – 100 nm / 0 – 10 nm / 1000 – 10 000 nm] in size.

In sun creams, nanoparticles help give protection from [X-rays. / heat rays. / ultraviolet rays.] [2]

[Turn over

4 This question is about the elements of the Periodic Table.

(a) Complete the table below.

Element	Group	Period	Colour at room temperature
bromine		4	red-brown
neon	0	2	
aluminium			silver/grey

[3]

(b) Chromium, manganese and iron form part of a block of elements found in the middle of the Periodic Table.

What name is given to this block of elements?

_____

Elements in this block form compounds which are:
Circle the correct answer.

colourless **orange** **white** **coloured**

[2]

(c) The element Zr has an atomic number of 40 and a mass number of 91. It forms a Zr^{4+} ion.

(i) What is the name of the element whose symbol is Zr?

_____ [1]

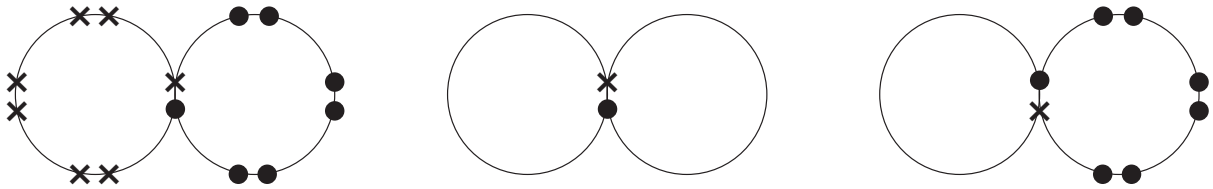
(ii) Complete the table below to show the numbers of protons, neutrons and electrons in a Zr atom and in a Zr^{4+} ion.

Formula	Number of protons	Number of neutrons	Number of electrons
Zr			
Zr^{4+}			

[3]

[Turn over

5 Three bonding diagrams A, B and C are shown below. Only the outer electrons are shown.



A B C

(a) Complete the table below to describe the arrangements of the electrons for each diagram and suggest a name for a molecule which could be represented by diagram A.

Diagram	Number of shared pairs of electrons	Number of lone pairs of electrons	Name of molecule
A	1	6	
B		0	hydrogen
C			hydrogen chloride

[4]

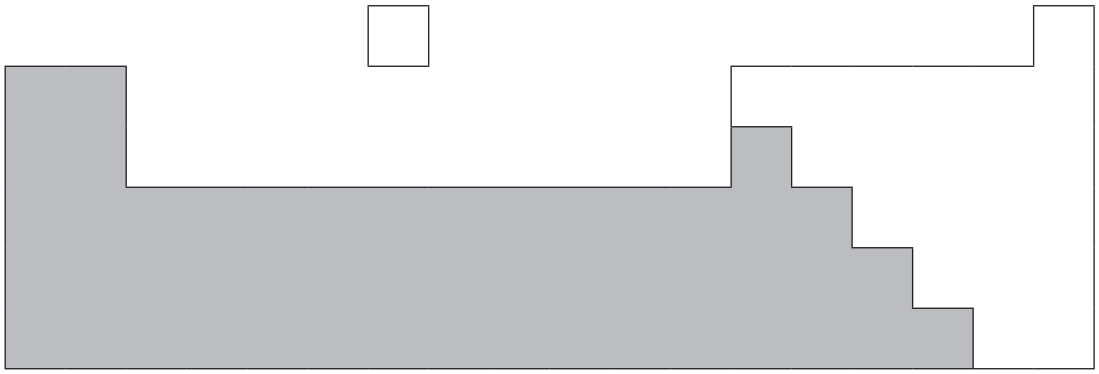
(b) Complete the following sentences using the words below.

non-metallic **diatomic** **metallic** **ionic** **transition metal**

Covalent bonding is typical of _____ elements and compounds.

Two atoms covalently bonded in a molecule means that the molecule is _____. [2]

6 The diagram below shows an outline of part of the modern Periodic Table.



(a) The elements in the shaded area in the diagram have similar physical properties.
Give **two** physical properties of the elements in this area.

1. _____

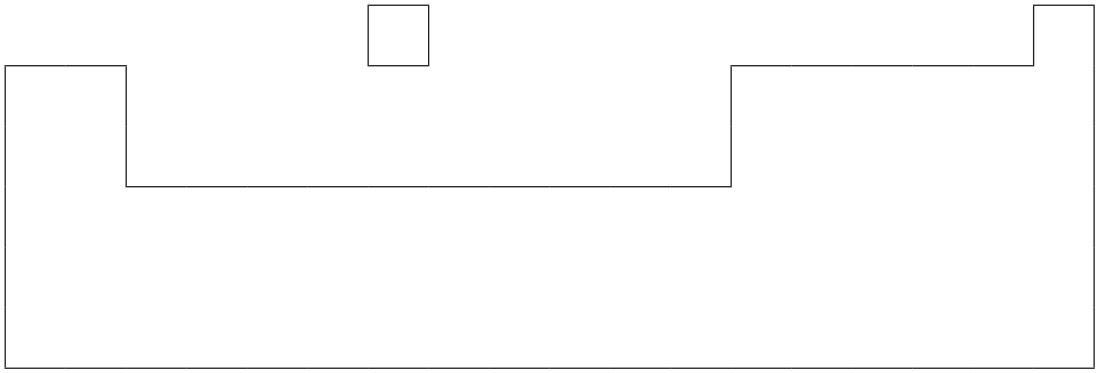
2. _____ [2]

(b) In the outline below shade in:

- the area where you would find the Group called the halogens – label this Group H

and

- the area where you would find the Group called the alkaline earth metals – label this Group AE.



[2]

[Turn over

(c) This question is about the chemistry of the alkali metals sodium and potassium.

Describe:

- how sodium and potassium are stored and what is observed if a piece of sodium is placed on some filter paper and then cut with a knife or spatula
- what is observed if a small piece of sodium is dropped into a large beaker or trough containing water (give four or more observations if you can)
- at least two ways in which the reaction of potassium with water is different to that of sodium with water.

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

How sodium and potassium are stored and what is observed if a piece of sodium is placed on some filter paper and then cut with a knife or spatula:

What is observed if a small piece of sodium is dropped into a large beaker or trough containing water (giving four or more observations if you can):

At least two ways in which the reaction of potassium with water is different to that of sodium with water:

[6]

[Turn over

7 **(a)** Complete the **definition** of a **salt** by adding the **three** missing words.

A salt is a compound which is formed when some or all of

the _____ ions of an _____

are replaced by _____ ions or ammonium ions. [3]

(b) The symbol equation below shows a reaction forming a salt.

$$CaO + H_2SO_4 \longrightarrow CaSO_4 + H_2O$$

(i) Rewrite this symbol equation as a word equation.

_____ [2]

(ii) What colour would you expect the salt to be in the dry solid state?

_____ [1]

(iii) Explain why this reaction can also be described as a neutralisation reaction.

_____ [1]

(c) The chemical formula for ammonium sulfate is $(NH_4)_2SO_4$

Complete the table below.

Number of nitrogen atoms in formula	Number of hydrogen atoms in formula	Number of sulfur atoms in formula	Number of oxygen atoms in formula

[1]

8 **(a)** Calculate the relative formula masses (M_r) of each of the following:
(relative atomic masses: H = 1; N = 14; O = 16; S = 32)

ammonium hydroxide NH_4OH

_____

nitric acid HNO_3

_____

ammonium sulfate $(NH_4)_2SO_4$

_____ [3]

(b) The relative formula mass of sodium carbonate is 106.

Calculate the number of moles in 30.5 g of sodium carbonate.
Give your answer to 2 decimal places.

_____ [2]

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

Examiner Number