Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2019–2020

Double Award Science: Chemistry

Unit C1

Foundation Tier

[GDW21] *GDW21*

THURSDAY 27 FEBRUARY 2020, 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 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**.
A Data Leaflet, which includes a Periodic Table of the elements is provided.

13046

1 Solutions may be classified as acidic, alkaline or neutral.

(a) Universal indicator paper was dipped into a solution of hydrochloric acid.

What colour is the universal indicator paper now?

_____

Name a different indicator that could be used to show a solution is acidic.

_____

[2]

(b) Five solutions A, B, C, D and E were tested with a pH meter. The pH of each solution is shown in the table below:

Solution	pH
A	5.7
B	13.8
C	2.9
D	9.6
E	7.0

Which solution A, B, C, D or E is a strong alkali?

_____

What is the pH range of a strong acid?
Circle the correct answer.

0–2 0–3 1–3 3–6 0–6 1–6

[2]

(c) What is the formula of the ion which is present in all acids?
Circle the correct answer.

H H^- H^+ OH^+ OH^- OH [1]

(d) Copper(II) oxide reacts with warm dilute sulfuric acid.

(i) Complete the word equation for the reaction of copper(II) oxide and sulfuric acid.

copper(II) oxide + sulfuric acid → + [2]

(ii) Describe what is observed when solid copper(II) oxide is added to warm dilute sulfuric acid.

_____

_____

_____ [2]

[Turn over

2 The modern Periodic Table contains over 100 elements.

(a) Define the term **element** by completing the sentence below:

An element is a substance that consists of _____

_____ [1]

(b) The list below contains some symbols and formulae:

K **CO_2** **Ne** **Co**

Mg **I_2** **O_2**

Choose the symbol or formula, from the list, which represents:

a molecule which is a compound

_____

a Group 2 element

_____

a Period 3 element

_____

a non-metal element which is **not** a gas

_____ [4]

(c) Use words from the list below to help you complete the sentences about sodium.

high **sinks** **rusts** **low** **tarnishes**

shiny **transparent** **floats**

Sodium has a _____ density.

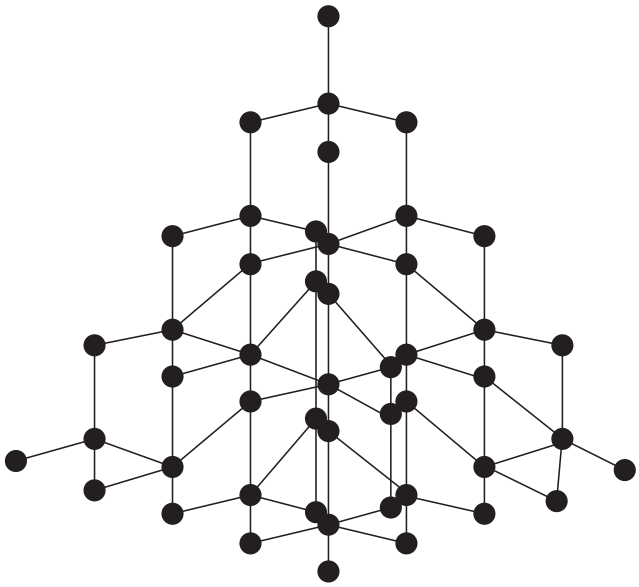
Sodium _____ when placed in water. Freshly cut sodium

appears _____ but _____ quickly in air.

[4]

[Turn over

3 The diagram below shows part of the giant structure of diamond.



Use this diagram along with your knowledge and understanding of diamond, to help you complete the sentences below.

Put a circle around the correct word from each box.

The bonds in diamond are | ionic / covalent / metallic | and are very | strong. / weak. / hard.

Each carbon atom in diamond is joined to | two / three / four | other atoms.

The melting point of diamond is

high.
low.
medium.

Diamond, graphite and

graphium
graphene
graphond

are all allotropes of carbon. [5]

[Turn over

4 Atoms consist of three subatomic particles.

(a) Complete the passage below about atomic structure by circling the correct answers.

The | neutron / nucleus / shell | is the central part of the atom, which

contains | ions / isotopes / protons | and | never / sometimes / always | contains electrons. [3]

(b) The table below gives information about the particles in an atom.
Complete the table.

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

[3]

(c) Atom A has 3 protons, 4 neutrons and 3 electrons.
What is the mass number of atom A?
Circle the correct answer.

3 4 6 7 10 [1]

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(Questions continue overleaf)

[Turn over

5 The table below shows the percentage by mass of three elements in fertilisers X, Y and Z. Each of these fertilisers contains a mixture of compounds.

Fertiliser	%N	%P	%K
X	6	24	24
Y	8	32	16
Z	24	24	16

(a) (i) Name the **three** elements present in these fertilisers.

_____ [1]

(ii) Fertilisers X and Y can be used to help the growth of tomatoes. Fertiliser Z does not help the growth of tomatoes.

Use the information in the table to help you suggest a reason why fertiliser Z does not help the growth of tomatoes.

_____

_____ [1]

(iii) Explain fully why the fertilisers X, Y and Z can be described as formulations.

_____

_____

_____

_____

_____ [3]

(b) Some materials have new properties when their particle size is reduced. These smaller particles are called nanoparticles. Zinc oxide and titanium oxide nanoparticles are used in sun creams.

Give two advantages of using nanoparticles in sun creams.

1. _____

2. _____ [2]

[Turn over

6 Outline the chemistry of the Group 7 elements.

Your answer should include:

- A description of the colour and physical state at room temperature of chlorine, bromine and iodine
- What is observed if iodine is heated in a boiling tube
- A description of the test for chlorine

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

A description of the colour and physical state at room temperature of chlorine, bromine and iodine:

What is observed if iodine is heated in a boiling tube:

A description of the test for chlorine:

[6]

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(Questions continue overleaf)

[Turn over

7 The electronic configurations of several atoms are shown in the table below.

Atom	Electronic configuration
Mg	2, 8, 2
Cl	2, 8, 7
H	1
F	2, 7
K	
	2, 6
N	

(a) Complete the table. [3]

(b) Using the electronic configurations in the table above, explain how magnesium atoms and chlorine atoms react to form the ionic compound magnesium chloride.

[4]

(c) Using the electronic configurations in the table opposite, draw a dot and cross diagram of a hydrogen fluoride molecule, HF. Show outer shell electrons only. Label a lone pair of electrons on the diagram.

[3]

[Turn over

8 Barium, a Group 2 metal, forms a variety of compounds.

(a) Calculate the relative formula masses of $Ba(OH)_2$ and $BaSO_4$.
(Relative atomic masses: H = 1; O = 16; S = 32; Ba = 137)

$Ba(OH)_2$

_____

$BaSO_4$

_____

[2]

(b) The relative formula mass of barium nitrate, $Ba(NO_3)_2$, is 261.

(i) Calculate the mass, in grams, present in 0.02 moles of $Ba(NO_3)_2$.

_____ g [1]

(ii) Calculate the number of moles in 14.0 g of $Ba(NO_3)_2$.
Give your answer to 3 decimal places.

[1]

(c) The word equation for the reaction of barium with oxygen is:

barium + oxygen ⟶ barium oxide

Write a balanced symbol equation for this reaction.

[3]

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

Examiner Number

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