Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017–2018

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

MV18

[GSS21]

THURSDAY 17 MAY 2018, MORNING

Time

1 hour, plus your additional time allowance.

Instructions to Candidates

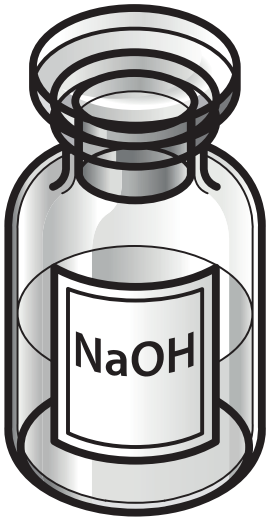
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write on blank pages.
Complete in black ink only.
Answer **all ten** questions.

Information for Candidates

The total mark for this paper is 60.
Quality of written communication will be assessed in Question **9**.
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.
A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

1 **(a)** Oven cleaner contains sodium hydroxide which is a corrosive substance.

(i) In the box below draw the hazard symbol for a corrosive substance. [1 mark]



(ii) Suggest **one** reason why anyone using oven cleaner should wear gloves. [1 mark]

_____

_____

(b) Vinegar is a common acidic household substance.

(i) What is the chemical name for vinegar? [1 mark]

Circle the correct answer.

citric acid

ethanoic acid

hydrochloric acid

(ii) Complete the following sentence. [1 mark]

Choose from:

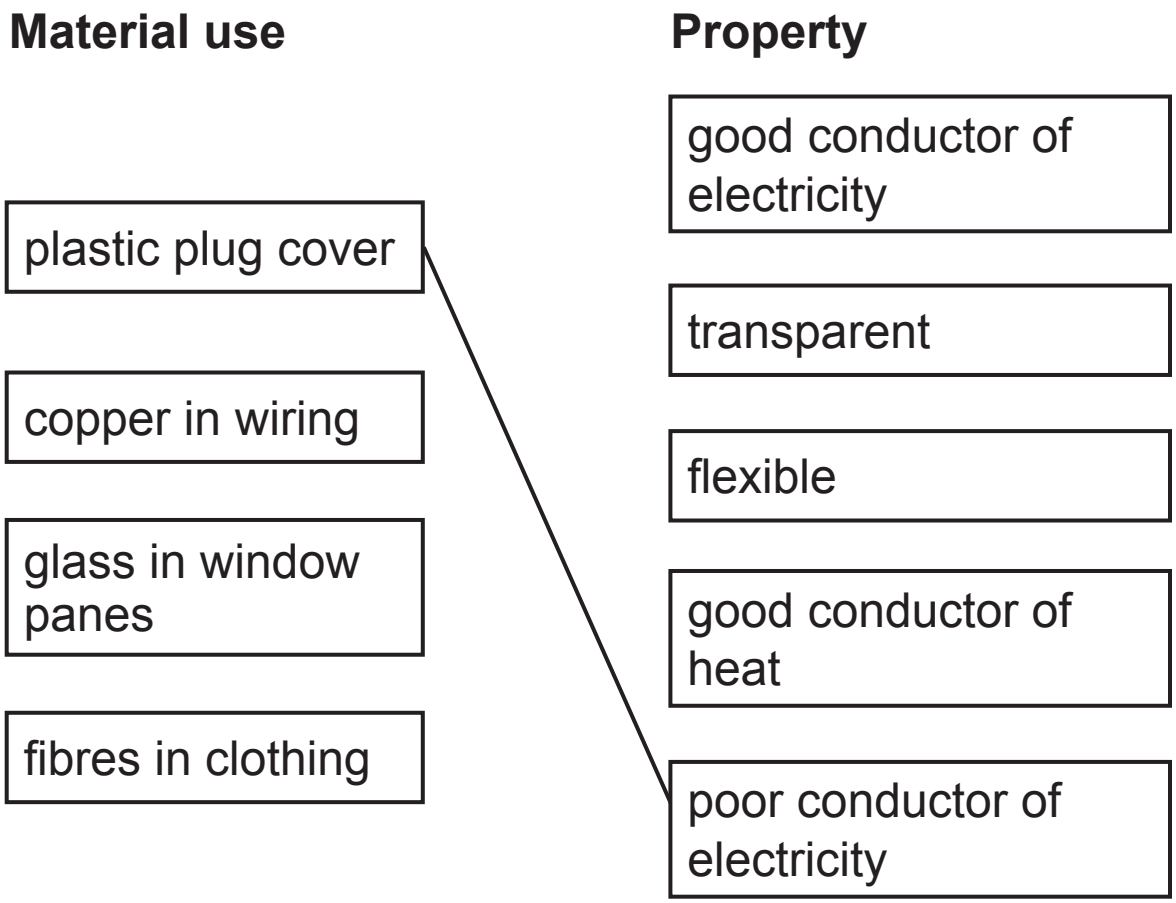
neutral

acidic

alkaline

Vinegar can be used to treat a wasp sting because a wasp sting is _____ .

2 **(a)** Materials have particular uses depending on their properties.
Using lines, match each material use to **one** property that makes it suitable for that use. [2 marks]
One has been done for you.



(b) Car bodies can be made from glass fibre. This material combines the properties of glass and plastic fibres producing a more useful material.

(i) What name is given to this type of material? [1 mark]

Circle the correct answer.

composite material

smart material

nanomaterial

(ii) Suggest **one** advantage of using glass fibre for car bodies. [1 mark]

_____

_____

3 The Periodic Table is a way of classifying the chemical elements.

(a) Tick (✓) **two** correct statements about the Periodic Table below. [2 marks]

Statement	**Tick (✓)**
Group 1 metals do **not** react with cold water	
the vertical columns are called Periods	
the elements are arranged by atomic number	
noble gases are very unreactive	

(b) Name **one** element that is an alkaline earth metal. [1 mark]

_____

(c) What name is given to the Group 7 elements? [1 mark]

_____

(d) Complete the following sentence about the development of the Periodic Table. [1 mark]

Choose from:

octaves

groups

elements

In 1864 John Newlands proposed the law of

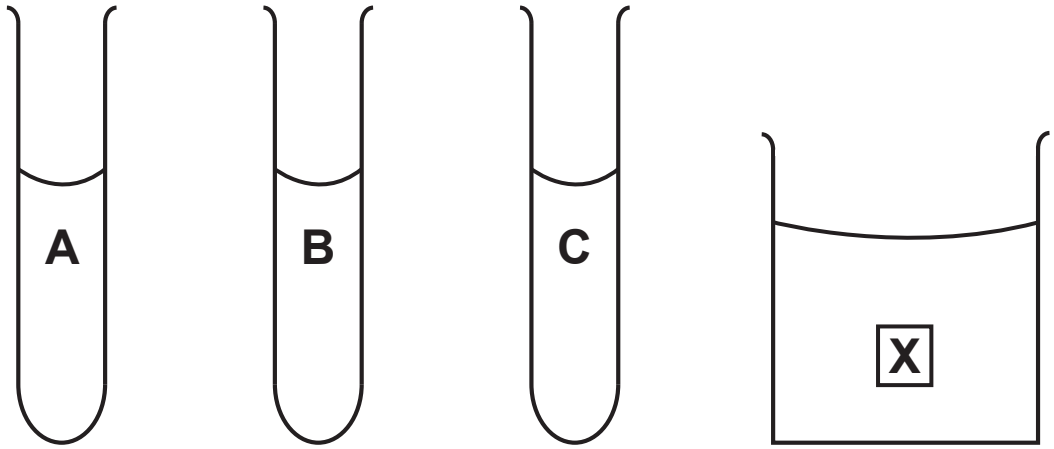
_____.

(e) Name the Russian scientist who further developed Newlands' table by leaving gaps for undiscovered elements. [1 mark]

_____

4 A student investigated the hardness of three water samples, **A**, **B** and **C**, using the method described below.

1. Measure 10 cm^3 of each water sample and place into three separate test tubes as shown below.



2. Add 1 cm^3 of the solution labelled **X** and shake for 30 seconds.
3. Repeat step 2 until a permanent lather is formed.
4. Record the volume of solution **X** used.

(a) Solution **X** is added in step 2 to test for hardness of water. What is solution **X**? [1 mark]

_____

(b) Give **two** things that were done to make this investigation a fair test. [2 marks]

1. _____

2. _____

(c) Explain how the student would know which sample was the hardest using the volumes of solution **X** added. [1 mark]

_____

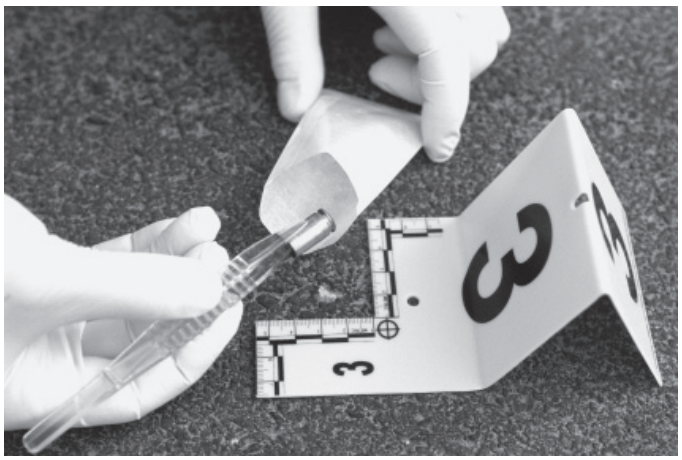
_____

(d) Give **two** disadvantages of hard water. [2 marks]

1. _____

2. _____

5 Evidence collected by forensic scientists can be used in court to identify someone who has committed a crime.



Forensic scientists at a crime scene should wear protective clothing. Before anything is moved or touched, the scene must be fully documented and photographed.

Clothes should be placed in separate bags and labelled. Items collected from the suspect and victim should not be in contact to prevent contamination. Bed clothes should be carefully handled to avoid loss of hairs and fibres. All fibres that might have transferred to a suspect or victim should be collected.

Use this information to answer parts **(a)** and **(b)** below.

(a) Give **two** pieces of evidence that could be collected at this crime scene. [1 mark]

1. _____

2. _____

(b) Give **one** thing that should be done to make sure evidence is not contaminated at this scene. Explain why this is done. [2 marks]

_____

_____

_____

_____

(c) Explain fully why fingerprints are useful in placing a person at a crime scene. [2 marks]

_____

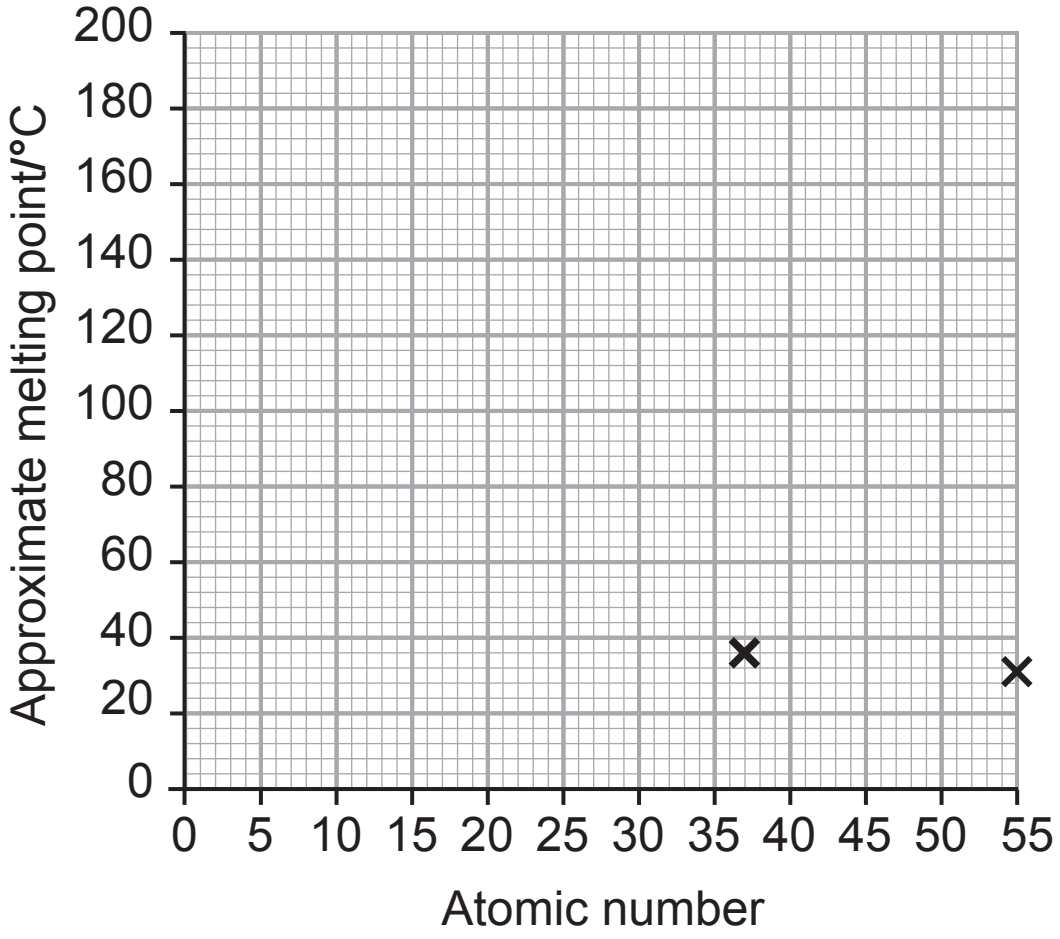
_____

_____

6 **(a)** The table below gives the approximate melting point of some Group 1 elements.

Element	Atomic number	Approximate melting point/°C
lithium	3	180
sodium	11	100
potassium	19	60
rubidium	37	35
caesium	55	30

(i) On the grid below, complete the line graph by plotting the remaining points and drawing a line of best fit. [3 marks]



(ii) Complete the following sentence to describe the trend shown by this information. [1 mark]

As atomic number _____

_____

(iii) Francium is another Group 1 element. It has an atomic number of 87.

Predict the melting point of francium. [1 mark]

_____ °C

(b) The Group 1 metal, potassium, is stored in oil in the laboratory.

(i) Explain why potassium needs to be stored in oil. [1 mark]

_____

_____

(ii) Apart from wearing safety goggles, state **two** other safety precautions needed when adding potassium to water. [2 marks]

1. _____

2. _____

(iii) Give **one** similarity and **one** difference in the reactions of potassium and lithium with water. [2 marks]

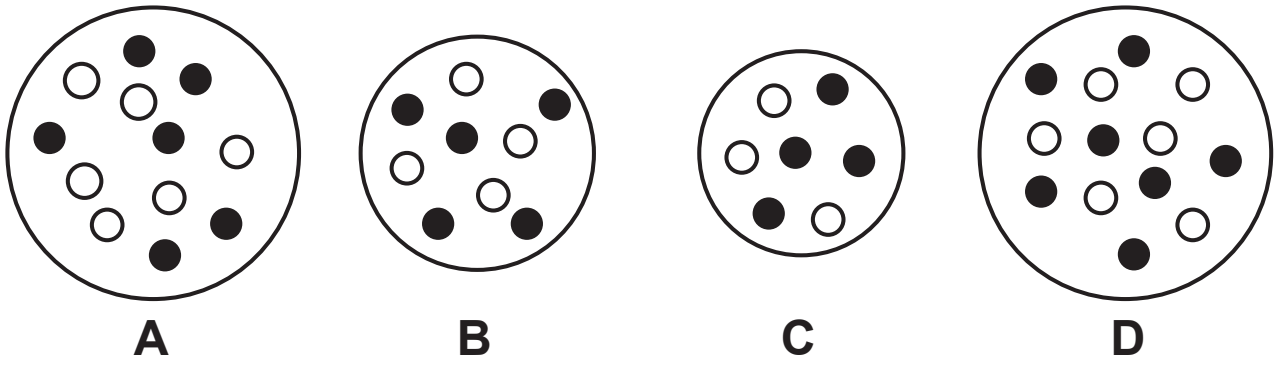
Similarity _____

_____

Difference _____

_____

7 **(a)** The diagrams below show the nuclei (protons and neutrons) of four atoms **A**, **B**, **C** and **D**.



Key: ○ Proton
● Neutron

(i) Which atom (**A**, **B**, **C** or **D**) has an atomic number of four? [1 mark]

_____

(ii) Name the element represented by **C**. [1 mark]

You may find your Data Leaflet helpful.

_____

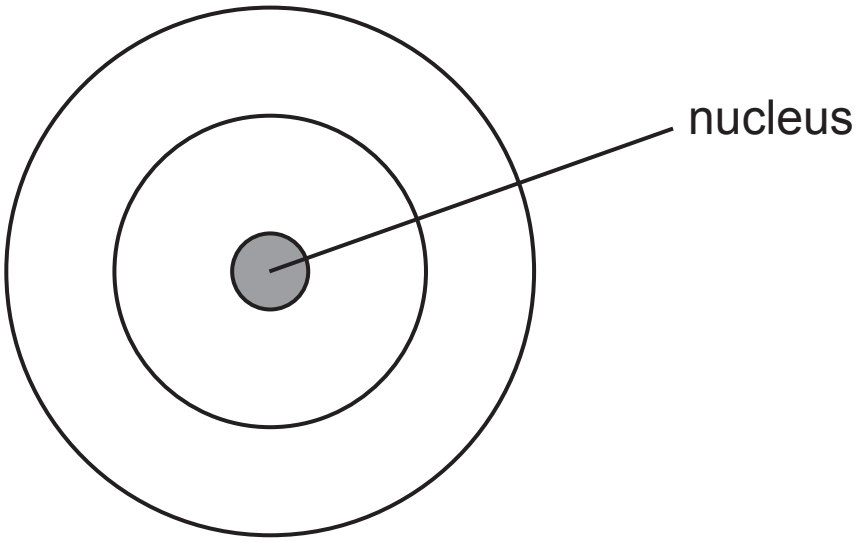
(iii) Which two nuclei (**A**, **B**, **C**, **D**) are from the same element? [1 mark]

_____ and _____

(b) (i) How many electrons will an atom of element **B** have? [1 mark]

_____

(ii) On the diagram below show how the electrons in element **B** are arranged. [1 mark]



(iii) What is the Group number and Period number of element **B**? [2 marks]

Group _____ Period _____

8 **(a)** Elements and compounds can be represented by chemical symbols and formulae but they must be written correctly.

You may find your Data Leaflet helpful.

(i) What is the correct formula for sodium chloride? [1 mark]

Circle the correct answer.

Na_2Cl_2

Na_2Cl

$NaCl_2$

NaCl

(ii) What is the correct formula for magnesium chloride? [1 mark]

Circle the correct answer.

$mgcl_2$

$MgCl_2$

$MGCL_2$

$mGcL_2$

(b) A compound has the formula $CaSO_4$.

(i) How many elements are present in $CaSO_4$? [1 mark]

_____

(ii) How many atoms are represented by the formula $CaSO_4$? [1 mark]

_____

(iii) Name the compound with the formula $CaSO_4$. [1 mark]

_____

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9 Indigestion can cause severe stomach pain.
Many indigestion tablets contain sodium hydrogencarbonate.

Explain how indigestion tablets work. [6 marks]

Your answer should include:

- the cause of stomach indigestion
- how these tablets remove indigestion
- the names of the chemicals produced during this reaction.

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

10 The table below gives the colour of five indicators at different pH values.

Indicator \ pH	1	2	3	4	5	6	7	8	9	10	11	12	13	14
cresol red	R	O	Y	Y	Y	Y	Y	V	V	V	V	V	V	V
universal	R	R	O	O	Y	Y	G	B	B	I	I	I	V	V
thymol blue	Y	Y	Y	Y	Y	Y	Y	Y	B	B	B	B	B	B
phenolphthalein	C	C	C	C	C	C	C	P	P	P	P	P	P	P
blue litmus	R	R	R	R	R	R	B	B	B	B	B	B	B	B

Key:
R = red;
O = orange;
Y = yellow;
C = colourless;
P = pink;
G = green;
B = blue;
I = indigo;
V = violet

(a) Use the information from the table above to answer the following questions.

(i) What colour is thymol blue indicator in a neutral solution? [1 mark]

_____

(ii) Name the indicator which gives the largest range of colours. [1 mark]

_____

(iii) Name the indicator which can **not** distinguish between pH 1 and pH 8. [1 mark]

_____

(b) Suggest **two** reasons why phenolphthalein indicator is of limited use when testing solutions with different pH values. [2 marks]

_____

_____

_____

(c) Complete the word equation below for the reaction of an acid with an alkali. [2 marks]

sulfuric acid + ☐ → sodium sulfate + ☐

THIS IS THE END OF THE QUESTION PAPER

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Q4.....Source: Principal Examiner

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Q7(a) .....Source: Principal Examiner

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Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
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10	
Total Marks	

Examiner Number