



Rewarding Learning

General Certificate of Secondary Education  
2019–2020

Centre Number

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Candidate Number

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# Single Award Science: Chemistry

Unit 2  
Foundation Tier



[GSA21]

\*GSA21\*

**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 **eleven** 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 11.

A Data Leaflet, which includes a Periodic Table of the Elements, is included for your use.

12624



\*24GSA2101\*

- 1 (a) Shown below are some hazard symbols and their names.  
Using lines, match each symbol to its name. The first one has been done for you.

**Hazard symbol**

**Name**



explosive



corrosive



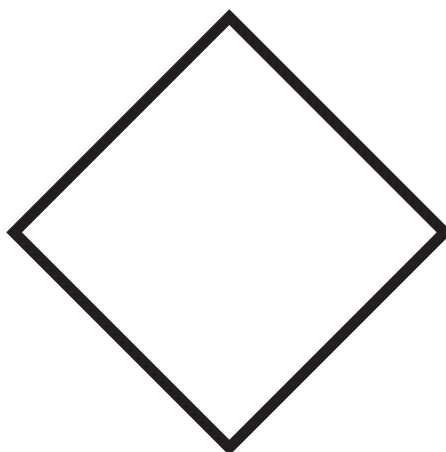
toxic

flammable

© Getty Images

[2]

- (b) Copper sulfate must be handled with caution. In the box below draw the hazard symbol for caution.



[1]





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**DO NOT WRITE ON THIS PAGE**  
**(Questions continue overleaf)**

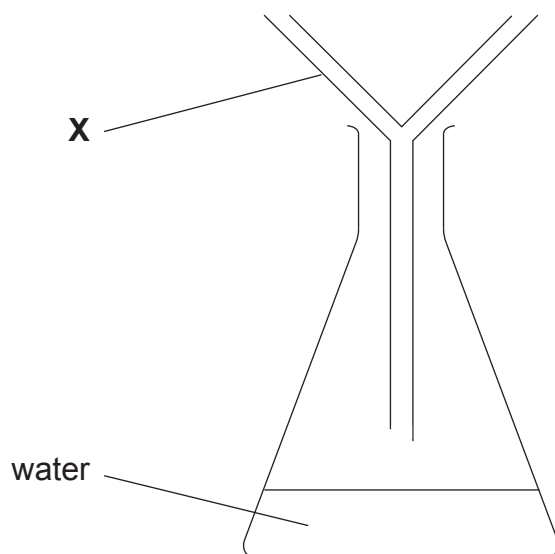
12624

[Turn over



\*24GSA2103\*

- 2 The diagram below shows how water can be separated from a mixture of water and soil.



Source: Principal Examiner

- (a) Name the piece of apparatus labelled **X**.

\_\_\_\_\_ [1]

- (b) What name is given to the water separated from the mixture in this process?

Choose from:

**filtrate**

**residue**

**distillate**

\_\_\_\_\_ [1]



(c) Place a tick (✓) in **one** box below to show which mixture could be separated using the same apparatus.

salt and water

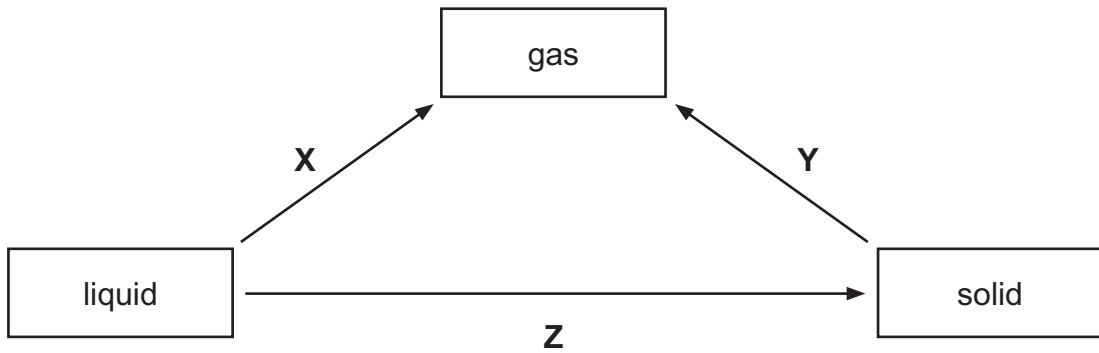
water and ink

stones and water

[1]



3 The diagram below shows three changes of state labelled X, Y and Z.



(a) Which letter X, Y or Z could represent:

water freezing? \_\_\_\_\_

water evaporating? \_\_\_\_\_

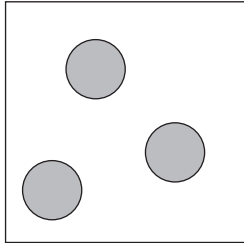
[2]



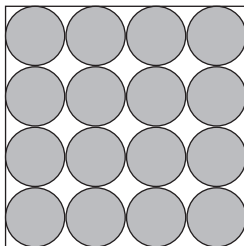
- (b) Solids, liquids and gases contain particles as shown in the diagrams below. Using lines, match each particle diagram to the state of matter it represents. One has been done for you.

**Particle diagram**

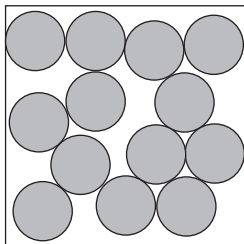
**State of matter**



solid



liquid



gas

[1]

- (c) Complete the following sentence.

Some solids can turn directly into a gas.

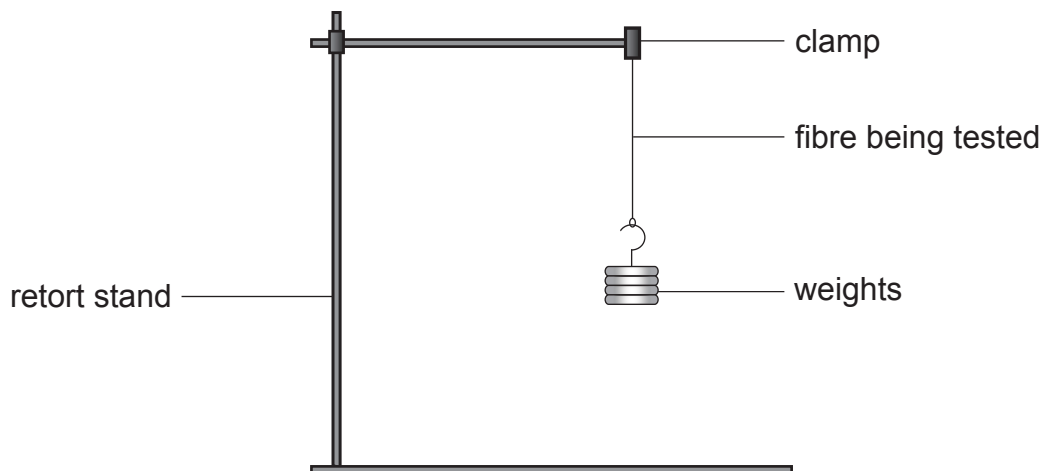
This process is called \_\_\_\_\_.

[1]

[Turn over



- 4 A student investigated the strength of five different fibres using the apparatus shown below.



Source: Principal Examiner

- (a) State **one** thing that must have been done to make this a fair test.

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[1]

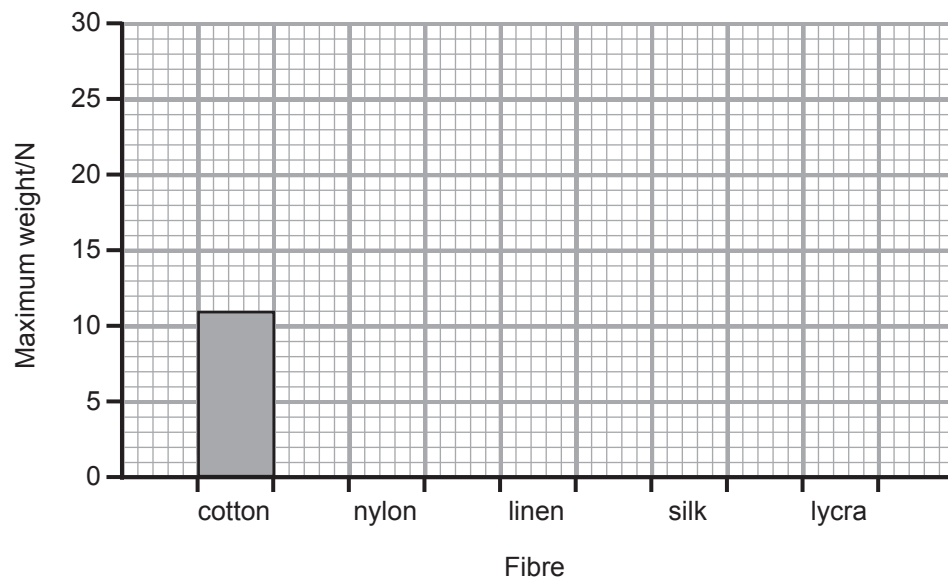
- (b) The maximum weight each fibre could hold before breaking was measured. The results are shown below.

Fibre	Maximum weight/N
cotton	11
nylon	20
linen	9
silk	8
lycra	30





(i) Complete the bar chart below for the results shown in the table.



[2]

(ii) Put the five fibres in order of strength from strongest to weakest.

\_\_\_\_\_ **strongest**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **weakest**

↓

[2]

[Turn over



(c) Nylon and lycra are synthetic, the other fibres tested are natural materials.

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

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[1]

(ii) From the investigation results what conclusion can the student make about the strength of synthetic fibres compared to natural fibres?

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[1]



- 5 Clare investigated the temperature change for four different chemical reactions (**T**, **U**, **V** and **W**). Her results are shown below.

Reaction	Start temperature/ °C	End temperature/ °C	Change in temperature/°C
<b>T</b>	22	68	+46
<b>U</b>	21	19	-2
<b>V</b>	22	47	
<b>W</b>	22	79	+57

- (a) Name the piece of apparatus that Clare could use to measure the temperature of these reactions.

\_\_\_\_\_ [1]

- (b) Calculate the change in temperature for reaction **V**.

\_\_\_\_\_ °C [1]

- (c) The temperature for reaction **U** decreased because it takes in heat. What name is given to this **type** of reaction?

\_\_\_\_\_ [1]

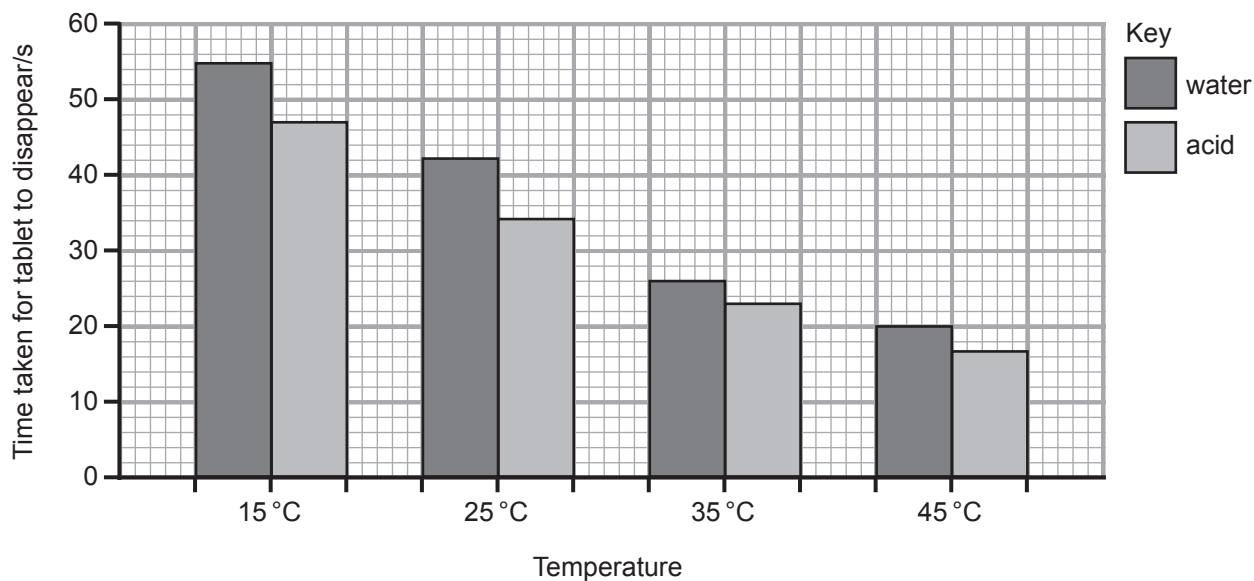
- (d) State **one** way that Clare could improve the reliability of her results.

\_\_\_\_\_  
\_\_\_\_\_ [1]

[Turn over



- 6 The bar chart below shows the time taken for an indigestion tablet to disappear in water and in acid at different temperatures.



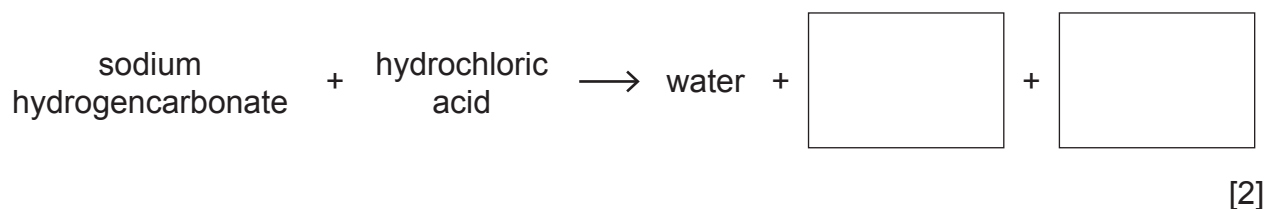
- (a) State **two** conclusions that can be made from this information.

1. \_\_\_\_\_  
 \_\_\_\_\_

2. \_\_\_\_\_  
 \_\_\_\_\_

[2]

- (b) (i) Indigestion tablets can contain sodium hydrogencarbonate. Complete the word equation below to show its reaction with hydrochloric acid.



- (ii) What name is given to this type of reaction?

\_\_\_\_\_ [1]



(iii) Sodium hydrogencarbonate has the formula  $\text{NaHCO}_3$ . How many elements are represented by this formula?

\_\_\_\_\_ [1]



- 7 The table below gives some observations when three Group 1 metals **A**, **B** and **C** are added to water.

Metal	Observations when the metal is added to water
<b>A</b>	<ul style="list-style-type: none"><li>• burns with a lilac flame</li><li>• floats</li><li>• very quickly disappears</li></ul>
<b>B</b>	<ul style="list-style-type: none"><li>• floats</li><li>• eventually disappears</li></ul>
<b>C</b>	<ul style="list-style-type: none"><li>• orange sparks</li><li>• floats</li><li>• quickly disappears</li></ul>

- (a) Use this information to place the metals **A**, **B** and **C** in order of reactivity. Put the **least** reactive first.

\_\_\_\_\_ least reactive  
\_\_\_\_\_ ↓  
\_\_\_\_\_ most reactive

[1]

- (b) Apart from the information given in the table, state **one** other observation that would be seen during the reaction of Group 1 metals with water.

\_\_\_\_\_

[1]

- (c) Apart from wearing safety goggles, give **one** safety precaution needed when adding these metals to water.

\_\_\_\_\_

[1]



(d) Sodium is a Group 1 metal which reacts with water and produces sodium hydroxide. What is the formula for sodium hydroxide?

Circle your answer.

$\text{Na}_2\text{OH}$       :       $\text{NaOH}$       :       $\text{Na}(\text{OH})_2$

[1]



8 (a) The table below gives information about the colours of three indicators.

	pH 1	pH 2	pH 3	pH 4	pH 5	pH 6	pH 7	pH 8	pH 9	pH 10	pH 11	pH 12
blueberries	R	R	V	V	G	G	G	G	G	G	G	G
red cabbage	P	P	P	V	V	B	B	B	G	G	Y	Y
litmus solution	R	R	R	R	R	R	V	B	B	B	B	B

Key	
P	Pink
R	Red
Y	Yellow
G	Green
B	Blue
V	Violet

(i) What colour will blueberry indicator be in an alkali?

\_\_\_\_\_ [1]

(ii) What colour will red cabbage indicator be in water?

\_\_\_\_\_ [1]

(iii) Name the indicator that would show the difference between a pH 8 and a pH 12 solution.

\_\_\_\_\_ [1]





(iv) A student is adding an acid to an alkali. Which indicator would be the best to show when the solution changes from an acid to an alkali? Explain your answer.

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[2]

(b) Describe how an indicator can be made from blueberries.

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[3]

(c) A pH meter can also be used to measure the pH of a solution. Give **one** reason why using a pH meter is better than using a chemical indicator.

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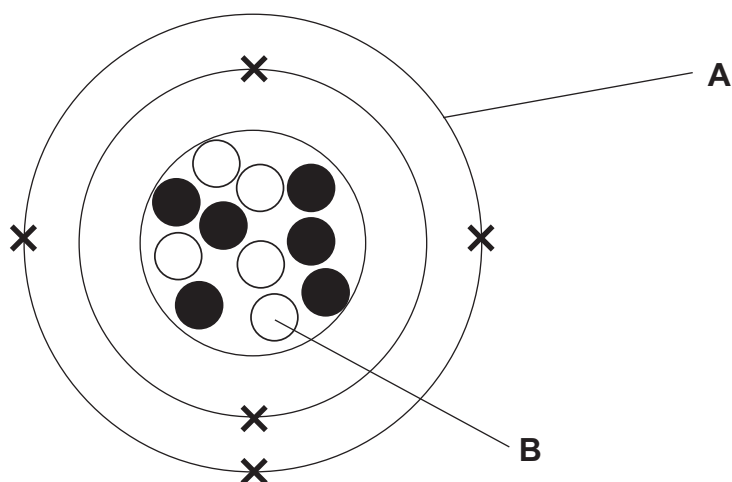
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[1]

[Turn over



9 (a) The diagram below shows an atom of boron.



(i) Name the parts labelled **A** and **B** on the diagram above.

**A** \_\_\_\_\_

**B** \_\_\_\_\_

[2]

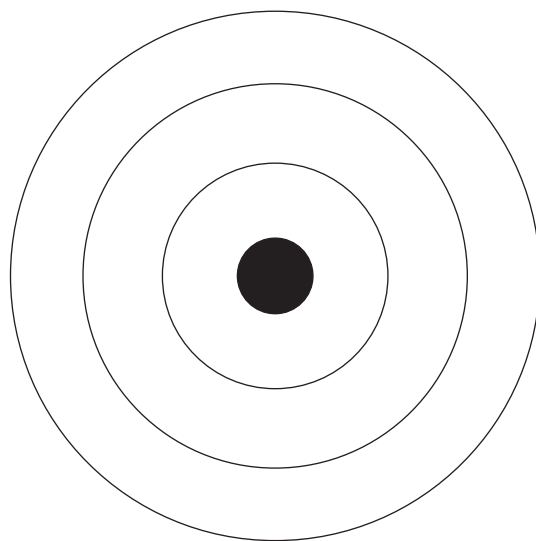
(ii) Colin knows that boron is in Group 3 of the Periodic Table.  
How can he tell this from the diagram above?

\_\_\_\_\_  
\_\_\_\_\_

[1]



- (b) A silicon atom has fourteen electrons.  
Complete the diagram below to show how these electrons are arranged in an atom of silicon.



[1]

- (c) What is meant by the term **atomic number**?

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[1]

[Turn over



- 10 The table below gives the amount of energy released when the first four alkanes are burnt.

Number of carbon atoms	Energy released/ kJ/mol
1	891
2	1561
3	2220
4	2878

- (a) Give the trend shown by this information.

\_\_\_\_\_ [1]

- (b) Predict the amount of energy released when an alkane with 5 carbon atoms is burnt.

\_\_\_\_\_ kJ/mol [1]

- (c) Calculate how much more energy is released when the alkane with 4 carbon atoms is burnt compared to the alkane with 1 carbon atom.

(Show your working out.)

\_\_\_\_\_ kJ/mol [2]



(d) Alkanes are hydrocarbons. What is meant by the term **hydrocarbon**?

\_\_\_\_\_

\_\_\_\_\_ [2]

(e) When hydrocarbons burn they produce carbon dioxide. Name the chemical used to test for this gas and describe the colour change observed.

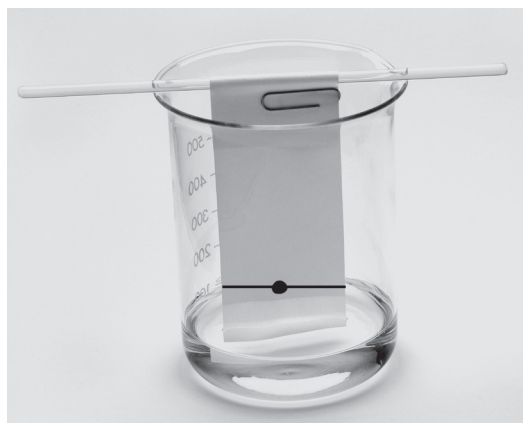
Chemical \_\_\_\_\_

Colour change: from \_\_\_\_\_ to \_\_\_\_\_ [3]

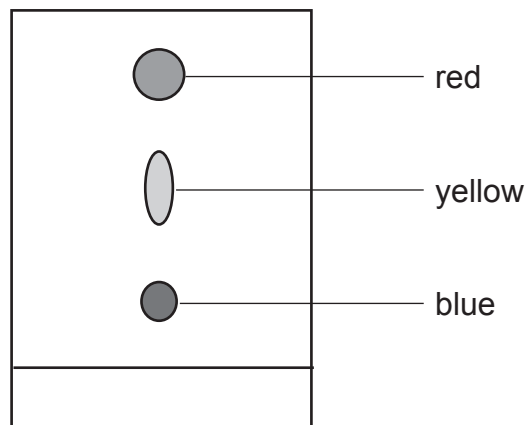
[Turn over



11 Shown below is the set-up and result of an experiment used to separate the colours in black ink.



set-up



result

© Trevor Clifford Photography / Science Photo Library

Describe how this experiment is carried out.

Your answer should include:

- the set-up of the experiment;
- the name of this method of separation;
- two conclusions that can be made from these results.

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

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[6]

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**THIS IS THE END OF THE QUESTION PAPER**

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For Examiner's use only	
Question Number	Marks
1	
2	
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11	

<b>Total Marks</b>	
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Examiner Number

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\*24GSA2124\*