Cambridge Assessment International Education

Cambridge IGCSE™ (9–1)

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

9200480553

CHEMISTRY **0971/62**

Paper 6 Alternative to Practical **May/June 2020**

1 hour

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Blank pages are indicated.

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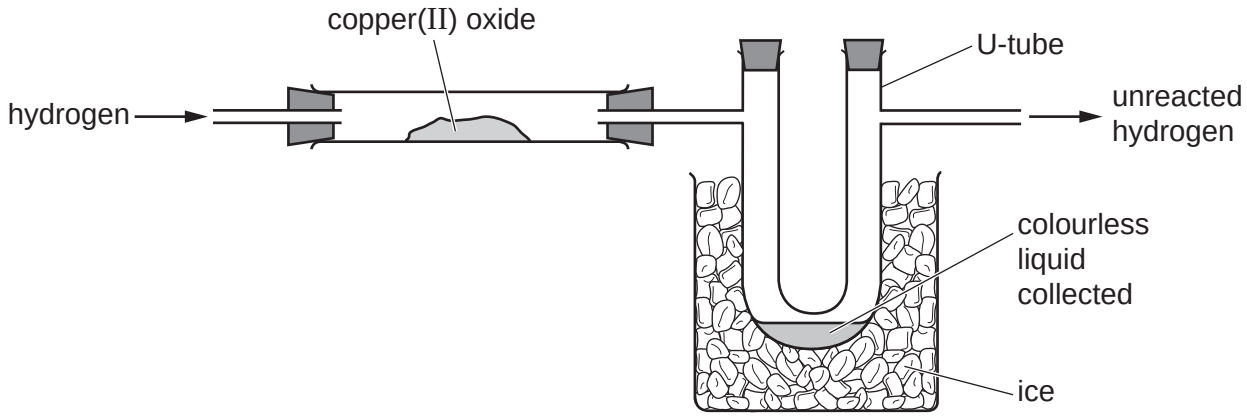
1 Hot copper(II) oxide reacts with hydrogen. The products are copper and steam.

The apparatus used to react copper(II) oxide with hydrogen is shown.



(a) Draw an arrow **on the diagram** to show where the apparatus should be heated. [1]

(b) During the reaction the colour of the copper(II) oxide changes.

State the colour change.

from ..... to .....
[1]

(c) Identify the colourless liquid collected.

..... [1]

(d) Explain why the U-tube is in ice.

.....

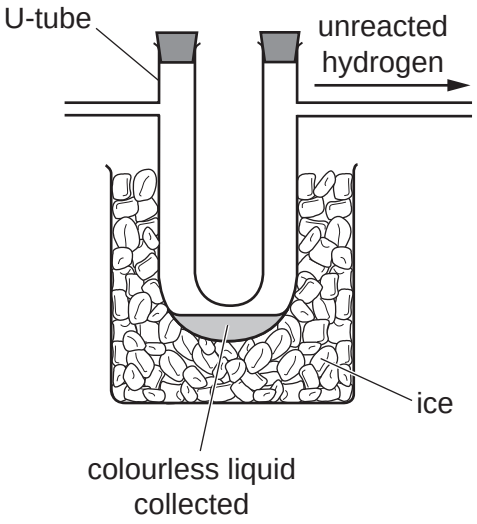
..... [2]

(e) (i) Large amounts of unreacted hydrogen should **not** be allowed to escape into the laboratory.

State why.

..... [1]

(ii) Complete the diagram to show how the unreacted hydrogen could be collected and its volume measured.
Label any apparatus that you draw.



[2]

[Total: 8]

2 A student investigated the temperature change when magnesium ribbon reacts with dilute sulfuric acid.

Five experiments were done.

Experiment 1

- Using a measuring cylinder, 20 cm^3 of dilute sulfuric acid were poured into a boiling tube.
- A thermometer was used to measure the initial temperature of the acid.
- A 1 cm length of magnesium ribbon was added to the acid in the boiling tube.
- The acid and magnesium ribbon in the boiling tube were stirred continuously using a thermometer.
- The highest temperature reached by the mixture was measured.
- The boiling tube was rinsed out with distilled water.

Experiment 2

- Experiment 1 was repeated using a 2 cm length of magnesium ribbon instead of the 1 cm length.

Experiment 3

- Experiment 1 was repeated using a 3 cm length of magnesium ribbon instead of the 1 cm length.

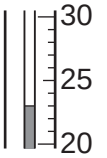
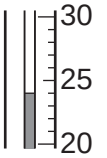
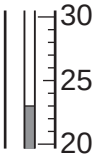
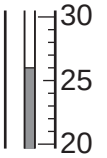
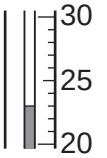
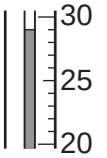
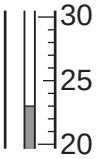
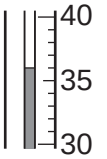
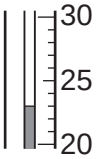
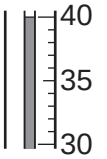
Experiment 4

- Experiment 1 was repeated using a 5 cm length of magnesium ribbon instead of the 1 cm length.

Experiment 5

- Experiment 1 was repeated using a 6 cm length of magnesium ribbon instead of the 1 cm length.

(a) Use the information in the description of the experiments and the thermometer diagrams to complete the table.

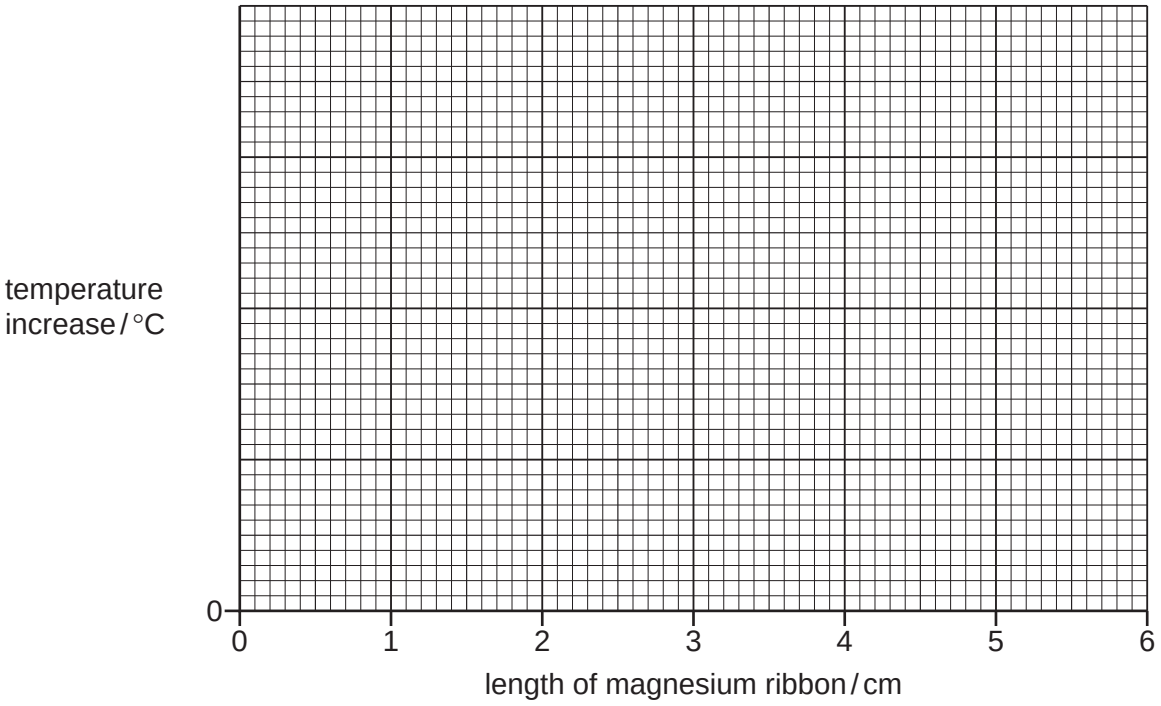
experiment	length of magnesium ribbon / cm	initial temperature		highest temperature		temperature increase / °C
		thermometer diagram	initial temperature of acid / °C	thermometer diagram	highest temperature of acid / °C	
1						
2						
3						
4						
5						

[4]

(b) In which experiment, 1, 2, 3, 4 or 5, was the temperature increase the largest?

..... [1]

(c) Add a suitable scale to the *y*-axis and plot the results from Experiments 1 to 5 on the grid. Draw a smooth line graph, making sure that your line passes through (0,0).



[5]

(d) Explain why the graph line must pass through (0,0).

.....

..... [1]

(e) **From your graph**, deduce the temperature increase if Experiment 1 is repeated using a 4 cm length of magnesium ribbon.

Show clearly **on the grid** how you worked out your answer.

.....
[3]

(f) **(i)** Why would carrying out the experiment in a polystyrene cup rather than a boiling tube improve the accuracy of the results?

.....

..... [1]

(ii) Sketch **on the grid** the graph you would expect if the experiment was repeated using a polystyrene cup instead of a boiling tube. [1]

(g) The volume of dilute sulfuric acid could be measured with a 20 cm^3 pipette.

(i) State **one** advantage of using a pipette rather than a measuring cylinder.

.....

..... [1]

(ii) State **one** disadvantage of using a pipette rather than a measuring cylinder.

.....

..... [1]

[Total: 18]

3 Two solids, solid **L** and solid **M**, were analysed. Solid **L** was chromium(III) chloride.
Tests were done on each solid.

tests on solid L

Complete the expected observations.

Solid **L** was dissolved in distilled water to produce solution **L**. Solution **L** was divided into four portions in three test-tubes and a boiling tube.

(a) To the first portion of solution **L** in the boiling tube, about 1 cm depth of dilute hydrochloric acid was added. The boiling tube was warmed gently.

A strip of filter paper was dipped in acidified potassium manganate(VII) solution and held at the mouth of the boiling tube.

observations ..... [1]

(b) To the second portion of solution **L** aqueous sodium hydroxide was added slowly until it was in excess and no further changes were seen.

observations .....

.....

..... [2]

(c) To the third portion of solution **L** aqueous ammonia was added slowly until it was in excess and no further changes were seen.

observations .....

.....

..... [2]

(d) To the fourth portion of solution **L** about 1 cm depth of dilute nitric acid was added followed by about 1 cm depth of aqueous silver nitrate.

observations .....

..... [1]

tests on solid M

Tests were done and the following observations made.

tests on solid **M**	observations
test 1 Flame test	yellow flame seen
test 2 About 10 cm^3 of dilute nitric acid was added to solid **M**. Any gas produced was tested.	effervescence limewater turned milky
test 3 About 1 cm depth of aqueous barium nitrate was added to the solution formed by adding dilute nitric acid to solid **M** in **test 2**.	no change

(e) Identify solid **M**.

..... [2]

[Total: 8]

4 Many window-cleaning products contain aqueous ammonia. Aqueous ammonia is an alkali that reacts with dilute acids.

Plan an investigation to find which of two window-cleaning products contains the most concentrated aqueous ammonia. Include in your plan:

- the method you will use
- how your results will be used to determine which window-cleaning product contains the most concentrated aqueous ammonia.

You are provided with an aqueous solution of the two window-cleaning products, dilute hydrochloric acid of known concentration and common laboratory apparatus.

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..... [6]

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