



# Cambridge IGCSE™

CANDIDATE  
NAME

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## CHEMISTRY

**0620/52**

Paper 5 Practical Test

**May/June 2020**

**1 hour 15 minutes**

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

### 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 [ ].
- Notes for use in qualitative analysis are provided in the question paper.

For Examiner's Use	
1	
2	
3	
<b>Total</b>	

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



- 1 You are going to investigate the temperature change when magnesium ribbon reacts with dilute sulfuric acid.

**Read all of the instructions carefully before starting the experiments.**

### Instructions

You are going to do five experiments.

#### Experiment 1

- Use a measuring cylinder to pour 20 cm<sup>3</sup> of dilute sulfuric acid into a boiling tube.
- Use a thermometer to measure the initial temperature of the acid. Record the initial temperature in the table in **(a)**.
- Place a 1 cm length of magnesium ribbon into the boiling tube.
- Continually stir the acid and magnesium ribbon in the boiling tube using a thermometer. Make sure the magnesium ribbon remains in the acid.
- Measure the **highest** temperature reached by the mixture. Record the highest temperature of the mixture in the table in **(a)**.
- Rinse out the boiling tube with distilled water.

#### Experiment 2

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

#### Experiment 3

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

#### Experiment 4

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

#### Experiment 5

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

**(a)** Complete the table.

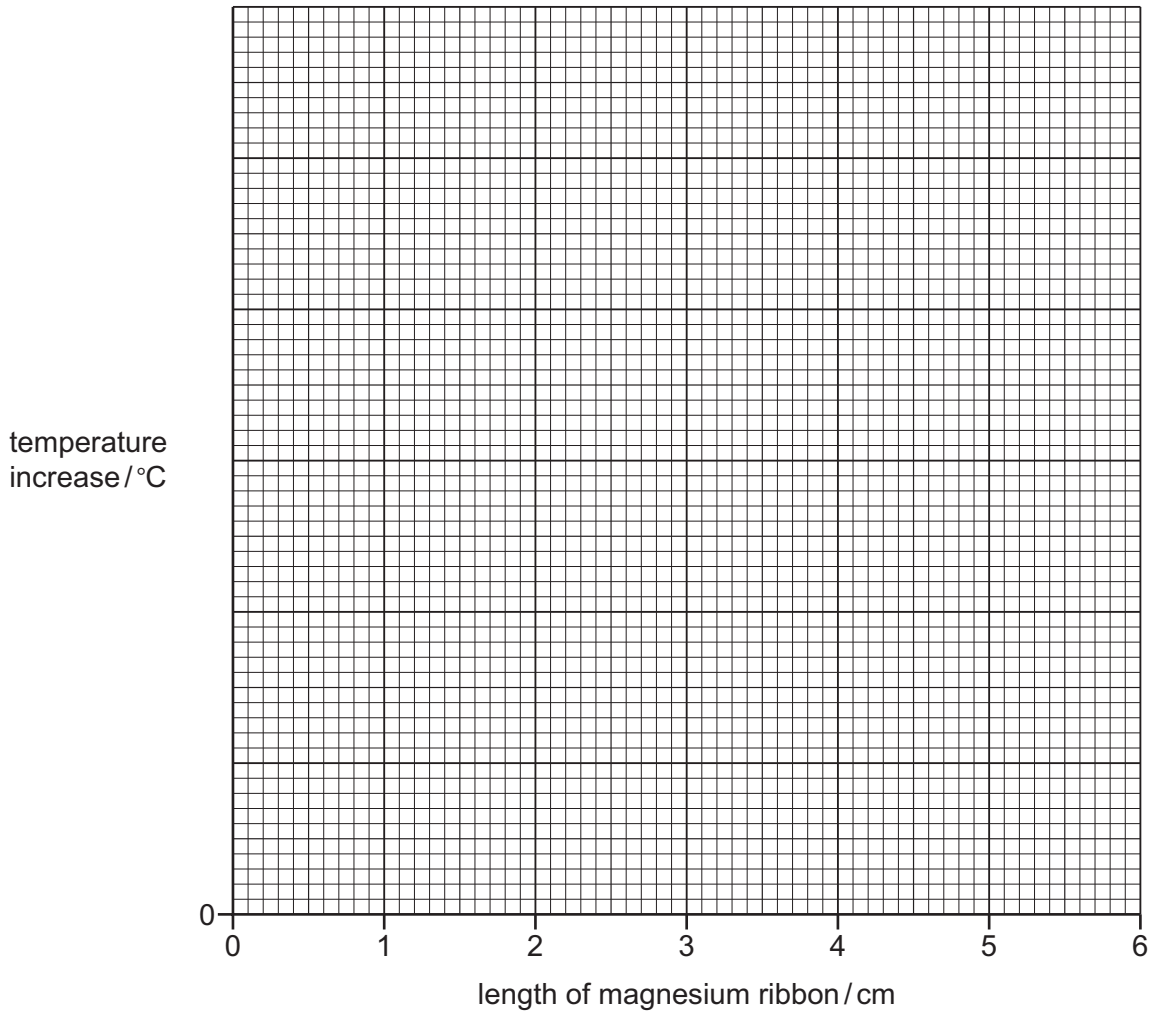
experiment	length of magnesium ribbon/cm	initial temperature/°C	highest temperature/°C	temperature increase/°C
1				
2				
3				
4				
5				

[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 your results from Experiments 1 to 5 on the grid. Draw a line of best fit, 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.

..... °C  
 [2]

(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<sup>3</sup> 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: 17]

- 2 You are provided with two substances, solid **L** and solid **M**.  
Do the following tests on solid **L** and solid **M**, recording all of your observations at each stage.

**tests on solid L**

- (a) Describe the appearance of solid **L**.

..... [1]

Place solid **L** in a boiling tube. Add about 20 cm<sup>3</sup> of distilled water to the boiling tube. Place a stopper in the boiling tube and shake the tube to dissolve solid **L** and form solution **L**.

Divide solution **L** into five approximately equal portions in five test-tubes.

- (b) Test the pH of the first portion of solution **L**.

pH = ..... [1]

- (c) To the second portion of solution **L** add about 1 cm depth of dilute nitric acid followed by about 1 cm depth of aqueous silver nitrate. Leave the test-tube to stand for at least five minutes. Continue with the rest of the experiment while the test-tube is left to stand.

Record your observations after the test-tube has been left to stand.

.....  
..... [1]

- (d) To the third portion of solution **L** add approximately 5 cm<sup>3</sup> of aqueous sodium carbonate. Record your observations.

.....  
.....  
..... [2]

- (e) To the fourth portion of solution **L** add aqueous sodium hydroxide slowly until it is in excess and no further changes are seen. Record your observations.

.....  
.....  
..... [2]

- (f) To the fifth portion of solution **L** add aqueous ammonia slowly until it is in excess and no further changes are seen.  
Record your observations.

.....  
..... [2]

- (g) Identify solid **L**.

.....  
..... [2]

**tests on solid M**

- (h) Carry out a flame test on solid **M**.  
Record your observations.

..... [1]

- (i) Place the remaining solid **M** into a boiling tube.

Add about 10 cm<sup>3</sup> of dilute nitric acid to solid **M** in the boiling tube.  
Test any gas produced.  
Record your observations.

**Keep the solution formed for (j).**

.....  
.....  
..... [2]

- (j) To the solution formed in (i) add about 1 cm depth of aqueous barium nitrate.  
Record your observations.

..... [1]

- (k) Identify solid **M**.

..... [2]

[Total: 17]











## Notes for use in qualitative analysis

### Tests for anions

anion	test	test result
carbonate ( $\text{CO}_3^{2-}$ )	add dilute acid	effervescence, carbon dioxide produced
chloride ( $\text{Cl}^-$ ) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
bromide ( $\text{Br}^-$ ) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	cream ppt.
iodide ( $\text{I}^-$ ) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	yellow ppt.
nitrate ( $\text{NO}_3^-$ ) [in solution]	add aqueous sodium hydroxide, then aluminium foil; warm carefully	ammonia produced
sulfate ( $\text{SO}_4^{2-}$ ) [in solution]	acidify, then add aqueous barium nitrate	white ppt.
sulfite ( $\text{SO}_3^{2-}$ )	add dilute hydrochloric acid, warm gently and test for the presence of sulfur dioxide	sulfur dioxide produced will turn acidified aqueous potassium manganate(VII) from purple to colourless

### Tests for aqueous cations

cation	effect of aqueous sodium hydroxide	effect of aqueous ammonia
aluminium ( $\text{Al}^{3+}$ )	white ppt., soluble in excess, giving a colourless solution	white ppt., insoluble in excess
ammonium ( $\text{NH}_4^+$ )	ammonia produced on warming	–
calcium ( $\text{Ca}^{2+}$ )	white ppt., insoluble in excess	no ppt., or very slight white ppt.
chromium(III) ( $\text{Cr}^{3+}$ )	green ppt., soluble in excess	grey-green ppt., insoluble in excess
copper(II) ( $\text{Cu}^{2+}$ )	light blue ppt., insoluble in excess	light blue ppt., soluble in excess, giving a dark blue solution
iron(II) ( $\text{Fe}^{2+}$ )	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) ( $\text{Fe}^{3+}$ )	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc ( $\text{Zn}^{2+}$ )	white ppt., soluble in excess, giving a colourless solution	white ppt., soluble in excess, giving a colourless solution

**Tests for gases**

gas	test and test result
ammonia (NH <sub>3</sub> )	turns damp red litmus paper blue
carbon dioxide (CO <sub>2</sub> )	turns limewater milky
chlorine (Cl <sub>2</sub> )	bleaches damp litmus paper
hydrogen (H <sub>2</sub> )	'pops' with a lighted splint
oxygen (O <sub>2</sub> )	relights a glowing splint
sulfur dioxide (SO <sub>2</sub> )	turns acidified aqueous potassium manganate(VII) from purple to colourless

**Flame tests for metal ions**

metal ion	flame colour
lithium (Li <sup>+</sup> )	red
sodium (Na <sup>+</sup> )	yellow
potassium (K <sup>+</sup> )	lilac
copper(II) (Cu <sup>2+</sup> )	blue-green

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