Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

3376642215

CHEMISTRY **0620/51**

Paper 5 Practical Test **October/November 2015**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
Practical notes are provided on page 8.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
Total	

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **7** printed pages and **1** blank page.

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CAMBRIDGE International Examinations

[Turn over

1 You are going to investigate the rate of reaction when magnesium ribbon reacts with four solutions of dilute sulfuric acid, of different concentrations, labelled solutions **A**, **B**, **C** and **D**. The sulfuric acid is in excess in all experiments.

Read all the instructions below carefully before starting the experiments.

Instructions
You are going to carry out five experiments.

(a) *Experiment 1*

Using a measuring cylinder, pour 30 cm^3 of dilute sulfuric acid **A** into the beaker.
Start the timer and add the 4 cm length of magnesium to the sulfuric acid in the beaker.
Stir the mixture constantly.
Measure the time taken for all of the magnesium to react and disappear.
Record the time in the table below.
Rinse out the beaker with distilled water.

(b) *Experiment 2*

Repeat Experiment 1, using the solution **B** of sulfuric acid. Record the time in the table.

(c) *Experiment 3*

Repeat Experiment 1, using the solution **C** of sulfuric acid. Record the time in the table.

(d) *Experiment 4*

Repeat Experiment 1, using the solution **D** of sulfuric acid. Record the time in the table.

Experiment number	solution of sulfuric acid	concentration of sulfuric acid in mol / dm^3	time for magnesium to completely disappear in seconds
1	**A**	1.0	
2	**B**	0.8	
3	**C**	0.6	
4	**D**	0.5	

[4]

(e) *Experiment 5*

Pour about 3 cm^3 of the solution **C** of sulfuric acid into a test-tube and record its temperature.
Add a 4 cm length of magnesium.
Record all of your observations and test the gas given off with a splint.

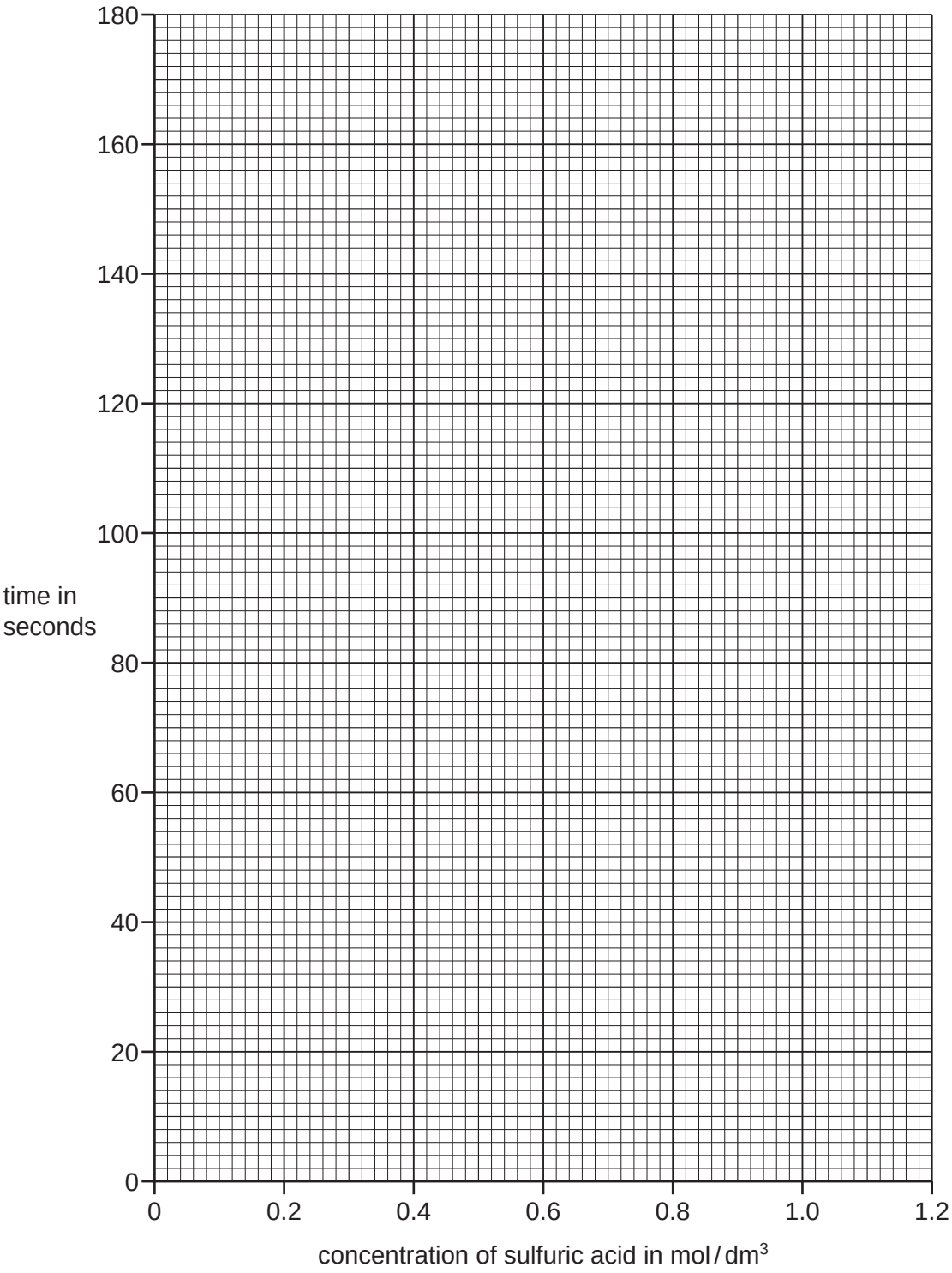
.....

.....

..... [2]

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(f) Plot the results for Experiments 1, 2, 3 and 4 on the grid and draw a smooth line graph.



[3]

(g) (i) **From your graph**, deduce the concentration of the sulfuric acid if the time for the reaction was 80 s.
Show clearly **on the graph** how you worked out your answer.

..... mol / dm^3 [2]

(ii) **From your graph**, deduce how long the reaction would take if a solution of sulfuric acid of concentration 1.2 mol / dm^3 was used.
Show clearly **on the graph** how you worked out your answer.

..... s [2]

(h) Why was the same amount of magnesium used in Experiments 1, 2, 3 and 4?

..... [1]

(i) Use your observations in Experiment 5 to answer these questions.

(i) What type of chemical reaction occurs when magnesium reacts with sulfuric acid?

..... [1]

(ii) Identify the gas given off.

..... [1]

(iii) Suggest the effect on the temperature change if this experiment was repeated using 2 cm of magnesium ribbon.

.....

..... [1]

(j) Suggest a different method which could be used to investigate the rate of the reaction between magnesium and sulfuric acid. State the difference in the apparatus used and measurements to be taken.

apparatus .....

measurements .....

.....

..... [3]

[Total: 20]

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2 You are provided with two metal salt solutions, **X** and **Y**.
Carry out the following tests on **X** and **Y**, recording all of your observations in the tables.
Conclusions must **not** be written in the tables.

tests	observations
<u>tests on solution **X**</u> **(a)** Describe the appearance of solution **X**.	..... [1]
Divide the solution into four equal portions in separate test-tubes. **(b)** To the first portion of solution add about 1 cm^3 of dilute nitric acid followed by aqueous silver nitrate.	..... [2]
(c) To the second portion of solution add about 1 cm^3 of aqueous sodium hydroxide and shake the mixture and leave to stand.	..... [1]
Note how the mixture changes after five minutes.	..... [1]
(d) To the third portion of solution add excess aqueous ammonia.	..... [1]
(e) To the fourth portion of solution add a few drops of dilute sulfuric acid followed by about 1 cm^3 of aqueous potassium manganate(VII).	..... [1]
Now add aqueous sodium hydroxide to the mixture.	..... [2]

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[Turn over

tests	observations
<u>tests on solution **Y**</u> Divide the solution into three equal portions in separate test-tubes. **(f)** To the first portion of the solution add about 1 cm^3 of dilute hydrochloric acid.	..... [1]
(g) Tip the second portion of the solution into a boiling tube. Add about 1 cm^3 of aqueous sodium hydroxide and shake the mixture. Add one small piece of aluminium foil to the mixture and warm gently. Test the gas given off with red litmus paper.	.... [3]
(h) To the third portion of the solution add aqueous potassium iodide.	..... [2]

(i) What conclusions can you draw about solution **X**?

.....

..... [3]

(j) What conclusions can you draw about solution **Y**?

.....

..... [2]

[Total: 20]

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NOTES FOR USE IN QUALITATIVE ANALYSIS

Test for anions

anion	*test*	*test result*
carbonate (CO_3^{2-})	add dilute acid	effervescence, carbon dioxide produced
chloride (Cl^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
iodide (I^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	yellow ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide then aluminium foil; warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify with dilute nitric acid, then aqueous barium nitrate	white ppt.

Test for aqueous cations

cation	*effect of aqueous sodium hydroxide*	*effect of aqueous ammonia*
aluminium (Al^{3+})	white ppt., soluble in excess giving a colourless solution	white ppt., insoluble in excess
ammonium (NH_4^+)	ammonia produced on warming	–
calcium (Ca^{2+})	white ppt., insoluble in excess	no ppt., or very slight white ppt.
copper (Cu^{2+})	light blue ppt., insoluble in excess	light blue ppt., soluble in excess giving a dark blue solution
iron(II) (Fe^{2+})	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) (Fe^{3+})	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc (Zn^{2+})	white ppt., soluble in excess giving a colourless solution	white ppt., soluble in excess giving a colourless solution

Test for gases

gas	*test and test results*
ammonia (NH_3)	turns damp red litmus paper blue
carbon dioxide (CO_2)	turns limewater milky
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	‘pops’ with a lighted splint
oxygen (O_2)	relights a glowing splint

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