UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	CANDIDATE NUMBER

9223011686

CHEMISTRY **0620/05**

Paper 5 Practical Test **October/November 2009**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in Instructions to Supervisors

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 a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES
Answer **all** questions.
Practical notes are provided on page 8.

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

For Examiner's Use	
1	
2	
Total	

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

For Examiner's Use

1 You are going to investigate the temperature rise produced when equal lengths of magnesium ribbon react with excess dilute sulfuric acid of different concentrations (labelled **A**, **B**, **C**, and **D**).

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

Instructions

Pour about 4 cm^3 of solution **A** into a test-tube. Add a piece of magnesium ribbon to the tube. Note your observations and test the gas.

observations .....

..... [1]

test for gas .....

result ..... [2]

Experiment 1
By using a measuring cylinder, pour 20 cm^3 of solution **A** into the beaker provided. Measure the initial temperature of the solution and record it in the table below. Add one length of magnesium ribbon to the solution in the beaker, and stir the mixture with the thermometer. Record the highest temperature reached.
Remove the thermometer and rinse out the beaker with water.

Experiment 2
Repeat Experiment 1 using solution **B** instead of solution **A**. Record the initial and final temperatures in the table.
Rinse out the beaker.

Experiment 3
Repeat Experiment 1, using solution **C**. Record the temperatures in the table.

Experiment 4
Repeat Experiment 1 using solution **D**. Record the temperatures in the table.

Table of results

solution of sulfuric acid	initial temperature / °C	highest temperature / °C	change in temperature / °C
A			
B			
C			
D			

[4]

(a) Work out the temperature change for each experiment and record the value in the table. [1]

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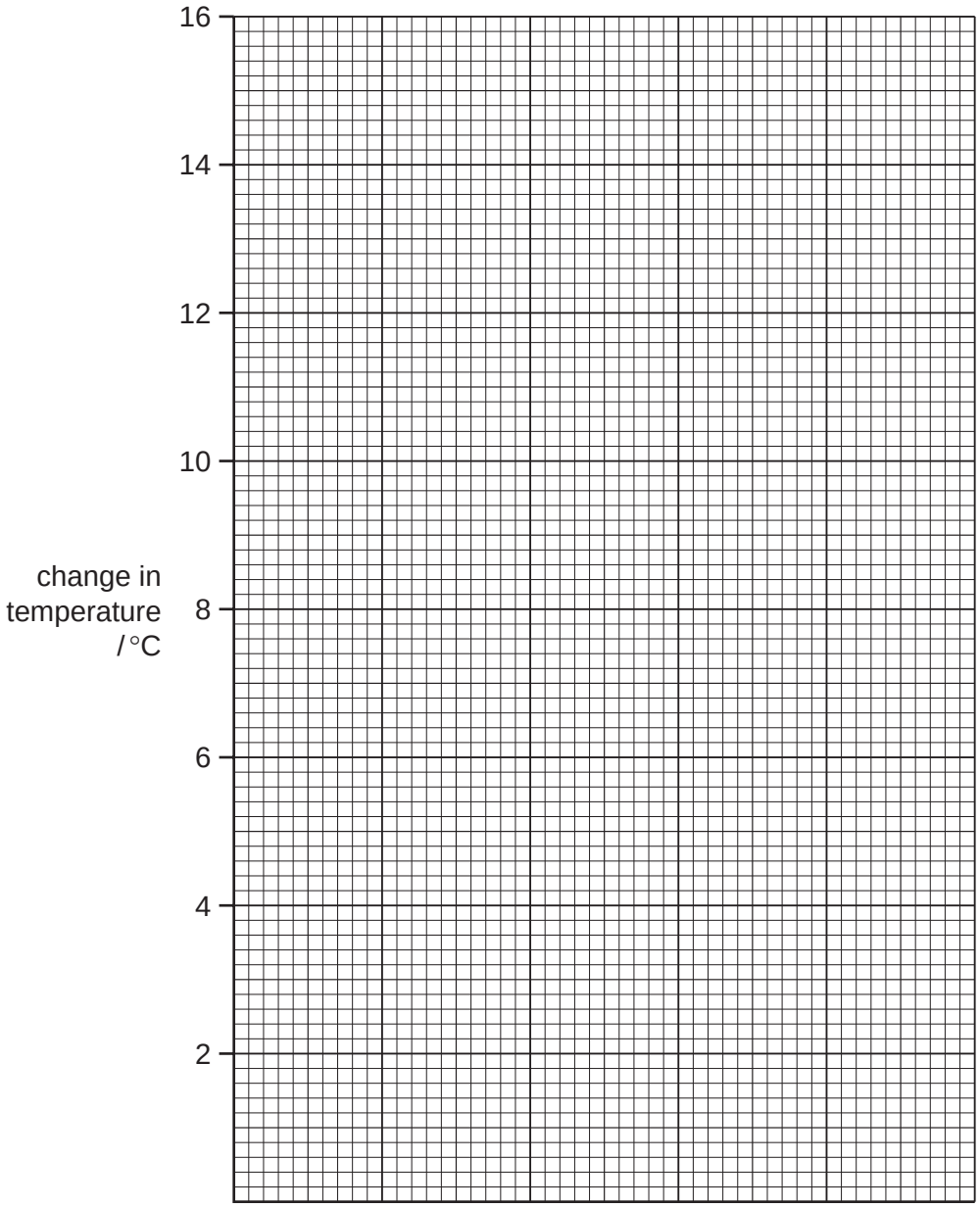
(b) Draw a labelled bar chart of the results to Experiments 1, 2, 3 and 4 on the grid below.



[4]

Use your results and observations to answer the following questions.

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(c) (i) Name the gas given off when magnesium reacts with dilute sulfuric acid.

.....[1]

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

.....[1]

(d) (i) Which Experiment produced the largest temperature change?

.....[1]

(ii) Suggest why this Experiment produced the largest temperature change.

.....

.....[1]

(e) Predict the effect on the temperature changes that would happen if

(i) equal masses of magnesium powder were used in the Experiments,

.....[1]

(ii) 40 cm^3 of dilute sulfuric acid was used in Experiment 1.

.....[1]

(iii) Explain your answer to **(e)(ii)**.

.....

.....[1]

(f) Give one possible source of experimental error in this investigation.

.....

.....[1]

[Total: 20]

For Examiner's Use

2 You are provided with three solutions **K**, **L** and **M**.
Carry out the following tests on the solutions, recording all of your observations in the table.
Do not write any conclusions in the table.

tests	observations
(a) Describe the appearance of the solutions. solution **K** solution **L** solution **M**	.... [1]
(b) Using Universal Indicator paper, test the pH of each solution. solution **K** solution **L** solution **M**	pH..... pH..... pH..... [2]
<u>tests on solution **K**</u> **(c) (i)** By using a teat pipette, add drops of solution **K** to about 3 cm^3 of copper sulfate solution in a test-tube. Now add an excess of solution **K** to the test tube. **(ii)** Repeat experiment **(c)(i)** using aqueous aluminium sulfate instead of aqueous copper sulfate. **(iii)** To about 3 cm^3 of solution **K** add a few drops of nitric acid and about 1 cm^3 of silver nitrate solution.	.... [2] .... [2] ..... [1]

tests	observations
<u>tests on solution **L**</u>	
(d) (i) Repeat experiment **(c)(i)** using solution **L**	..... [1]
(ii) Repeat experiment (**c)(ii)** using solution **L**	..... [2]
(iii) Repeat experiment **(c)(iii)** using solution **L**	..... [1]
<u>tests on solution **M**</u>	
(e) Repeat experiment **c(iii)** using solution **M**	..... [2]

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(f) What conclusions can you make about solution **K**?

.....

..... [2]

(g) What conclusions can you make about solution **L**?

.....

..... [2]

(h) Identify solution **M**.

..... [2]

[Total: 20 marks]

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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, then add 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