UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY

Paper 5 Practical Test

0620/05

October/November 2006

Candidates answer on the Question Paper.
Additional Materials: As listed in Instructions to Supervisors

1 hour 15 minutes

Candidate Name

Centre Number

Candidate Number

READ THESE INSTRUCTIONS FIRST

Write your name, Centre number and candidate number on all the work you hand in.

Write in dark blue or black pen in the spaces provided on the Question Paper.

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 THE BARCODE.

DO **NOT** WRITE IN THE GREY AREAS BETWEEN THE PAGES.

Answer **all** questions.

The number of marks is given in brackets [ ] at the end of each question or part question.

Practical notes are provided on page 8.

FOR EXAMINER'S USE	
1	
2	
Total	

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

BLANK PAGE

For Examiner's Use

1 You are going to investigate the reactions of three different metals.
Magnesium, iron and zinc will be used.
Read all the **instructions** below carefully before starting the experiments.

Instructions

Experiment 1

By using a measuring cylinder, pour 5 cm^3 of the aqueous copper(II) sulphate into the test-tube provided. Measure the initial temperature of the solution and record it in the table below. Add the 1 g sample of zinc powder to the solution in the test-tube and stir the mixture with the thermometer. Record the maximum temperature reached and any observations in the table.
Remove the thermometer and rinse with water.

Experiment 2

Repeat Experiment 1, using 1 g of iron filings instead of zinc. Record the maximum temperature reached and any observations in the table.

Experiment 3

Repeat Experiment 1, using the 0.5 g sample of magnesium. Test the gas given off with a lighted splint.

Table of results

experiment	metal	temperature of solution/°C		observations
		initial	maximum	
1	zinc			
2	iron			
3	magnesium			

[9]

For Examiner's Use

(a) Use your results and observations to answer the following questions.

(i) Which metal is most reactive with aqueous copper(II) sulphate?

..... [1]

(ii) Give two reasons why you chose this metal.

1 .....

2 ..... [2]

(iii) Name the gas given off in Experiment 3.

..... [1]

You are now going to investigate the reaction between two of the metals and aqueous copper(II) sulphate in more detail.

Experiment 4

Rinse the thermometer with water at room temperature. By using a measuring cylinder pour 10 cm^3 of aqueous copper(II) sulphate into a polystyrene cup. Measure the initial temperature of the solution and record it in the table below.
Add the 1 g sample of magnesium powder to the cup and record the temperature every 10 seconds for 1 minute. Record all of your results in the table.

Experiment 5

Repeat Experiment 4 using the 2 g sample of zinc powder instead of magnesium.

Record all of your results in the table.

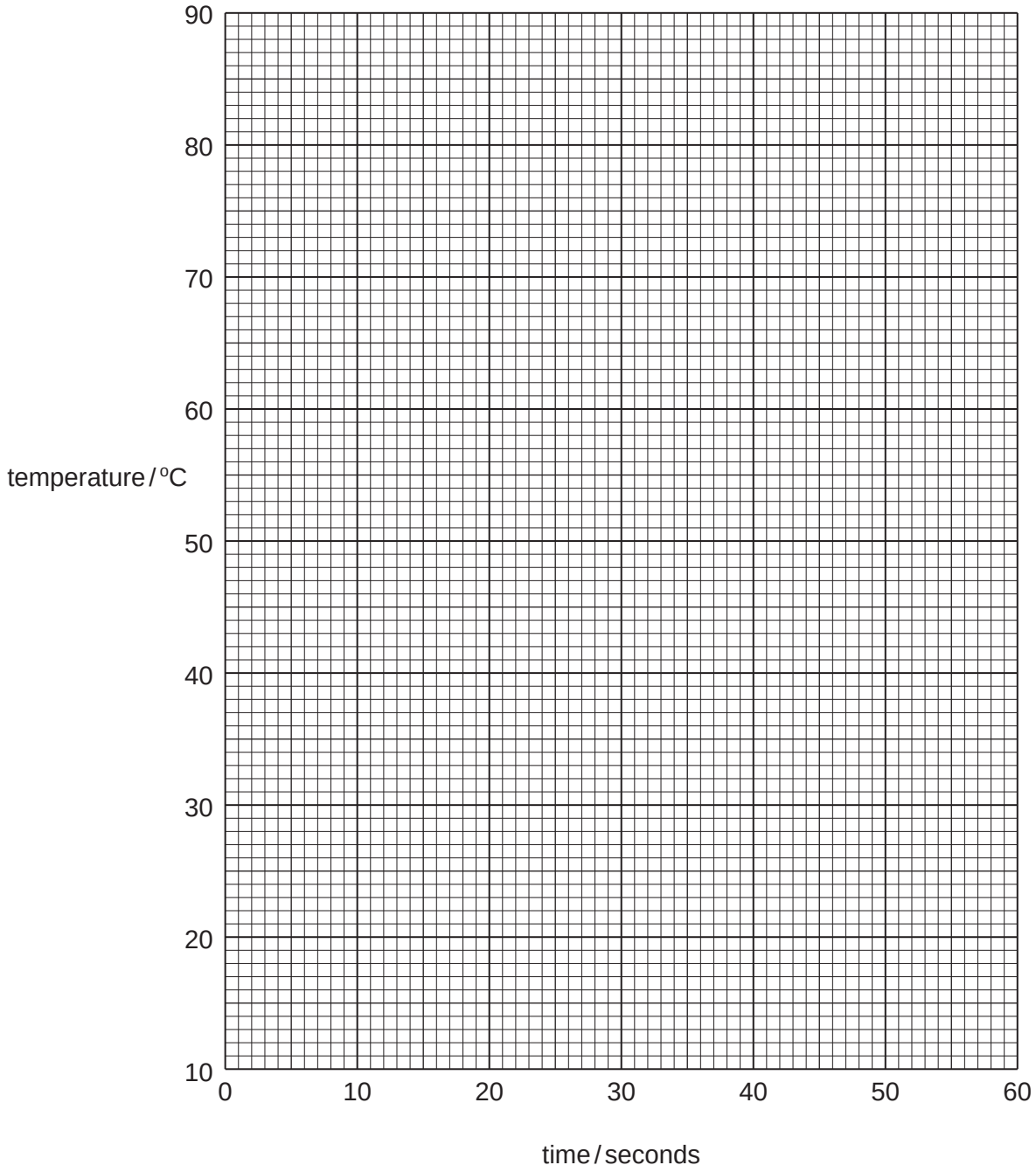
Table of results

time/seconds	temperature/°C	
	Experiment 4	Experiment 5
0		
10		
20		
30		
40		
50		
60		

[3]

(b) Plot the results of Experiments 4 and 5 on the grid below. Draw two smooth line graphs. Clearly label the graphs.

For Examiner's Use



[4]

(c) **Use your graph** to estimate the temperature of the reaction mixture in Experiment 4 after 5 seconds. Indicate **clearly** on the graph how you obtained your answer.

.....

[2]

For Examiner's Use

2 You are provided with solid **F** and solid **G**.

Carry out the following tests on **F** and **G**, recording all of your observations in the table.

Conclusions must not be written in the table.

tests	observations
(a) Place a little of solid **F** in a hard glass test-tube. Insert a damp piece of pH paper in the mouth of the tube. Heat the solid gently, then more strongly.	....[3]
(b) Place the rest of solid **F** in a boiling-tube. Add 10 cm^3 of distilled water and shake to dissolve. Divide the solution into 4 equal portions in test-tubes.	
(c) (i) Test the pH of the first portion of the solution using Universal Indicator solution.	colour ..... pH .....[2]
(ii) To the second portion, add about 1 cm^3 of aqueous sodium hydroxide. Heat **gently** and test the gas given off with damp litmus paper.	....[2]
(c) (iii) To the third portion of solution, add a few drops of dilute nitric acid and then aqueous lead(II) nitrate.	....[2]

tests	observations
(c) (iv) To the fourth portion of solution, add a few drops of dilute nitric acid followed by aqueous silver nitrate.	....[1]
(d) (i) Dissolve solid **G** in about 5 cm^3 of distilled water in a test-tube. Divide the solution into two equal portions in two test-tubes. **(ii)** Repeat **(c)(iii)** using the first portion of the solution. **(iii)** Repeat **(c)(iv)** using the second portion of the solution.	....[2] ....[2]

For Examiner's Use

(e) Name the gas given off in **(c)(ii)**.

..... [1]

(f) Identify solid **F**.

..... [2]

(g) Name the anion in solid **G**.

..... [1]

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 aqueous lead(II) nitrate	yellow ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide then aluminium foil; warm carefully	ammonia produced
sulphate (SO_4^{2-}) [in solution]	acidify with dilute nitric acid, 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., 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