Centre Number	Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
CAMBRIDGE INTERNATIONAL EXAMINATIONS

CHEMISTRY 0620/5

PAPER 5 Practical Test

OCTOBER/NOVEMBER SESSION 2002

1 hour 15 minutes

Candidates answer on the question paper.
Additional materials:
As listed in Instructions to Supervisors

TIME 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
Practical notes are provided on page 8.

This question paper consists of 7 printed pages and 1 blank page.

(NH) S16055/2
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UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

[Turn over

1 You are going to investigate the reactions of four different metals. Copper, 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 15 cm^3 of dilute sulphuric acid into the boiling tube provided. Measure the initial temperature of the acid and record it in the table. Add the 1 g sample of zinc powder to the acid in the boiling 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 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.

Experiment 4

Repeat Experiment 1, using 1 g of copper. Record all results in the table.

Table of results

Experiment	Metal	Temperature of acid / °C		Observations
		initial	maximum	
1	zinc			
2	iron			
3	magnesium			
4	copper			

[10]

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

(i) Which metal is most reactive with sulphuric acid?

.....[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 magnesium and aqueous copper(II) sulphate.

Experiment 5

Rinse the thermometer with water at room temperature. By using a measuring cylinder pour 5 cm^3 of aqueous copper(II) sulphate into a test-tube. Measure the initial temperature of the solution and record it in the table below.

Add the 0.2 g sample of magnesium powder to the test-tube and record the maximum temperature reached. Record all of your observations in the table.

Table of results

initial temperature of aqueous copper(II) sulphate ..... °C

maximum temperature reached when magnesium added ..... °C
[2]

observations when magnesium was added to aqueous copper(II) sulphate

.....

.....

.....[3]

(b) How do your observations show that the reaction of magnesium with aqueous copper(II) sulphate is exothermic?

.....[1]

(c) What type of exothermic reaction occurs when magnesium is added to aqueous copper(II) sulphate?

.....[1]

(d) Use your results from Experiments 1 to 5 to put the four metals in order of reactivity.

least reactive .....

.....

.....

most reactive .....[1]

2 You are provided with liquid **F** and liquid **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) (i) Place a little of liquid **F** in a test-tube and describe its smell and colour.	....[2]
(ii) Place a little of liquid **G** in a test-tube and describe its smell and colour.	....[1]
(b) (i) By using a teat pipette add about 1 cm^3 of liquid **F** to a crystal of iodine provided in a test-tube. Stopper and shake the test-tube. Keep for **(b)(ii)**.	....[2]
(ii) Add about 1 cm^3 of **G** to the other crystal of iodine provided. Stopper and shake the test-tube.	....[2]
Add this mixture to the mixture in **(b)(i)**.	.....[1]

Tests	*Observations*
(c) **(i)** Using a teat pipette transfer a few drops of **F** to a dry watch glass. Touch the liquid with a lighted splint.	....[2]
(ii) Repeat **(c)(i)** using liquid **G**.	....[1]
(d) To about 1 cm^3 of liquid **G**, add a few drops of dilute nitric acid and then aqueous lead(II) nitrate.	....[2]
(e) To about 1 cm^3 of liquid **G**, add a few drops of dilute nitric acid followed by aqueous silver nitrate.	....[2]

(f) What type of substance is liquid **F**?

.....

.....[2]

(g) Identify **one** ion present in liquid **G**.

.....[1]

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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 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 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 result*
ammonia (NH_3)	turns damp litmus paper blue
carbon dioxide (CO_2)	turns lime water milky
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	‘pops’ with a lighted splint
oxygen (O_2)	relights a glowing splint