Centre Number	Candidate Number	Name

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY **0620/05**

Paper 5 Practical Test

May/June 2005

1 hour 15 minutes

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

READ THESE INSTRUCTIONS FIRST

Write your name, Centre number and candidate number in the spaces at the top of this page.
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.

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.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

FOR EXAMINER'S USE	
1	
2	
TOTAL	

This document consists of **6** printed pages and **2** blank pages.

1 You are going to investigate a mixture of calcium hydroxide and water.

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

Instructions

Shake the mixture of calcium hydroxide and water provided in the bottle.

After one minute of shaking, filter the mixture into a beaker.

Start Experiment 1 when enough solution has been collected. Continue to filter the mixture.

Experiment 1

By using a measuring cylinder, measure 25 cm^3 of the solution (filtrate) into the conical flask provided.

Carry out the titration as follows.

Fill the burette to the 0.0 cm^3 mark with the solution **M** of hydrochloric acid.

Add 3 or 4 drops of phenolphthalein to the flask.

Add solution **M** slowly to the flask until the colour just disappears. Record the burette readings in the table. Pour the solution away and rinse the conical flask.

Experiment 2

Empty the contents of the burette down the sink.

Rinse the burette with the solution **N** of hydrochloric acid.

Repeat Experiment 1 using the solution **N** of hydrochloric acid.

Record your results in the table.

Normally you would be required to carry out repeat titrations. However, owing to time considerations you are only required to carry out **one** titration for each experiment

Table of results

burette readings/ cm^3	Experiment 1	Experiment 2
final reading		
initial reading		
difference		

[6]

(a) Describe the appearance of the mixture of calcium hydroxide and water.

.....

[1]

(b) How did the colour of the solution in the flask change?

from ..... to ..... [2]

(c) What type of chemical reaction occurs when hydrochloric acid reacts with calcium hydroxide?

..... [1]

(d) **(i)** In which experiment was the greater volume of hydrochloric acid used?

..... [1]

(ii) Compare the volumes of acid used in Experiments 1 and 2.

.....

..... [2]

(iii) Suggest an explanation for the difference in volumes.

.....

..... [2]

(e) Predict the volume of hydrochloric acid **M** which would be needed to react completely if Experiment 1 was repeated with 50 cm^3 of calcium hydroxide solution and explain your answer.

volume of solution .....

explanation .....

..... [3]

(f) Suggest **one** change you could make to the **apparatus** used in the experiments to obtain more accurate results.

.....

..... [1]

(g) From the list below choose the correct word to complete the sentence.

not **slightly** **very**

Calcium hydroxide is ..... soluble in water. [1]

2 You are provided with liquid **A**.

Carry out the following tests on **A**, recording all of your observations in the table. Do **not** write any conclusions in the table.

tests	observations
(a) Describe the appearance and smell of **A.**	.... [2]
(b) Test the pH of the solution using indicator paper.	colour ..... pH ..... [2]
(c) Divide the liquid into five test-tubes. **(i)** To the first portion, add the piece of magnesium ribbon provided. Note any observations and test the gas.	.... [3]
(ii) To the second portion of liquid **A**, add slowly a spatula measure of anhydrous sodium carbonate. Test the gas with limewater.	.... [2]
(iii) To the third portion of liquid **A**, add a spatula measure of solid **B**. Boil **gently** for 2 minutes. Note any observations. By using a teat pipette transfer the solution to another test tube. To this solution add excess aqueous ammonia.	.... [2]

tests	observations
(iv) To the fourth portion of the liquid add about 1 cm^3 of ethanol. Ask your supervisor to add a few drops of concentrated sulphuric acid to the mixture. Boil the mixture gently. Pour the mixture into a beaker half full of water. Note your observations.	.... [2]
(v) To the fifth portion of liquid **A** add a few drops of dilute sulphuric acid and about 1 cm^3 of potassium dichromate solution. Boil **gently** and note any observation.	.... [1]

(d) (i) Name the gas given off in test **(c)(i)**.

..... [1]

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

..... [1]

(e) Use your observations in test **(c)(iii)** to say what ion is present in solid **B**.

.....

..... [2]

(f) What conclusions can you draw about liquid **A**?

.....

..... [2]

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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 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 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