UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY

Paper 5 Practical Test

0620/05

October/November 2005

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** WRITE IN THE BARCODE.

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

Do not use staples, paper clips, highlighters, glue or correction fluid.

You may use a calculator.

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.

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For Examiner's Use

1 You are going to investigate the speed of reaction between aqueous hydrochloric acid and marble chips (calcium carbonate).

Read **all** the **Instructions** below carefully before starting the Experiments.

Instructions

Put 5 test-tubes in a line in the rack provided so you can see the graph paper through them.

To each test-tube you are going to add 3 cm^3 of different solutions of aqueous hydrochloric acid and a marble chip. The marble chips are the same size.

Experiment 1

Using the measuring cylinder pour 3 cm^3 of the solution **P** of aqueous hydrochloric acid into the first test-tube.

Experiment 2

Using the measuring cylinder pour 3 cm^3 of the solution **Q** of aqueous hydrochloric acid into the second test-tube.

Experiments 3, 4 and 5

Repeat Experiment 1 using 3 cm^3 of the solutions of aqueous hydrochloric acid **R**, **S** and **T** in the third, fourth and fifth test-tubes.

Into all of the test-tubes quickly place a marble chip and start the timer. Shake the tubes from time to time.

Look at the tubes from the side. Take the time in seconds for **each** tube when the lines on the graph paper can be seen through all of the acid in that tube**. Do not stop the timer until all the reactions are finished.**

Record the times in the table.

Table of results

Experiment	solution of hydrochloric acid	time/s
1	**P**	
2	**Q**	
3	**R**	
4	**S**	
5	**T**	

[3]

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(a) Plot your results on the grid. Draw a best-fit straight line graph.

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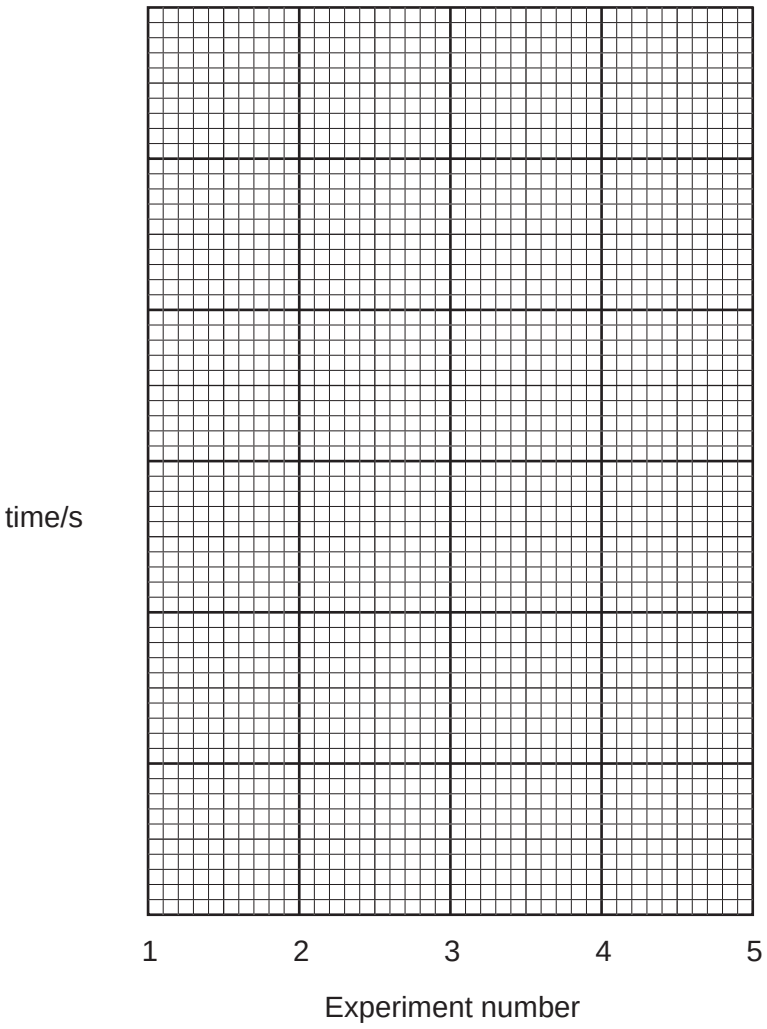

[4]

(b) Describe how the appearance of the mixture in the test-tubes changed as you timed the reaction.

.....

..... [3]

(c) **(i)** Which Experiment has the fastest rate of reaction?

..... [1]

(ii) Explain why this Experiment has the fastest rate.

.....

.....

..... [2]

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(d) (i) In the Experiments which of the reactants is in *excess*?

.....

[1]

(ii) Explain your answer to **(d)(i)**.

.....

.....

[2]

(e) (i) State two sources of error in the Experiments.

1 .....

.....

2 .....

.....

[2]

(ii) Suggest two improvements to reduce the sources of error in the Experiments.

1 .....

.....

2 .....

.....

[2]

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2 You are provided with a solid compound **X**.

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

tests	observations
(a) Appearance of solid **X**.	.... [2]
(b) Place one spatula measure of **X** into a hard-glass test-tube. Heat gently then strongly. Test any gases with damp pH indicator paper. Note all observations.	.... [4]
Add the rest of solid **X** to a test-tube. Add about 10 cm^3 of distilled water and shake to dissolve. Divide the solution into five portions in test-tubes.	
(c) **(i)** By using a teat pipette add drops of aqueous sodium hydroxide to the first portion of the solution. Now add excess aqueous sodium hydroxide to the test-tube.	.... [3]
(ii) Using the second portion repeat Experiment **(c)(i)** using aqueous ammonia instead of aqueous sodium hydroxide.	.... [3]

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[Turn over

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(iii) To the third portion of solution add a few drops of hydrochloric acid and about 1 cm^3 of barium chloride solution.	..... [1]
(iv) To the fourth portion of solution add a few drops of nitric acid and about 1 cm^3 of lead nitrate solution.	..... [1]
(v) To the fifth portion of solution add aqueous sodium hydroxide and a spatula measure of aluminium granules. Warm **carefully** and test the gas with damp indicator paper.	.... [2]

(d) What do tests **(c)(iii)** and **(iv)** tell you about **X**?

..... [1]

(e) What conclusions can you draw about substance **X**?

.....

.....

.....

..... [3]

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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

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