Centre Number	Candidate Number	Name

CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY **0620/05**

Paper 5 Practical Test

October/November 2003

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 printed 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 **7** printed pages, **1** blank page and an insert.

University of Cambridge Local Examinations Syndicate
[Turn over

1 You are going to investigate the speed of reaction between aqueous potassium bromate and potassium iodide solution.

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

Instructions

Fill the burette upto the 0.0 cm^3 mark with the aqueous potassium iodide.

Put 5 test-tubes in a rack. Using the burette, add 6 cm^3 of aqueous potassium iodide to each test-tube to be used in the 5 following experiments.

Experiment 1

You are going to measure 5 different solutions into a small beaker. Use the 10 cm^3 measuring cylinder to measure all the solutions. The cylinder does **not** need rinsing between additions.

Using the measuring cylinder pour 12 cm^3 of the aqueous potassium bromate into the small beaker. Use the 10 cm^3 measuring cylinder to add 2 cm^3 of hydrochloric acid and 4 cm^3 of water to the beaker. Now add 5 cm^3 of starch solution and 1 cm^3 of sodium thiosulphate solution to the beaker.

Place the beaker on the insert.

Add 6 cm^3 of aqueous potassium iodide from a test-tube to the mixture in the beaker and start your timer. Stop the timer when you can no longer read the words on the insert when looking down through the beaker.

Record the time in the table.

Pour away the contents of the beaker and rinse the beaker with distilled water.

table of results

experiment	volume		time/s
	potassium bromate/cm^3	water/cm^3	
1	12	4	
2	10	6	
3	8	8	
4	6	10	
5	4	12	

[4]

Experiment 2

Using a measuring cylinder pour into the beaker 10 cm^3 of the potassium bromate solution. Follow the instructions exactly as given for Experiment 1, using the same volumes of the other reagents, but this time add 6 cm^3 of water to the beaker.

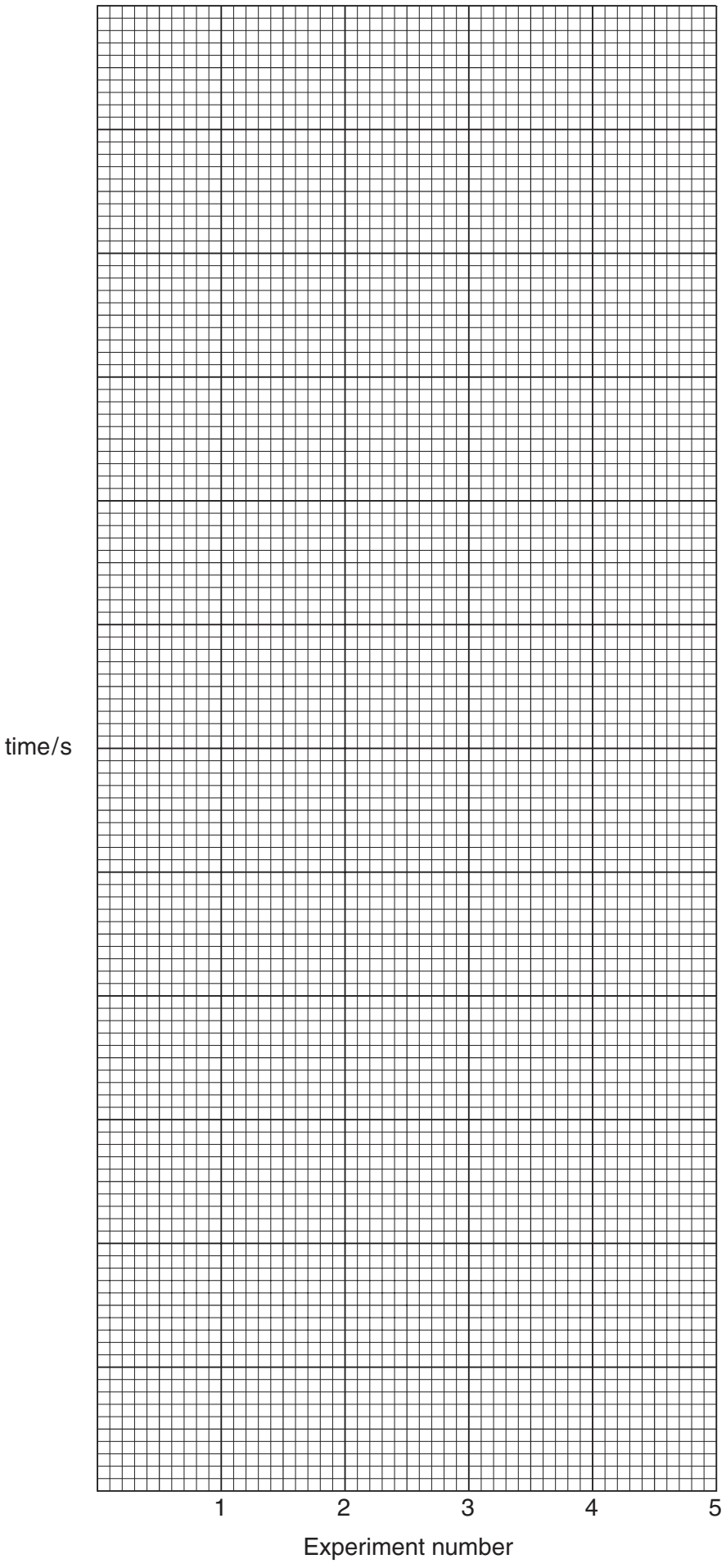
Record your time in the table.

Experiments 3, 4 and 5

Repeat Experiment 1 using the volumes of aqueous potassium bromate and water specified in the table of results. Record the times in the table.

[Turn over

(a) Plot your results on the grid. Draw a smooth line graph. [4]



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

.....[2]

(c) From your graph estimate the time of the reaction if Experiment 1 was repeated using 7 cm^3 of potassium bromate and 9 cm^3 of water.

.....[2]

Show clearly on your graph how you worked out your answers. [1]

(d) (i) Which Experiment is the quickest?

.....[1]

(ii) Explain why this Experiment is the quickest.

.....

.....

.....[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]

2 You are provided with an aqueous solution of substance **X**.

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

tests	observations
(a) colour of solution **X**.	.....[1]
(b) **(i)** By using a teat pipette add drops of aqueous sodium hydroxide to about 2 cm^3 of the solution in a test-tube. Now add excess aqueous sodium hydroxide to the test-tube.	....[3]
(ii) Carefully warm the mixture. Test any gas given off with damp indicator paper.	....[2]
(c) Repeat **(b)(i)** using aqueous ammonia instead of aqueous sodium hydroxide.	....[3]
(d) Acidify about 2 cm^3 of solution **X** with dilute sulphuric acid. Add two pieces of zinc. Warm the mixture gently. Test the gas given off.	....[3]
Leave the mixture to react for 10 minutes. After 10 minutes decant the liquid and repeat test **(b)(i)**.	....[2]
(e) Add a few drops of hydrochloric acid to about 2 cm^3 of solution **X** in a test-tube. Add about 1 cm^3 of barium chloride solution to the mixture.	.....[2]

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

.....

.....

.....[4]

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NOTES FOR USE IN QUALITATIVE ANALYSIS

Tests 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.

Tests 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

Tests 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