Centre Number	Candidate Number	Name

CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY **0620/05**

Paper 5 Practical Test

May/June 2006

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.
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.
Practical notes are provided on page 8.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
Total	

This document consists of **8** printed pages.

1 You are going to investigate the speed of reaction when aqueous hydrogen peroxide breaks down using a catalyst. Manganese(IV) oxide is the catalyst. A catalyst remains unchanged at the end of the reaction.

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

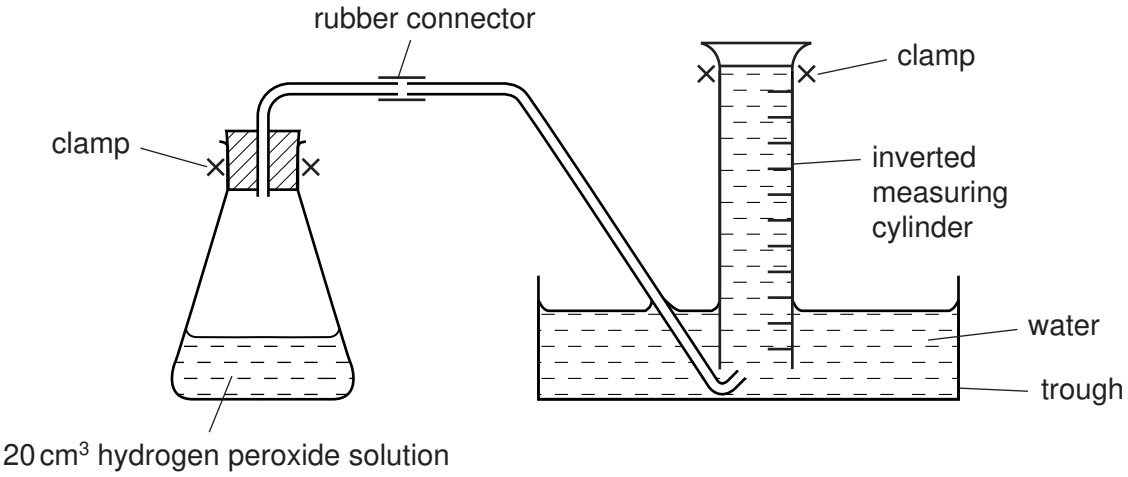
Instructions

Experiment 1

Using a measuring cylinder, pour 20 cm^3 of the hydrogen peroxide solution labelled **A** into the conical flask. Fill the 50 cm^3 measuring cylinder provided with water and set up the apparatus as in the diagram below. Add one spatula measure of manganese(IV) oxide to the conical flask, quickly put the bung in the flask and start your timer.

Measure the volume of gas collected in the measuring cylinder at 10 seconds and at 20 seconds and record the results in the table opposite.

Pour away the contents of the conical flask and rinse the flask with distilled water.



Experiment 2

Using the measuring cylinder, pour 15 cm^3 of the solution **A** of aqueous hydrogen peroxide into the conical flask. Now add 5 cm^3 of distilled water to the flask. Set up the apparatus as in Experiment 1. Repeat the instructions as given for Experiment 1, adding one spatula measure of manganese(IV) oxide to the flask and measuring the volume of gas given off at 10 seconds and 20 seconds. Record your results in the table.

Experiment 3

Repeat Experiment 1 using 10 cm^3 of solution **A** and 10 cm^3 of distilled water. Record your results in the table.

Experiment 4

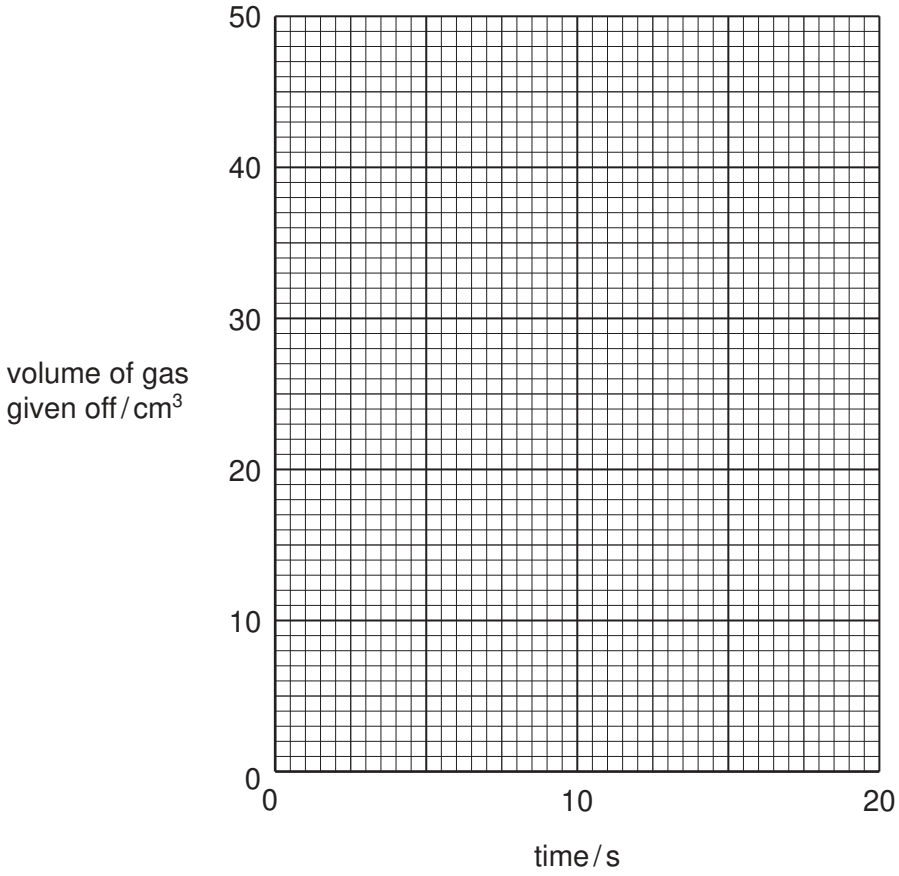
Repeat Experiment 1 using 5 cm^3 of solution **A** and 15 cm^3 of distilled water. Record your results in the table.

Table of results

Experiment	volume of gas collected after 10 seconds / cm^3	volume of gas collected after 20 seconds / cm^3
1		
2		
3		
4		

[5]

(a) Plot your results on the grid for each Experiment. Draw 4 graphs. Label each line clearly with the number of the Experiment.



[4]

(b) Describe the appearance of the mixture in the conical flask as you timed the reaction.

.....

..... [1]

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

.....

[1]

(ii) Explain, in terms of particles, why this Experiment has the fastest rate.

.....

.....

.....

[2]

(d) (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]

(e) State a practical method you could use to prove that manganese(IV) oxide was a catalyst in Experiment 1.

.....

.....

.....

[2]

Experiment 5

To a few cm^3 of solution **A** in a test-tube, add a spatula measure of manganese(IV) oxide.

Test the gas given off by using a splint.

test .....

observation ..... [2]

Identify the gas.

..... [1]

2 You are provided with a mixture of two compounds, **B** and **C**, each containing the same metal cation. Compound **B** is soluble in water and compound **C** is insoluble.
Carry out the following tests on the mixture, recording all of your observations in the table. Do not write any conclusions in the table.

tests	observations
(a) Describe the appearance of the mixture.	....[1]
(b) Place one spatula measure of the mixture into a hard glass test-tube. Heat gently then strongly. Test any gases released with cobalt chloride paper. Note all observations.	....[2]
Add the rest of the mixture to a boiling tube. Add about 25 cm^3 of distilled water and shake for two minutes. Filter the mixture into a small beaker and retain both the filtrate and the residue.	
Tests on the filtrate Pour about 2 cm depth of the solution into each of four 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) Take the second portion and repeat test **(c)(i)** using aqueous ammonia instead of aqueous sodium hydroxide.	....[2]

tests	observations
(iii) To the third portion of the solution add a few drops of hydrochloric acid and about 1 cm^3 of barium nitrate solution.	.....[1]
(iv) To the fourth portion of the solution add a few drops of nitric acid and about 1 cm^3 of silver nitrate solution.	.....[1]
Tests on the residue	
(d) By using a spatula, transfer some of the residue from the filter paper into a test-tube. Add hydrochloric acid to the test-tube and test the gas with limewater.	....[2]

(e) What does test **(b)** indicate?

.....[1]

(f) What do tests **(c)(iii)** and **(iv)** tell you about **B**?

.....

.....[2]

(g) What conclusions can you draw about

compound **B**, ...

.....

compound **C**? .....

.....[3]

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 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, then add 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 result*
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