UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

3551390504

CHEMISTRY **0620/52**

Paper 5 Practical Test **May/June 2011**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
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.
DO **NOT** WRITE IN ANY BARCODES.

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 **7** printed pages and **1** blank page.

UNIVERSITY of CAMBRIDGE International Examinations

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1 You are going to investigate the reaction between excess magnesium and two different dilute acids, **X** and **Y**.

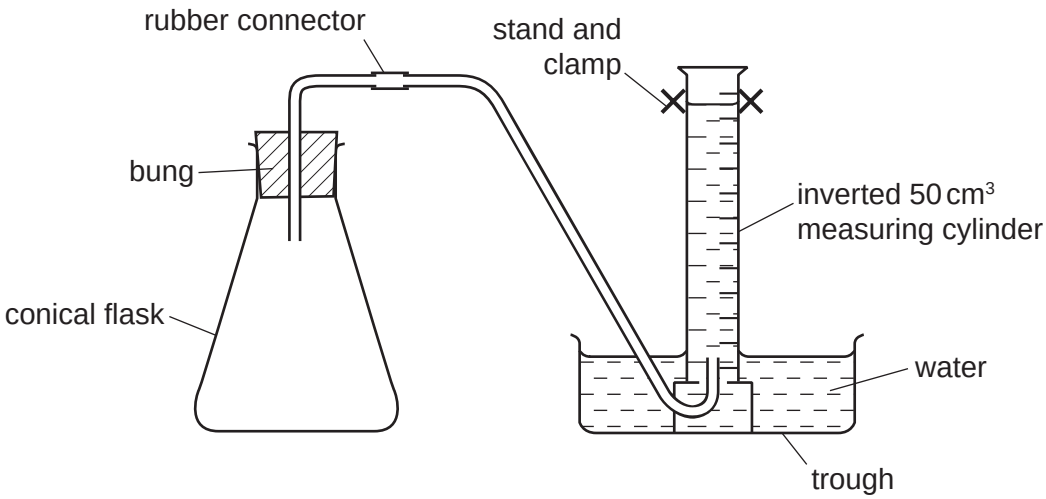
Read all the instructions below carefully before starting the experiments.

Instructions

You are going to carry out two experiments.

(a) *Experiment 1*

Set up the apparatus as shown in the diagram below.



Remove the bung from the conical flask and move the measuring cylinder away from the delivery tube without letting any water run out. Twist one of the strips of magnesium provided to break it into four pieces and place all of them into the conical flask.

Using a different measuring cylinder, add 50 cm^3 of aqueous acid **X** into the conical flask and replace the bung firmly. Place the measuring cylinder back over the delivery tube and start the timer. In the table, record the volume of gas collected in the measuring cylinder every thirty seconds for three minutes.

time / s	0	30	60	90	120	150	180
volume of gas / cm^3							

[3]

(b) *Experiment 2*

Repeat the whole of Experiment 1 using 50 cm^3 of aqueous acid **Y**.
In the table, record the volume of gas collected in the measuring cylinder every thirty seconds for three minutes.

time / s	0	30	60	90	120	150	180
volume of gas / cm^3							

[3]

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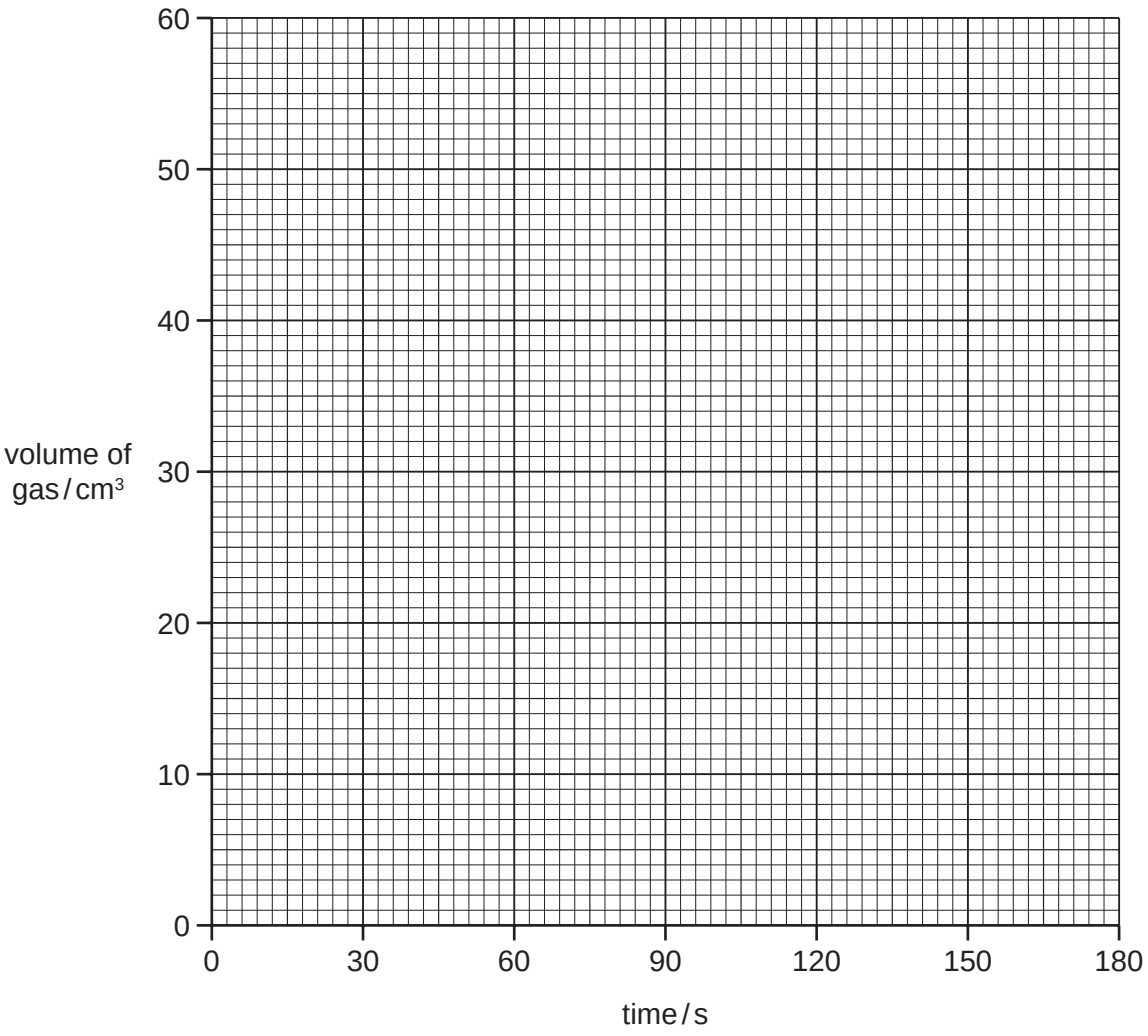
(c) Plot the results you have obtained for both experiments on the grid below. For each set of results, draw a smooth line graph. Indicate clearly which line represents Experiment 1 and which line represents Experiment 2.



[6]

(d) **(i)** In which experiment was the speed of reaction fastest?

..... [1]

(ii) Suggest why the speed was fastest in this experiment.

.....

..... [1]

(e) Why eventually will no more gas be produced?

.....

..... [2]

(f) **From your graph**, deduce the time required to collect 25 cm^3 of gas in Experiment 1. Show clearly **on the graph** how you worked out your answer.

..... [2]

(g) Why was the measuring cylinder moved away from the delivery tube while the acid solution was added to the flask?

.....

..... [2]

(h) Give **one** advantage and **one** disadvantage of using a measuring cylinder to add the acids to the flask.

advantage .....

disadvantage ..... [2]

[Total: 22]

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2 You are provided with mixture **Z**.
Z consists of two solids, **W** and **V**. Solid **W** is water-soluble and solid **V** is insoluble.
Carry out the following tests on **Z**, recording **all** of your observations in the table.
Conclusions must **not** be written in the table.

tests	observations
tests on mixture **Z** **(a)** Describe the appearance of the mixture.	.... [1]
(b) Place a little of mixture **Z** in a test-tube. Heat the mixture for about 1 minute. After 1 minute, test the gas with damp pH indicator paper. Leave the test-tube to cool.	.... [3]
Add the rest of mixture **Z** to about 10 cm^3 of distilled water in a boiling tube. Stopper the boiling tube and shake the contents for about one minute. Filter the contents of the test-tube. Keep the residue and the filtrate for the following tests. tests on the filtrate **(c) (i)** To about 1 cm^3 of the filtrate, add a few drops of dilute nitric acid followed by about 1 cm^3 of silver nitrate solution and shake the test-tube. **(ii)** To about 1 cm^3 of the filtrate, add about 1 cm^3 of aqueous sodium hydroxide. Gently heat the mixture. Test the gas given off with damp pH indicator paper. **(iii)** To the third portion of the filtrate, add about 1 cm^3 of dilute hydrochloric acid followed by about 1 cm^3 of barium chloride solution.	 .... [2] .... [1] .... [1]

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tests	observations
<u>tests on the residue</u> **(d)** Using a spatula, transfer some of the residue from the filter paper to a test-tube. Using a teat pipette, add about 2 cm^3 of dilute hydrochloric acid to the residue. Test the gas given off. Add to the solution in the test-tube an equal volume of distilled water. Shake the contents and divide into two portions. **(e) (i)** To the first portion of the solution, add excess aqueous sodium hydroxide. **(ii)** To the second portion, add excess aqueous ammonia solution.	.... [3] ..... [2] ..... [1]

(f) What conclusions can you draw about solid **W**?

.....

..... [2]

(g) What conclusions can you draw about solid **V**?

.....

..... [2]

[Total: 18]

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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 silver nitrate	yellow ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide then aluminium foil; warm carefully	ammonia produced
sulfate (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 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 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