UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

8480914510

CHEMISTRY **0620/62**

Paper 6 Alternative to Practical **October/November 2011**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

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.

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	
3	
4	
5	
6	
Total	

This document consists of **10** printed pages and **2** blank pages.

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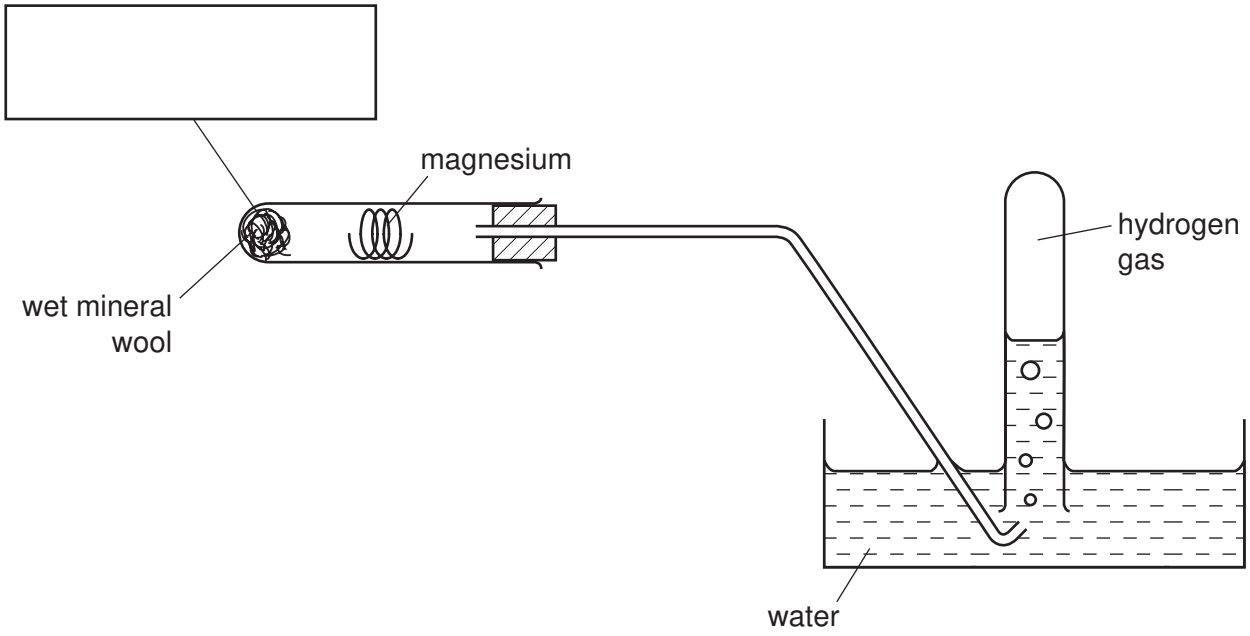
For Examiner's Use

1 A student reacted steam with heated magnesium ribbon using the apparatus below.
A white solid was left in the boiling tube and hydrogen gas was collected.



(a) (i) Complete the box to show the chemical used. [1]

(ii) Indicate on the diagram, with two arrows, where heat is applied. [1]

(b) Suggest the name of the white solid.

..... [1]

(c) State a test for hydrogen.

test .....

result ..... [2]

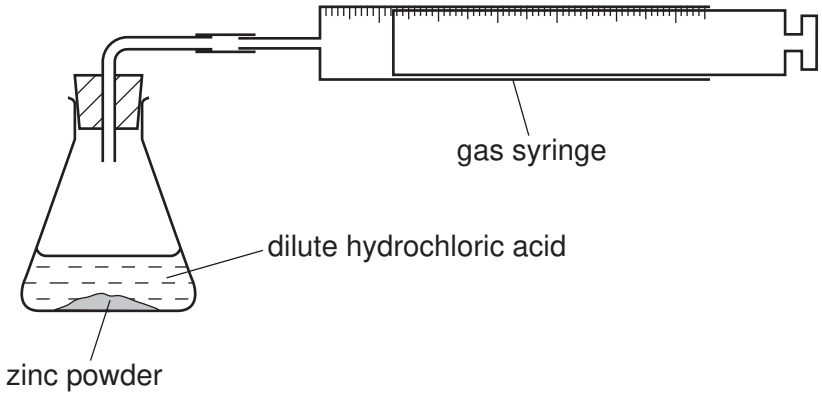
(d) Suggest why the boiling tube containing the magnesium often cracks on cooling.

..... [1]

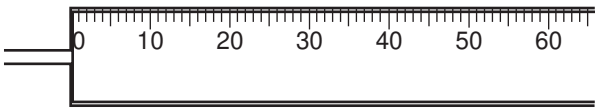
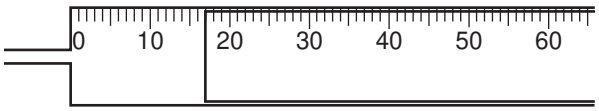
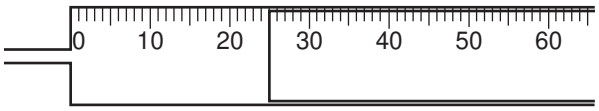
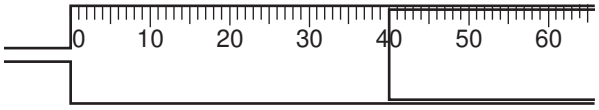
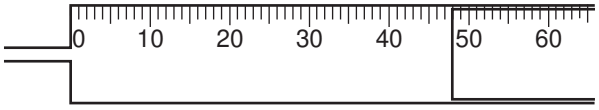
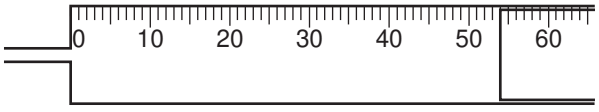
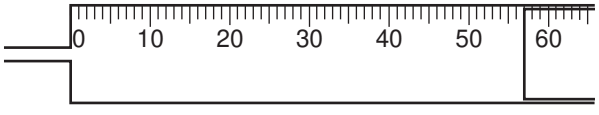
[Total: 6]

For Examiner's Use

2 A student carried out an experiment to investigate the speed of reaction between 50 cm^3 of dilute hydrochloric acid and excess zinc powder using the apparatus shown below.
The reaction was carried out at a room temperature of 25 °C.



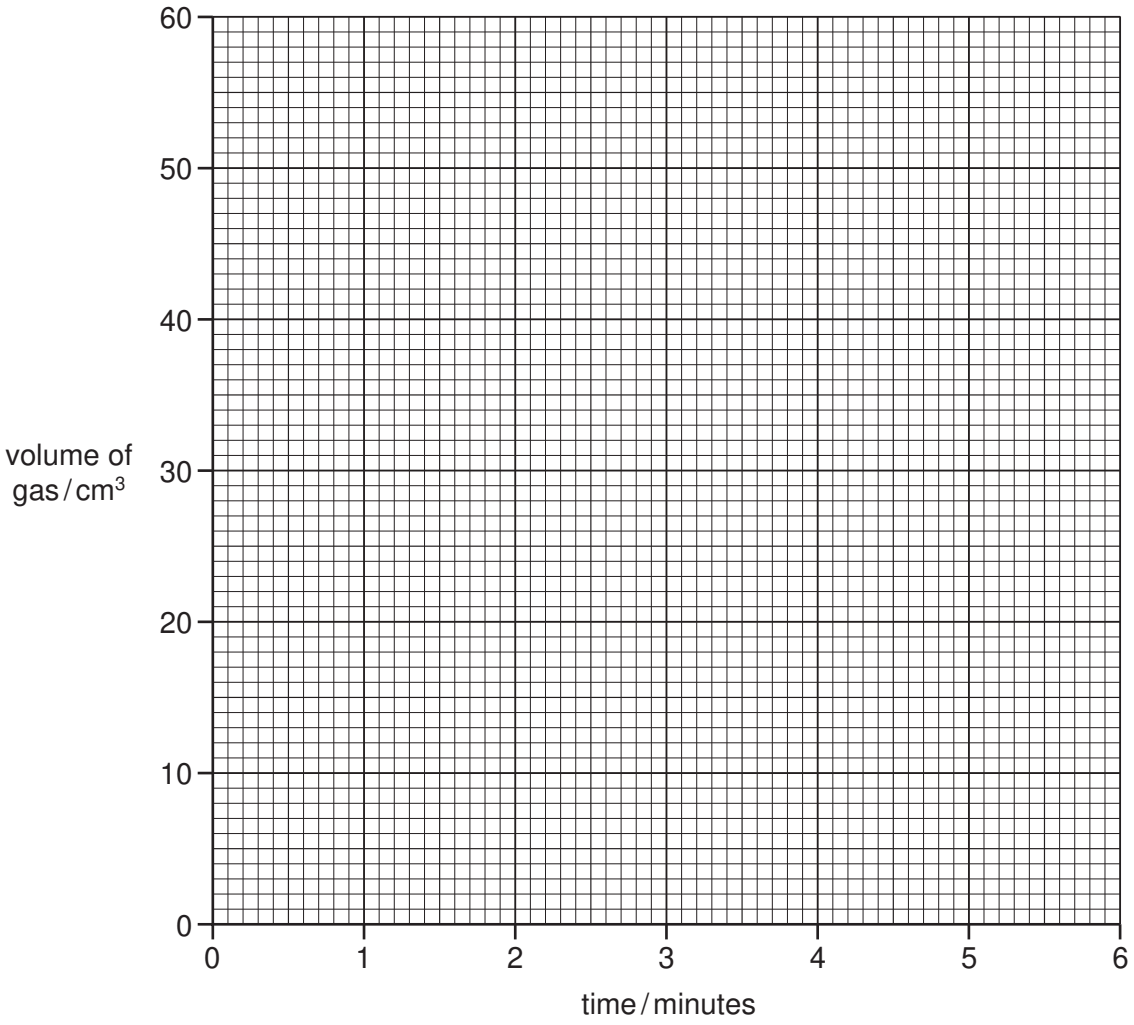
(a) The volume of gas produced was measured every minute for six minutes.
Use the syringe diagrams to complete the table of results.

time / minutes	gas syringe diagram	volume of gas collected / cm^3
0		
1		
2		
3		
4		
5		
6		

[3]

For Examiner's Use

(b) Plot the results on the grid below and draw a smooth line graph.



[4]

(c) (i) At which time does the result appear to be inaccurate?

..... [1]

(ii) **Use your graph** to work out the volume of gas that should have been recorded at this time. Show clearly **on the grid** how you obtained your answer.

..... [2]

(d) (i) How does the speed of the reaction change over six minutes?

..... [1]

(ii) Explain why this change in speed takes place.

.....

..... [1]

(e) Sketch, **on the grid**, the graph you would expect if the experiment was repeated

(i) at 50 °C,

(ii) using excess lumps of zinc.

Clearly label your sketches. [2]

[Total: 14]

For Examiner's Use

3 The following account is from a student's notebook on how she made a sample of hydrated cobalt(II) chloride crystals, $CoCl_2.6H_2O$.

Approximately 40 cm^3 of dilute hydrochloric acid was poured into a beaker and the acid warmed. A spatula measure of cobalt carbonate was added to the acid and stirred with a glass rod. This was repeated until no more cobalt carbonate reacted.
The mixture was filtered and the excess cobalt carbonate removed. The filtrate was heated until crystallisation point and left to cool.
Crystals of pink hydrated cobalt(II) chloride were obtained.

(a) Why was the acid warmed?

..... [1]

(b) Why did it not matter if the volume of hydrochloric acid was not exactly 40 cm^3?

..... [1]

(c) Why was the mixture stirred with a glass rod and not a metal spatula?

..... [1]

(d) How would the student have known when no more cobalt carbonate reacted?

..... [1]

(e) How would the student know when the crystallisation point had been reached?

..... [1]

(f) Suggest the effect of heat on hydrated cobalt(II) chloride crystals.

.....

..... [2]

[Total: 7]

[Turn over

4 A student investigated the reaction of iodine with two different aqueous solutions of sodium thiosulfate, **F** and **G**.

Two experiments were carried out.

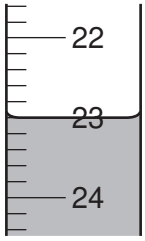
Experiment 1

A burette was filled with the aqueous solution of sodium thiosulfate, **F**, to the 0.0 cm^3 mark.

Using a measuring cylinder, 20 cm^3 of aqueous potassium iodate was poured into a conical flask. Excess potassium iodide and dilute sulfuric acid were added to the flask and the mixture shaken. These chemicals reacted to form iodine.

The sodium thiosulfate solution was added from the burette 1 cm^3 at a time. When the colour of the mixture was pale yellow, starch solution was added to the flask. Sodium thiosulfate solution was then added until the solution became colourless.

(a) Use the burette diagram to record the volume in the table and complete the column.



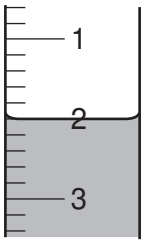
final reading

Experiment 2

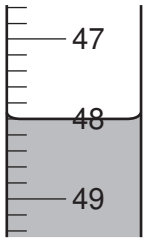
The burette was emptied and rinsed with the aqueous solution of sodium thiosulfate, **G**.

Experiment 1 was repeated using the solution **G** of sodium thiosulfate instead of solution **F**.

(b) Use the burette diagrams to record the volumes in the table and complete the table.



initial reading



final reading

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

[4]

(c) Why was the burette rinsed with solution **G** before carrying out Experiment 2?

..... [1]

(d) Suggest the purpose of the starch in the experiments.

..... [1]

(e) **(i)** In which Experiment was the greater volume of sodium thiosulfate solution used?

..... [1]

(ii) Compare the volumes of sodium thiosulfate solution used in Experiments 1 and 2.

..... [1]

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

.....

.....

..... [2]

(f) If Experiment 1 was repeated using 10 cm^3 of aqueous potassium iodate, what volume of solution **F** would be used? Explain your answer.

.....

..... [2]

(g) **(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]

[Total: 16]

5 Two different liquids, **H** and **J**, were analysed.
H was an aqueous solution of copper(II) sulfate.
The tests on the liquids and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
(a) (i) Appearance of liquid **H**.	..... [1]
(ii) Appearance and smell of liquid **J**.	distinctive smell
(iii) Distilled water was added to liquid **J** in a test-tube and the contents shaken.	two layers of liquid visible
(b) To liquid **H** was added dilute hydrochloric acid and then aqueous barium chloride.	..... [2]
(c) (i) To a little of liquid **H**, excess aqueous sodium hydroxide was added.	..... [2]
(ii) To a little of liquid **H**, about 1 cm^3 of aqueous ammonia solution was added.	.....
Excess aqueous ammonia solution was then added.	..... [3]
(d) A few drops of liquid **J** were put on a dry watch glass. The liquid was touched with a lighted splint.	liquid burns with a sooty flame

(e) What conclusions can you draw about liquid **J**?

.....

..... [2]

[Total: 10]

6 Kleen Up is a colourless liquid used to clean work surfaces and glass windows.
Kleen Up contains ammonia solution, which is a weak alkali.

(a) State a chemical test to show the presence of ammonia in Kleen Up.

test .....

result ..... [2]

(b) Plan an experiment to determine the concentration of ammonia in Kleen Up.
You are provided with aqueous nitric acid of known concentration and common laboratory apparatus.

.....

.....

.....

.....

.....

..... [5]

[Total: 7]

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