UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

CHEMISTRY **0620/63**

Paper 6 Alternative to Practical **May/June 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 **13** printed pages and **3** blank pages.

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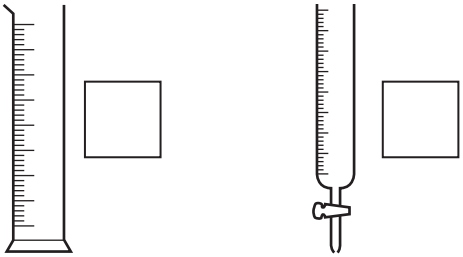
For Examiner's Use

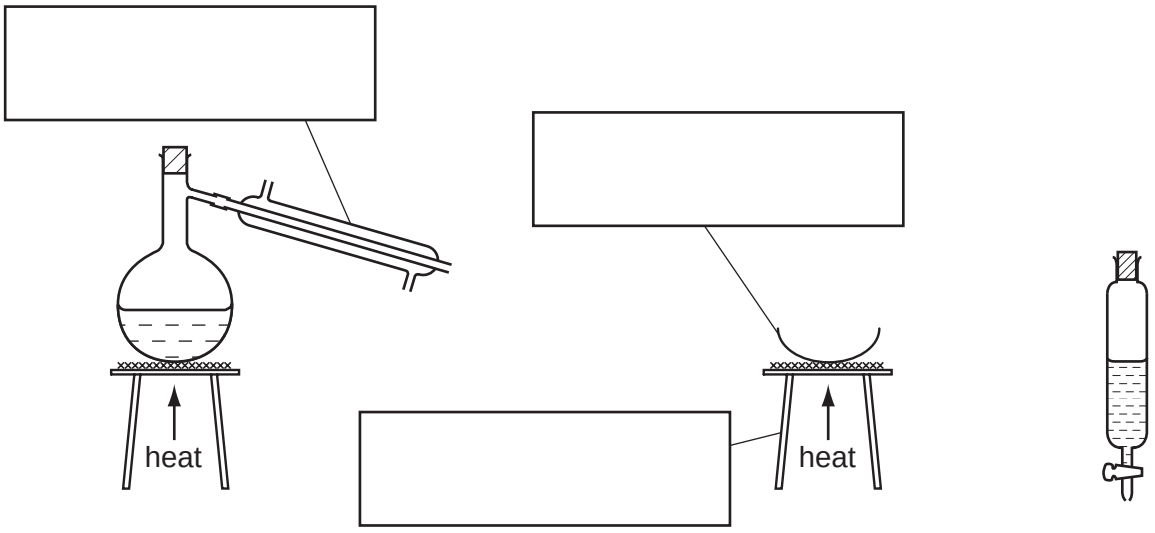
1 A student separated an aqueous solution of sodium chloride.
She measured out 70 cm^3 of the solution and then obtained pure water from the solution.

(a) Which of these pieces of apparatus is most suitable to measure 70 cm^3 of the solution?
Tick **one** box.



[1]

(b) (i) Complete the empty boxes to name the pieces of apparatus below.



A **B** **C**

[3]

(ii) Which method of separation, **A**, **B** or **C**, would be most suitable to obtain pure water from the solution?

apparatus ..... [1]

(c) Describe how crystals of sodium chloride could be quickly obtained from the solution.

.....

.....

..... [2]

[Total: 7]

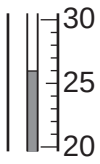
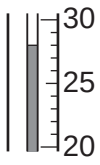
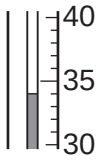
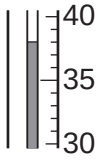
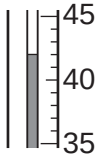
2 A student investigated the temperature changes when increasing amounts of zinc powder were added to 25 cm^3 of aqueous copper(II) sulfate in a beaker. The equation for the reaction is shown below.

$$Zn(s) + CuSO_4(aq) \rightarrow Cu(s) + ZnSO_4(aq)$$

Five experiments were carried out. The initial temperature in each experiment was 22 °C.

The thermometer diagrams in the table show the highest temperature reached after each addition of zinc.

(a) Use the thermometer diagrams to record the highest temperatures and complete the table.

experiment	mass of zinc added / g	thermometer diagram	highest temperature / °C	temperature rise / °C
1	0.30			
2	0.60			
3	0.90			
4	1.20			
5	1.50			

[4]

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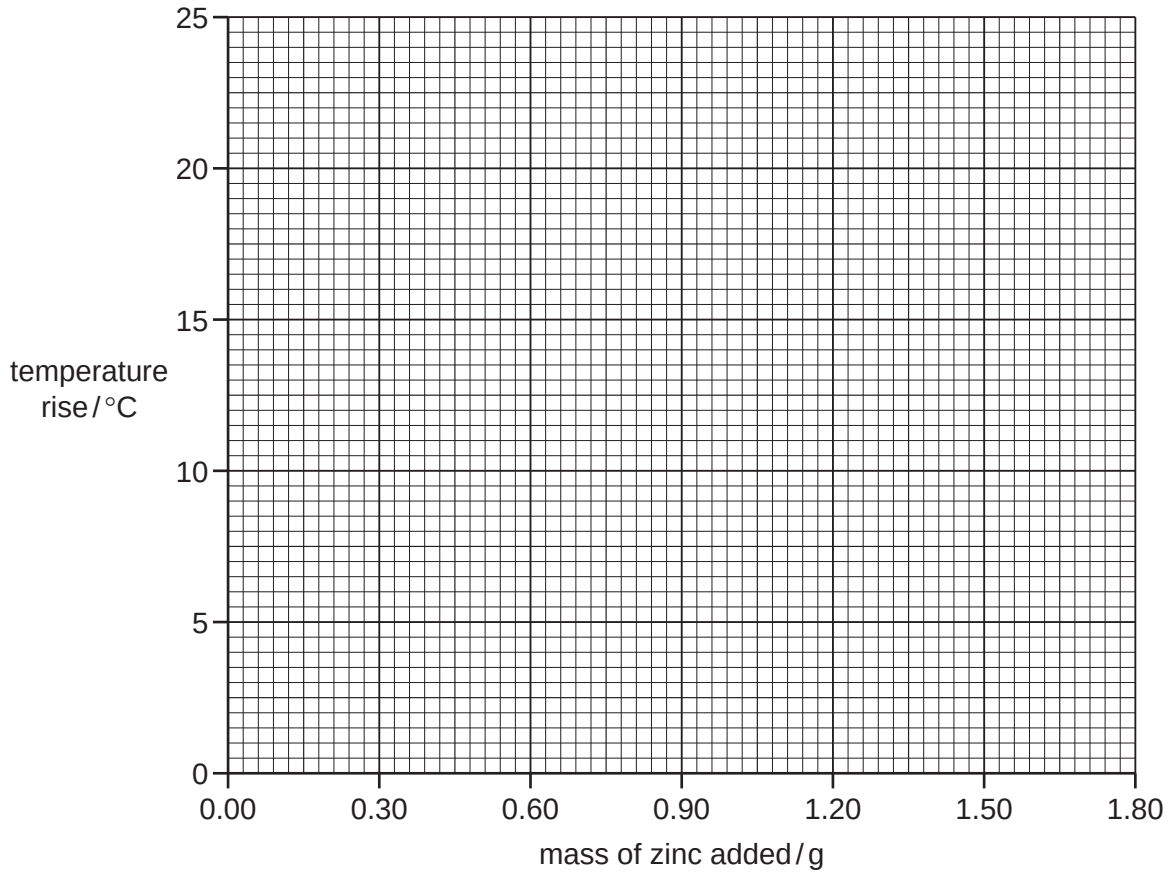
(b) Plot the results on the grid below and draw a straight line graph.



[3]

(c) Which result appears to be inaccurate?

..... [1]

(d) Use your graph to find the temperature rise produced by 1.80 g of zinc. Show clearly **on the grid** how you obtained your answer.

..... [3]

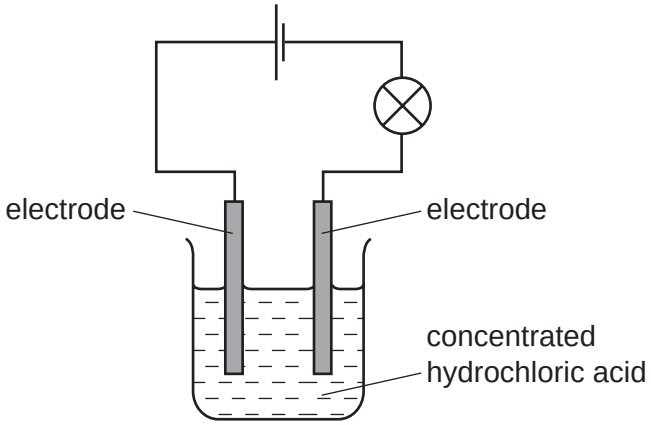
(e) State **two** observations, other than a rise in temperature, which would be made when zinc reacted with the aqueous copper(II) sulfate.

1. .....

2. ..... [2]

[Total: 13]

3 Electricity was passed through a solution of concentrated hydrochloric acid using the apparatus shown.



(a) Give **two** expected observations.

1. .....

2. ..... [2]

(b) Suggest a suitable material for the electrodes.

..... [1]

(c) A lighted splint placed in a test-tube of the gas collected at the negative electrode gave a pop sound.

The identity of the gas was ..... [1]

(d) State **two** safety precautions that must be followed when carrying out this experiment.

1. .....

2. ..... [2]

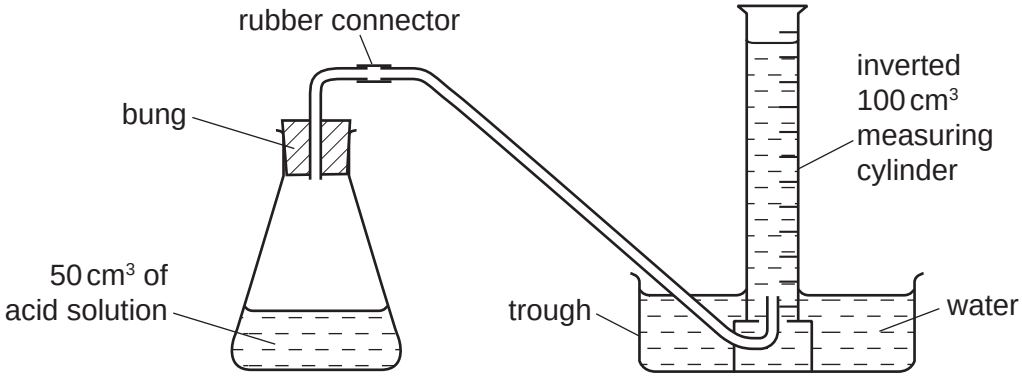
[Total: 6]

4 A student investigated the speed of reaction between excess magnesium and two different dilute acids, **X** and **Y**.

Two experiments were carried out.

Experiment 1

The apparatus was set up as shown in the diagram.

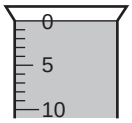
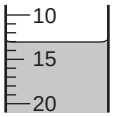
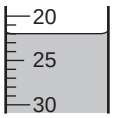
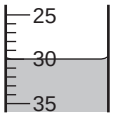
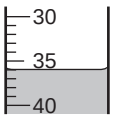
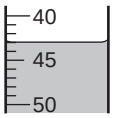
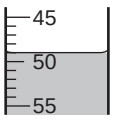


Using a measuring cylinder, 50 cm³ of acid **X** was poured into the conical flask.
0.5 g of magnesium ribbon was added to the conical flask and the bung replaced.

The timer was started and the volume of gas collected in the measuring cylinder was measured every thirty seconds for three minutes.

For Examiner's Use

(a) Use the measuring cylinder diagrams to record the volumes of gas collected in the table of results.

time / s	measuring cylinder diagram	total volume of gas collected / cm^3
0		
30		
60		
90		
120		
150		
180		

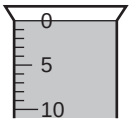
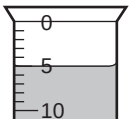
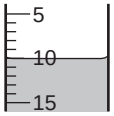
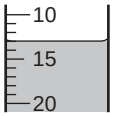
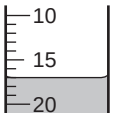
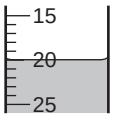
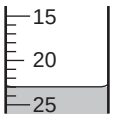
[3]

For Examiner's Use

Experiment 2

Experiment 1 was repeated using 50 cm^3 of acid **Y**.

(b) Use the measuring cylinder diagrams to record the volumes of gas collected in the table of results.

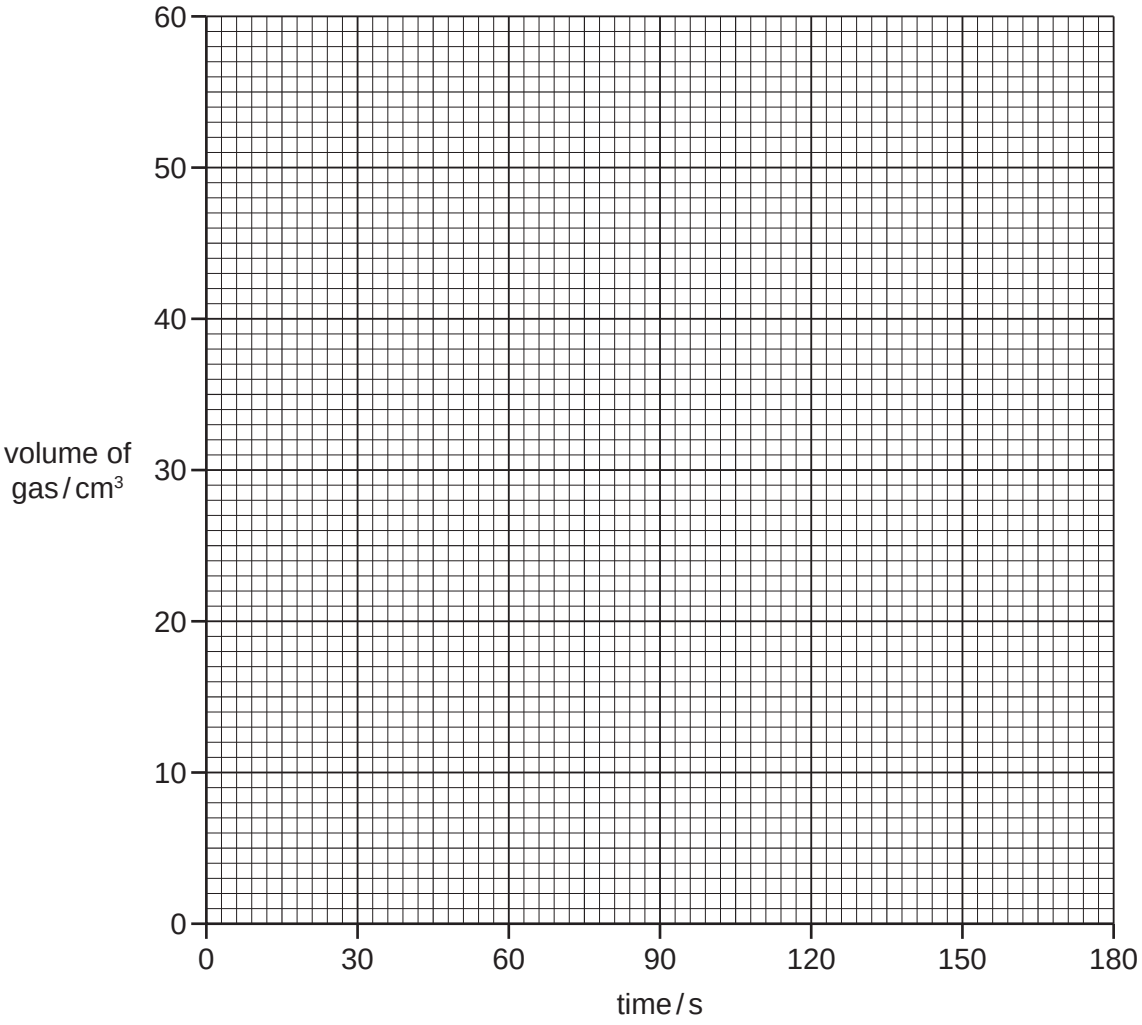
time / s	measuring cylinder diagram	total volume of gas collected / cm^3
0		
30		
60		
90		
120		
150		
180		

[3]

[Turn over

For Examiner's Use

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

advantage .....

disadvantage ..... [2]

[Total: 20]

5 A mixture, **Z**, of two different solids was analysed. **Z** consisted of solid **W**, which was water-soluble ammonium chloride, and solid **V**, which was insoluble.

The tests on the solids, and some of the observations, are in the following table.

Complete the observations in the table.

tests	observations
<u>tests on mixture **Z**</u> **(a)** Appearance of the mixture.	white solid
Mixture **Z** was added to distilled water in a boiling tube. The boiling tube and contents were shaken and then filtered. <u>tests on the filtrate</u> The filtrate was divided into three test-tubes. **(b) (i)** To the first test-tube of the filtrate, a few drops of dilute nitric acid was added followed by silver nitrate solution. **(ii)** To the second test-tube of the filtrate, aqueous sodium hydroxide was added. The mixture was heated. The gas given off was tested with damp pH indicator paper. **(iii)** To the third test-tube of the filtrate, dilute hydrochloric acid was added followed by barium chloride solution.	..... [2] .... [2] ..... [1]

tests	observations
<u>tests on the residue</u>	
(c) By using a spatula, some of the residue was transferred from the filter paper into a test-tube. Dilute hydrochloric acid was added to the residue.	rapid effervescence
The gas given off was tested.	limewater turned milky
The solution in the test-tube was divided into two portions.	
(d) (i) To the first portion of the solution, excess aqueous sodium hydroxide was added.	white precipitate formed, insoluble in excess
(ii) To the second portion of the solution, excess aqueous ammonia solution was added.	no precipitate formed

(e) Identify the gas given off in **(c)**.

..... [1]

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

.....

.....

..... [2]

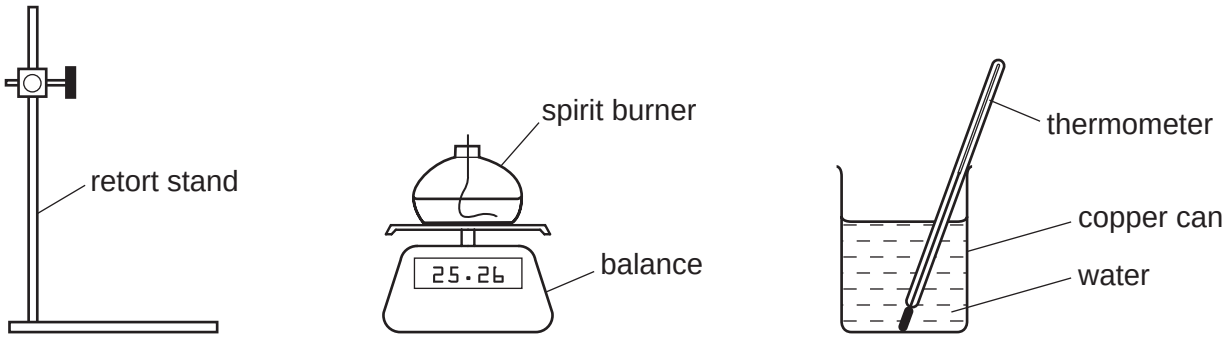
[Total: 8]

6 Petrol is a liquid fuel obtained from petroleum (crude oil).

Bioethanol is a liquid fuel made by the fermentation of carbohydrates obtained from plants such as sugar cane.

Using the apparatus below, plan an experiment to investigate which of these two fuels produces more energy.

You may use the space below to draw a diagram to help you answer the question.



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..... [6]

[Total: 6]

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