Centre Number	Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
CAMBRIDGE INTERNATIONAL EXAMINATIONS

CHEMISTRY 0620/6

PAPER 6 Alternative to Practical

OCTOBER/NOVEMBER SESSION 2002

1 hour

Candidates answer on the question paper.
No additional materials are required.

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

FOR EXAMINER'S USE

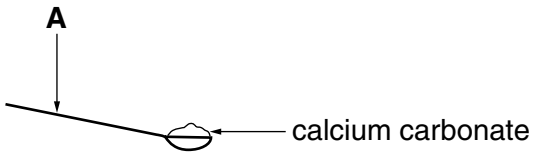
This question paper consists of 11 printed pages and 1 blank page.

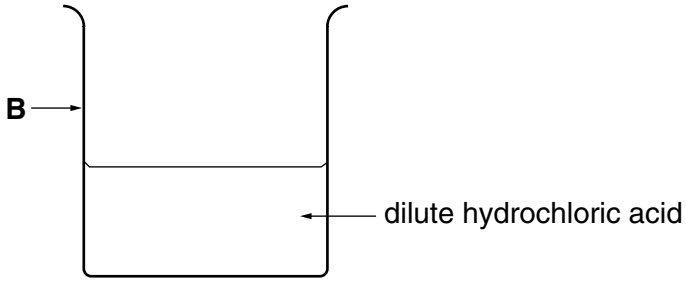
University of Cambridge Local Examinations Syndicate

[Turn over

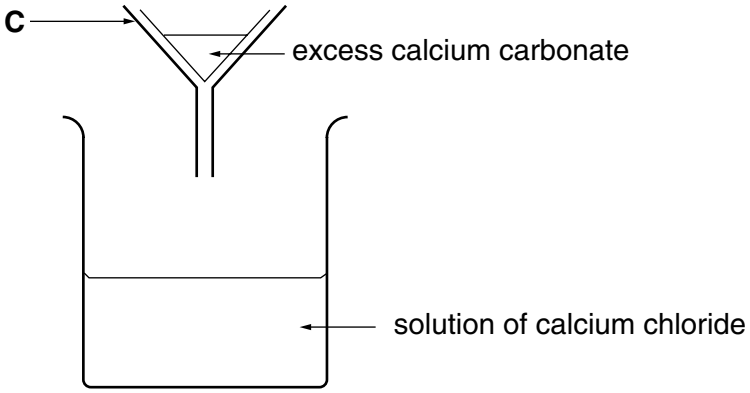
1 A student investigated the neutralisation of dilute hydrochloric acid, using an excess of calcium carbonate.

Step 1 Excess calcium carbonate was added to hydrochloric acid.





Step 2. Excess calcium carbonate was removed from the solution.



Step 3. The solution of calcium chloride was tested with indicator paper.

(a) Identify the pieces of apparatus labelled:

A.....

B.....

C.....[3]

(b) What does the term *excess* mean?

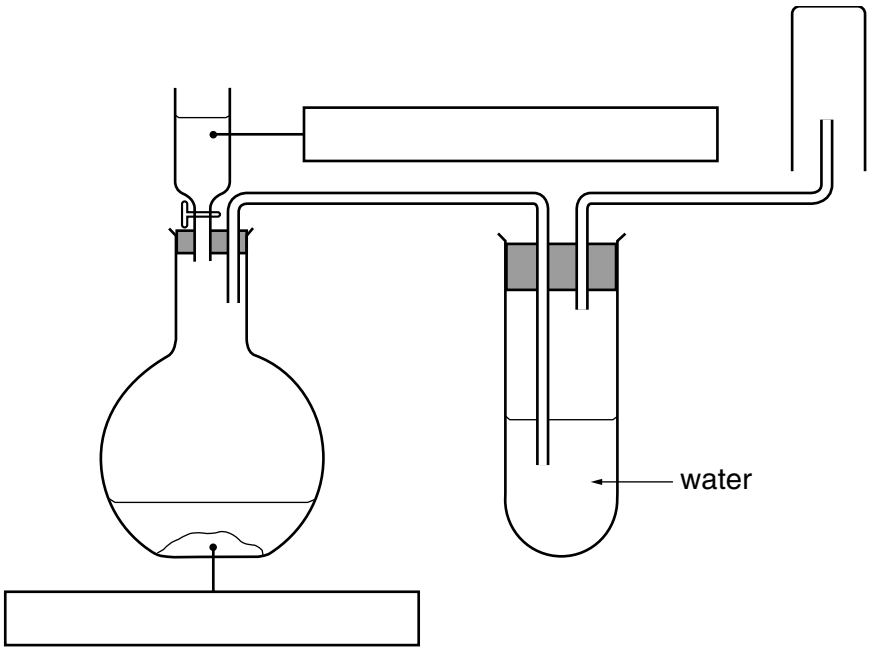
.....

.....[1]

(c) Suggest the pH value of the solution of calcium chloride.

.....[1]

2 Hydrogen chloride gas is strong-smelling, denser than air and soluble in water. A sample of hydrogen chloride gas can be prepared by adding concentrated sulphuric acid to sodium chloride. Study the diagram of the apparatus used.



(a) Fill in the boxes to show the chemicals used. [2]

(b) Identify and explain **two** mistakes in the diagram.

Mistake 1.....

.....[2]

Mistake 2.....

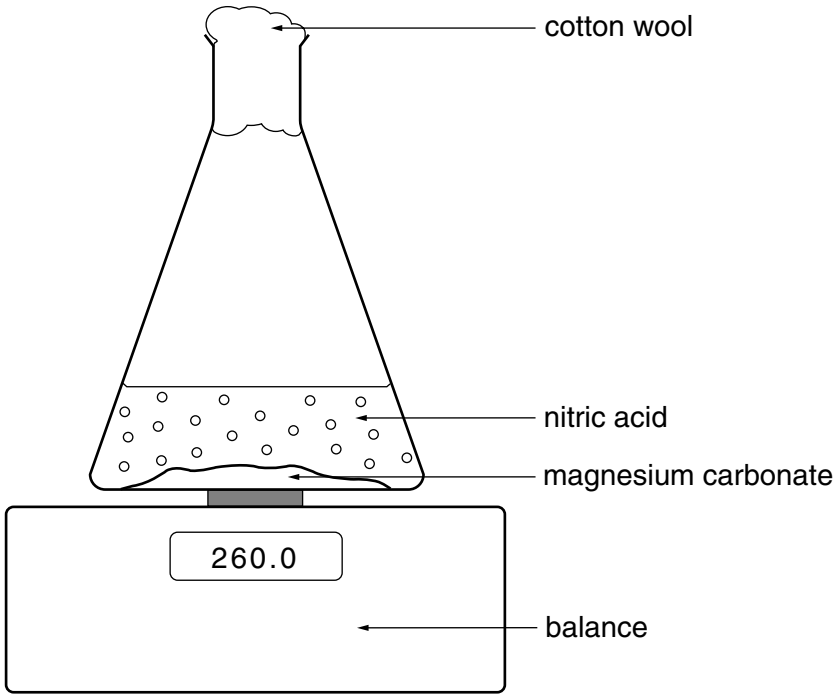
.....[2]

(c) State **one** precaution that should be taken when carrying out this experiment.

.....

.....[1]

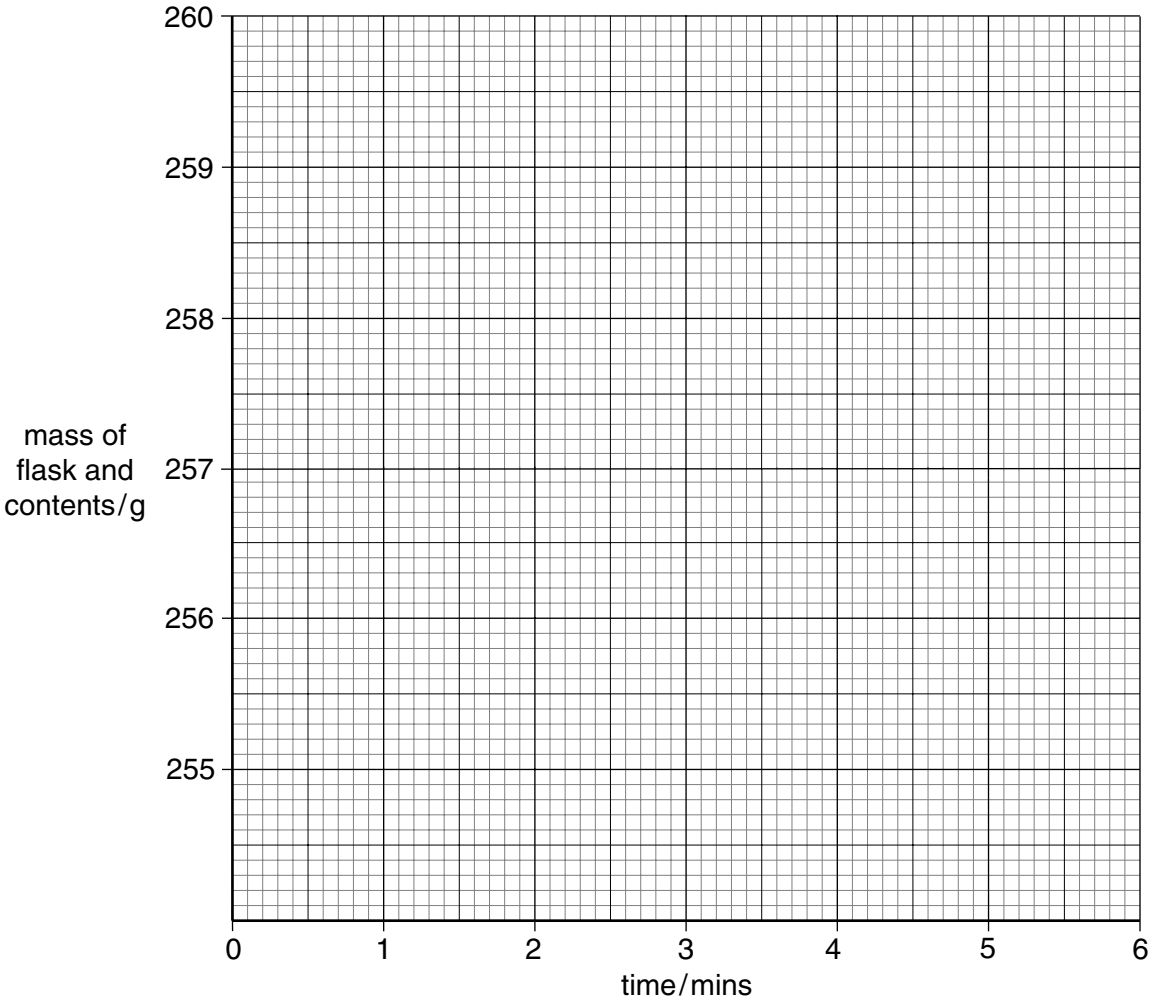
3 Dilute nitric acid was added to a large amount of magnesium carbonate in a conical flask as shown.



The flask was placed on a balance and the mass of the flask and contents recorded every minute. The results are shown in the table.

time / min	0	1	2	3	4	5	6
mass of flask and contents / g	260.0	257.9	256.8	256.6	255.8	255.6	255.6

(a) Plot the results on the grid and draw a smooth line graph. [3]



(b) Which result appears to be inaccurate? Why have you selected this result?

.....

.....[2]

(c) Why does the mass of the flask and contents decrease?

.....[1]

(d) Suggest the purpose of the cotton wool.

.....[1]

(e) At what time did the reaction finish?

.....[1]

(f) On the grid, sketch the graph you would expect if the experiment were repeated using nitric acid at a higher temperature. [2]

4 An investigation was carried out on the reactions of four different metals. Equal masses of copper, magnesium, iron and zinc were used.

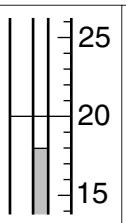
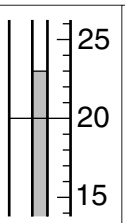
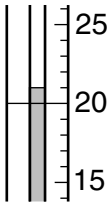
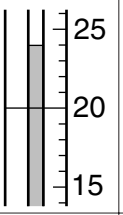
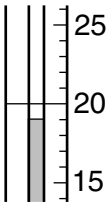
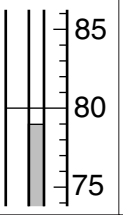
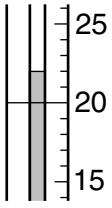
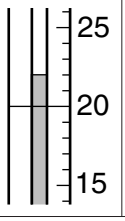
Experiment 1

A 15 cm^3 sample of dilute sulphuric acid was added to each of four boiling tubes. The initial temperature of the acid was measured. Zinc was added to the first tube, iron to the second tube, magnesium to the third tube and copper to the fourth tube.

The maximum temperature reached in each tube was measured and any observations were recorded in the table.

(a) Use the thermometer diagrams to complete the results table.

Table of results

metal added	temperature of acid/°C		temperature difference/°C	observations
	initial	maximum		
zinc				gas given off slowly
iron				gas given off very slowly
magnesium				gas given off rapidly: lighted splint pops
copper				no visible reaction

[6]

Use your results and observations to answer the following questions.

(i) Which metal is most reactive with sulphuric acid?

.....[1]

(ii) Give **two** reasons why you chose this metal.

1. .....

2. .....[2]

(iii) Name the gas given off.

.....[1]

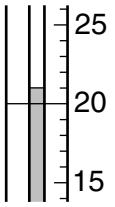
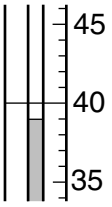
The reaction between magnesium and aqueous copper(II) sulphate was then investigated.

Experiment 2

A 5 cm^3 sample of aqueous copper(II) sulphate was measured into a test-tube. The initial temperature of the solution was measured.

Magnesium powder was added to the test-tube and the maximum temperature reached was measured. Use the thermometer diagrams to complete the results table.

Table of results

initial temperature of aqueous copper(II) sulphate		
maximum temperature reached after magnesium added		

[2]

(b) How do your observations show that the reaction of magnesium with aqueous copper(II) sulphate is exothermic?

.....[1]

(c) What type of exothermic reaction occurs when magnesium is added to aqueous copper(II) sulphate?

.....[1]

(d) Use your results from Experiments 1 and 2 to put the four metals in order of reactivity.

least reactive .....

.....

.....

most reactive .....[1]

5 Two liquids, **F** and **G**, were tested. The tests and some of the observations are in the following table. **G** was an aqueous solution of a metal iodide.

Complete the observations in the table.

tests	*observations*
(a) (i) Appearance of liquid **F**.	colourless smells like petrol
(ii) Appearance of liquid **G**.	colourless no smell
(b) (i) About 1 cm^3 of liquid **F** was added to a crystal of iodine. The test-tube was shaken.	purple solution
(ii) About 1 cm^3 of liquid **G** was added to a crystal of iodine. The test-tube was shaken.	red/brown solution
The mixture from **(b)(i)** was added to the mixture in **(b)(ii)**.	two layers formed
(c) A few drops of **F** were placed on a dry watch glass. The liquid was touched with a lighted splint.	....[2]
(d) To about 1 cm^3 of liquid **G** was added a few drops of dilute nitric acid followed by aqueous lead(II) nitrate.	....[2]
(e) To about 1 cm^3 of liquid **G** was added a few drops of dilute nitric acid followed by aqueous silver nitrate.	....[2]

(f) What type of substance is liquid **F**?

.....

.....[2]

6 The following paragraph was taken from a student's notebook.

To make potassium chloride

25.0 cm^3 of aqueous potassium hydroxide were placed in a flask and a few drops of indicator were added. Dilute hydrochloric acid was added to the flask until the indicator changed colour. The volume of acid used was 19.0 cm^3.

(a) What piece of apparatus should be used to measure the aqueous potassium hydroxide?

.....[1]

(b) **(i)** Name a suitable indicator that could be used.

.....[1]

(ii) The indicator colour would change

from.....

to..... [2]

(c) Which solution was more concentrated? Explain your answer.

.....

.....[2]

(d) How could **pure** crystals of potassium chloride be obtained from this experiment?

.....

.....

.....

.....[3]

7 **FASTGROW FERTILISER**

Fertilisers are used to increase the growth of plants. Fertilisers have to dissolve in water if they are to be used by plants.

Plan an experiment to find the solubility, in g/100 cm^3, of FASTGROW fertiliser at 30 °C.

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.....[6]

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