| Centre Number | Candidate Number |
|---|---|
| | |

Candidate Name _____

**International General Certificate of Secondary Education**
**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

# CHEMISTRY 0620/6

PAPER 6 Alternative to Practical

**MAY/JUNE 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 |
|---|
| |

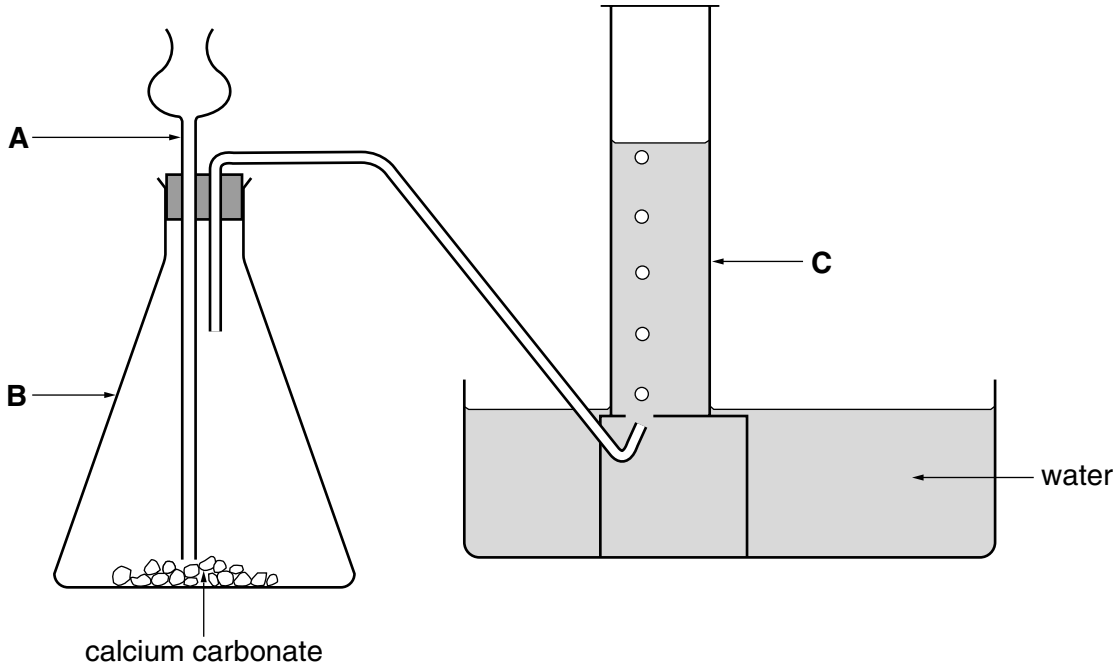
**This question paper consists of 11 printed pages and 1 blank page.**



University of Cambridge Local Examinations Syndicate

[Turn over

**1** The apparatus below was used to make carbon dioxide. Dilute hydrochloric acid was added to calcium carbonate.




**(a)** Identify the pieces of apparatus labelled:

**A** .....

**B** .....

**C** .....

[3]

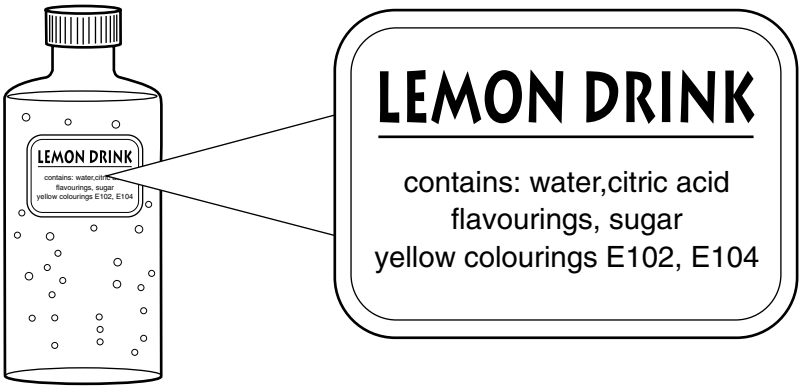
**(b)** Indicate on the diagram with an arrow where the acid was added. [1]

**(c)** State a test for carbon dioxide.

test .....

result .....[2]

**2** The label shows the substances present in a bottle of lemon drink.




**(a)** A piece of litmus paper was dipped in the drink.

**(i)** What colour will the paper turn?

.....[1]

**(ii)** Why does using litmus paper give a better result than adding Universal Indicator solution to the drink?

.....

.....[1]

**(b)** How could a sample of pure water be obtained from the drink?

.....

.....

.....[2]

**(c)** Describe an experiment you could carry out to show that the drink contained **two** different yellow substances.

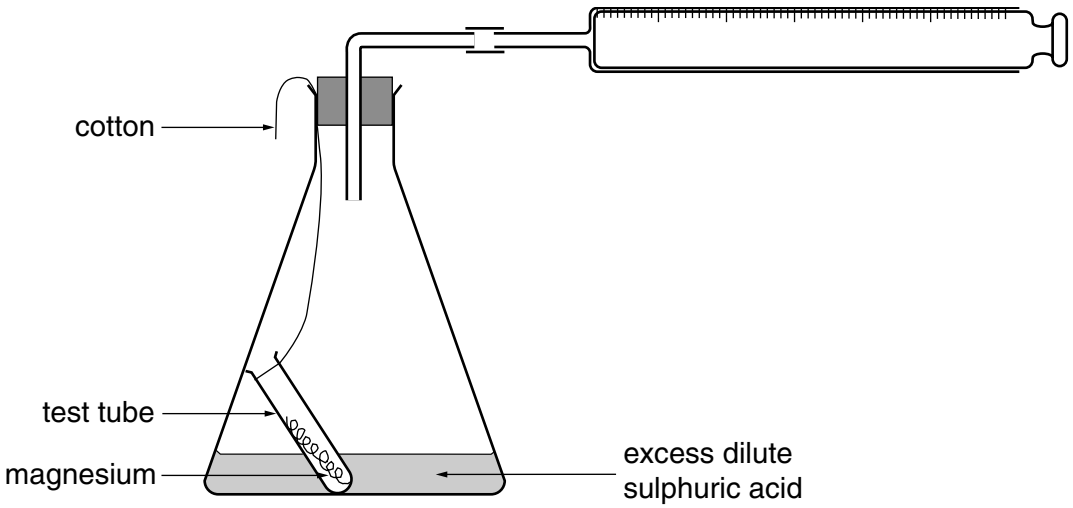
.....

.....

.....

.....[3]

**3** The apparatus below was used to investigate the speed of the reaction between an **excess** of dilute sulphuric acid and 4 cm of magnesium ribbon.




**(a) (i)** What is the purpose of the test-tube?

.....[1]

**(ii)** What is the purpose of the gas syringe?

.....[1]

**(b)** How was the reaction started?

.....[1]

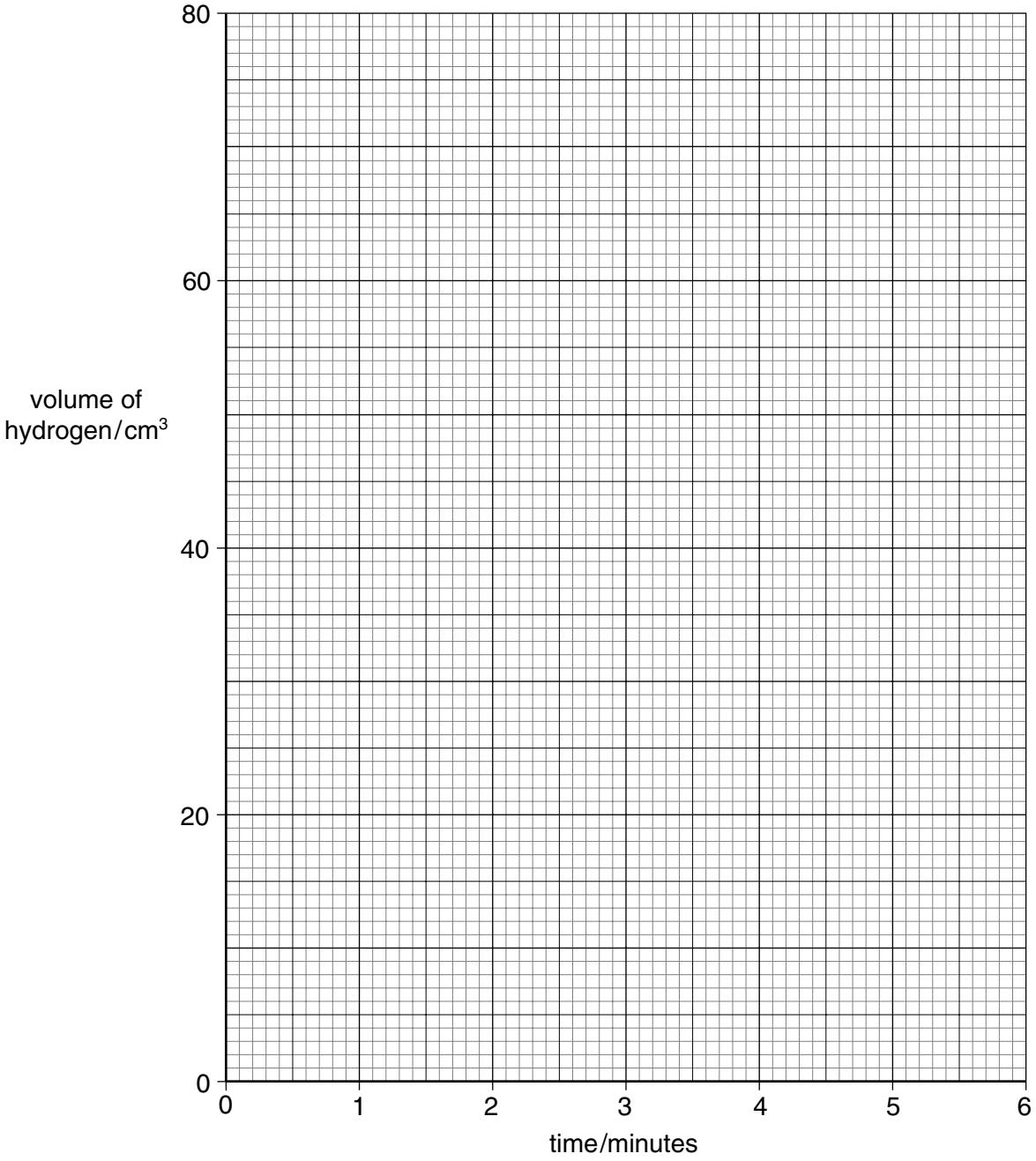
**(c)** What does an *excess* of sulphuric acid mean?

.....[1]

The reaction produced hydrogen. The results obtained are shown in the table.

| Time / minutes | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Volume of hydrogen /$cm^3$ | 0 | 28 | 42 | 64 | 76 | 80 | 80 |

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




[3]

**(e)** Which result appears to be incorrect? Why have you selected this result?

.....

.....[2]

**(f)** From the graph work out the volume of hydrogen produced after 30 seconds. Indicate clearly on the grid how you used the graph.

.....[2]

**(g)** Sketch on the grid the graph you would expect if the experiment were repeated using 2 cm of magnesium. Label this graph **M**. [1]



**[Turn over**

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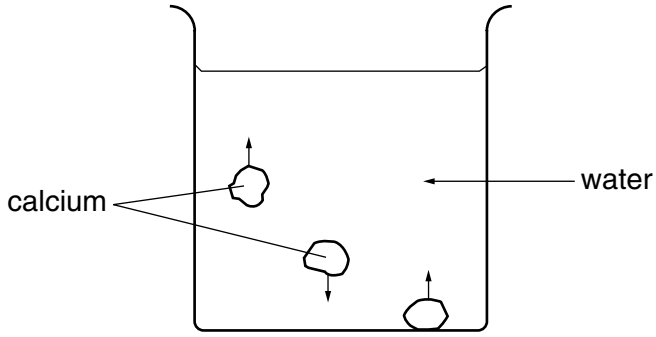
**4** Small pieces of calcium are added to a beaker of cold water. The pieces of calcium move up and down.




**(a)** Give **one** other observation expected in this reaction.

.....[1]

**(b)** Suggest why the pieces of calcium move up and down.

.....[1]

**(c)** Suggest a value for the pH of the solution formed.

.....[1]



**[Turn over**

**5** A student investigated the redox reaction between potassium manganate(VII) and iron(II) ions. Two different aqueous solutions of potassium manganate(VII), **A** and **B**, were used.

*Experiment 1*

A burette was filled to the 0.0 $cm^3$ mark with the solution **A** of aqueous potassium manganate(VII). A 25 $cm^3$ sample of aqueous iron(II) ions was added into a conical flask from a measuring cylinder.

Solution **A** was gradually added until there was just a **permanent** pale pink colour in the contents of the flask.

Use the burette diagram to read the volume added and record the volume in the table.

*Experiment 2*

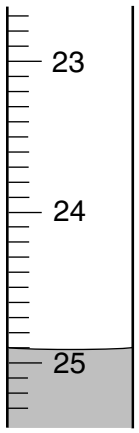
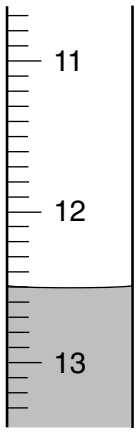
Experiment 1 was repeated using the solution **B** of potassium manganate(VII) instead of solution **A**.

Use the burette diagram to read the volume added and complete the table.

A little of the contents of the flask were poured into a test-tube. Excess aqueous sodium hydroxide was added to the tube.

A red-brown precipitate was formed.

*Table of results*

| Burette readings / $cm^3$ | | |
|---|---|---|
| | Experiment 1 | Experiment 2 |
| Final reading |   |   |
| Initial reading | 0.0 | 0.0 |
| Difference | | |

[2]

**(a) (i)** In which Experiment was the greatest volume of aqueous potassium manganate(VII) used?

.....[1]

**(ii)** Compare the volumes of potassium manganate(VII) used in Experiments 1 and 2.

.....

.....[2]

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

.....

.....[1]

**(iv)** Predict the volume of solution **B** which would be needed to completely react with 50 $cm^3$ of the solution of iron(II) ions.

.....

.....[2]

**(b)** What product is formed in the flask at the end of the reaction? Give a reason for your answer.

product .....

reason .....[2]

**(c)** Explain **one** change you could make to the **apparatus** used in the experiments to obtain more accurate results.

change .....

explanation.....[2]

**6** Two solid compounds **S** and **T** were tested. The tests on **S** and **T** and some of the observations are in the following table. **S** was copper(II) oxide. Complete the observations in the table.

| *Tests* | *Observations* |
|---|---|
| **(a)** Appearance of **S** and **T**. | **S** black solid<br><br>**T** black solid |
| **(b) (i)** Solid **S** was added to aqueous hydrogen peroxide. | no reaction |
| The mixture was boiled. The gas given off was tested with a glowing splint. | splint extinguished |
| **(ii)** Solid **T** was added to aqueous hydrogen peroxide. | rapid effervescence |
| The gas given off was tested with a glowing splint. | splint relit |
| **(c) (i)** Solid **T** was added to hydrochloric acid and heated. | |
| The gas given off was tested with damp blue litmus paper. | litmus paper bleached |
| **(ii)** Test **(c)(i)** was repeated using solid **S**. | |
| The colour of the solution was noted. | green solution |
| **(d)** The solution from **(c)(ii)** was divided into two equal portions of 1 $cm^3$. | |
| **(i)** To the first portion was added excess aqueous sodium hydroxide. | .....<br>.....[2] |
| **(ii)** To the second portion was added excess aqueous ammonia. | .....<br>.....<br>.....[3] |

**(e)** Name the gas given off in test **(b)(ii)**.

.....[1]

**(f)** Name the gas given off in test **(c)(i)**.

.....[1]

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

.....

.....

.....[2]

**7** Describe a chemical test to distinguish between each of the following pairs of substances. An example is given.

potassium chloride and potassium iodide

test: add aqueous lead(II) nitrate

result: potassium chloride gives a white precipitate, potassium iodide gives a yellow precipitate

**(a)** hydrochloric acid and aqueous sodium chloride

test .....

result .....

.....[2]

**(b)** propane and propene

test .....

result .....

.....[2]

**(c)** sulphuric acid and nitric acid

test .....

result .....

.....[2]

**8** **ELECTROPLATING A COPPER KEY**

Electroplating is when a metal is coated with another metal using electricity.

To electroplate a metal a very clean surface is needed.

Describe an experiment to nickel plate a copper key. You are provided with the following items.

6 V bulb and holder

6 V battery and connecting wires

250 $cm^3$ beaker

steel wool/sandpaper

copper key

distilled water

nickel rod

solid nickel(II) sulphate, $NiSO_4$

You can use a labelled diagram to help you answer the question.

.....

.....

.....

.....

.....

.....[5]