Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

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| CANDIDATE NAME | | | | | | | | | |
| CENTRE NUMBER | | | | | | CANDIDATE NUMBER | | | |

*7492298544*

**CHEMISTRY** **0620/62**

Paper 6 Alternative to Practical **February/March 2015**

**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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

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.

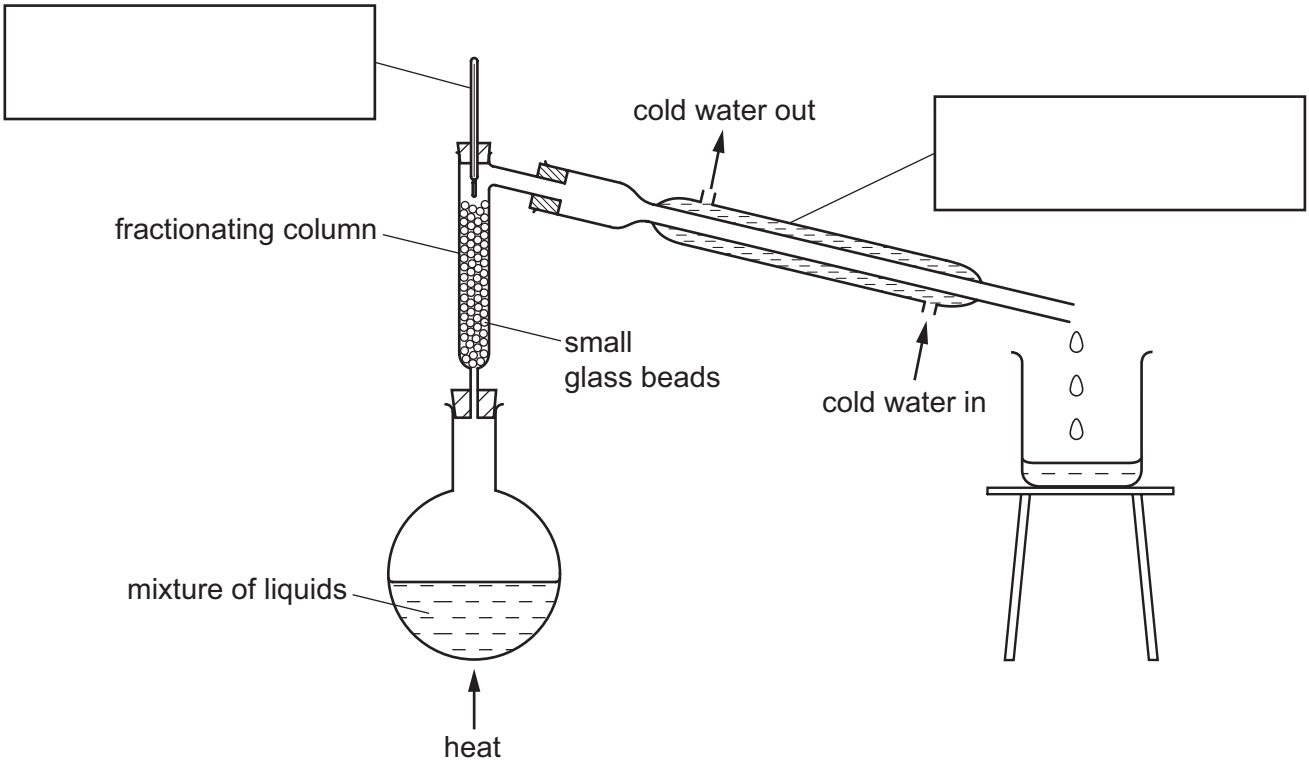
The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **12** printed pages.


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**1** A teacher separated a mixture of two liquids using the apparatus shown. The liquids were:

- ethanoic acid, boiling point 118 °C,
- chloroethanoic acid, boiling point 190 °C.




**(a)** Complete the boxes to label the pieces of apparatus used. [2]

**(b)** **(i)** Which liquid would be collected first? Explain why.

.....

..... [2]

**(ii)** How would the teacher know when all of this liquid had been collected?

..... [1]

**(c)** Suggest why small glass beads are used in the fractionating column instead of large glass beads.

.....

..... [1]

**(d)** Give a test to show that the liquids are acidic.

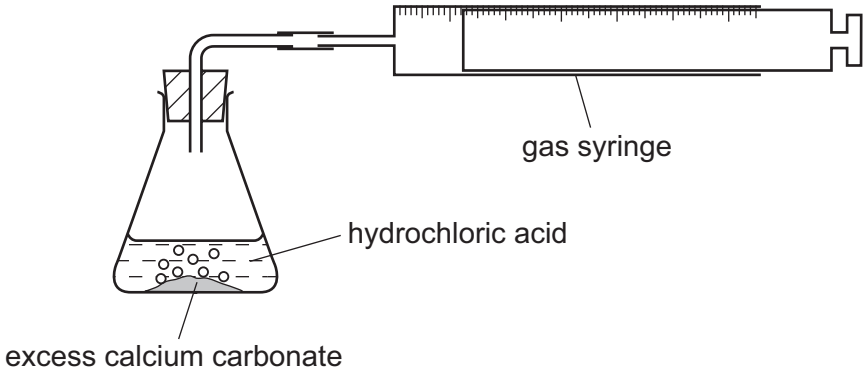
test .....

result ..... [2]

[Total: 8]

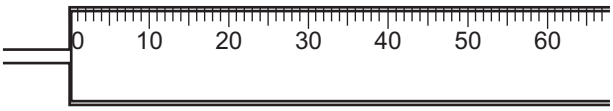
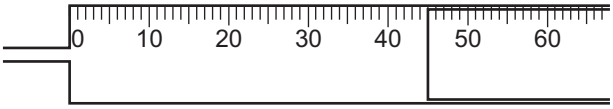
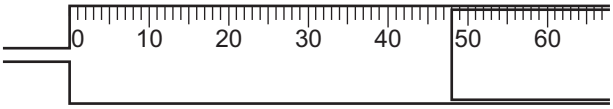
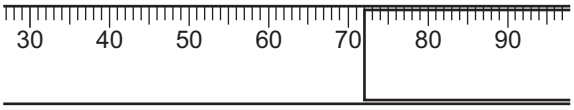
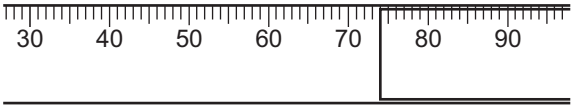
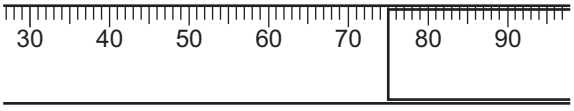
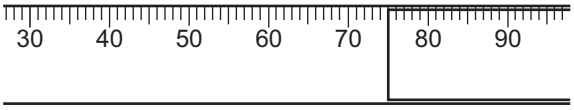
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**2** The rate of reaction between excess calcium carbonate and dilute hydrochloric acid was investigated using the apparatus shown below. The temperature of the hydrochloric acid was 25 °C.



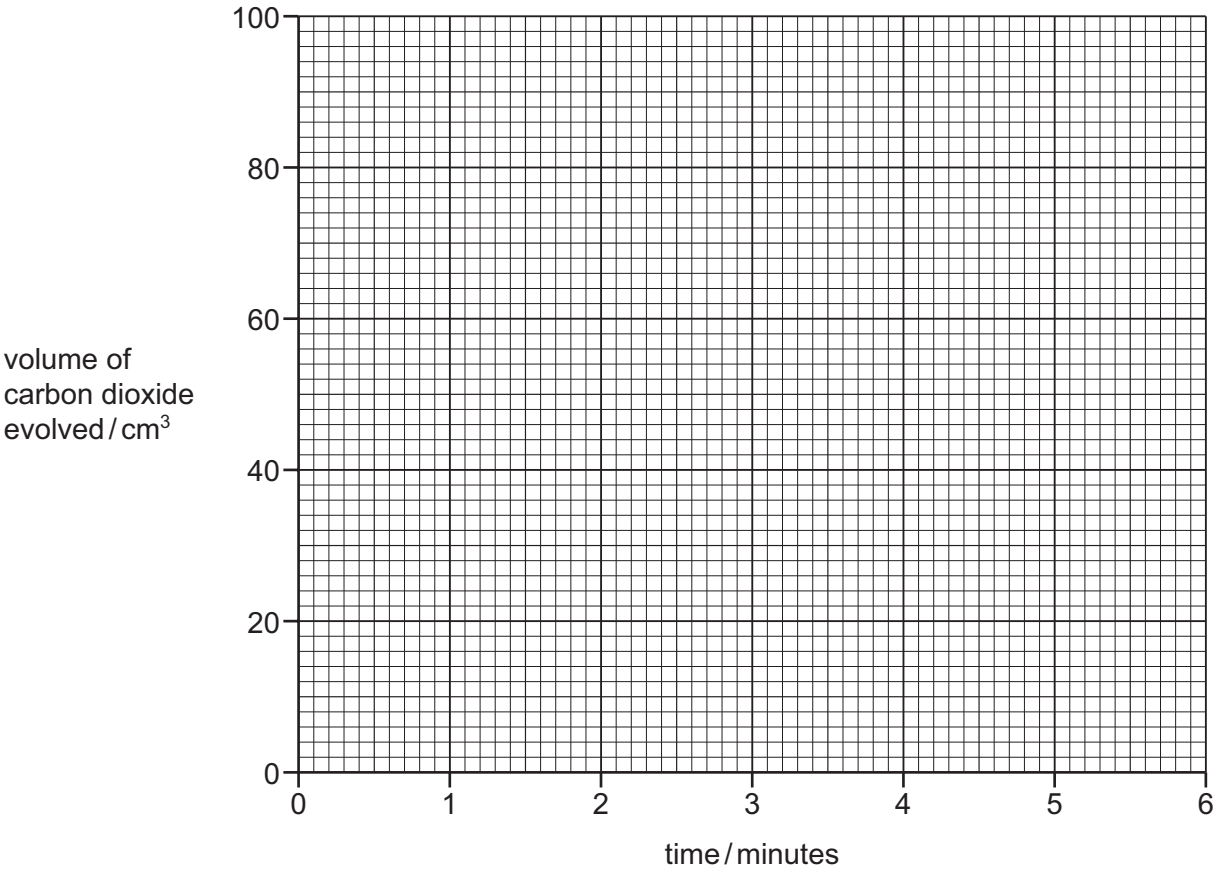

The volume of carbon dioxide evolved was measured every minute for six minutes.

**(a)** Use the gas syringe diagrams to complete the table of results.

| time / minutes | gas syringe diagram | total volume of carbon dioxide evolved / $cm^3$ |
|---|---|---|
| 0 |  | |
| 1 |  | |
| 2 |  | |
| 3 |  | |
| 4 |  | |
| 5 |  | |
| 6 |  | |

[3]

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




[4]

**(c) (i)** Which point appears to be inaccurate? Explain why.

.....

..... [2]

**(ii)** **Use your graph** to work out the volume of gas expected at that time. Show clearly **on the grid** how you worked out your answer.

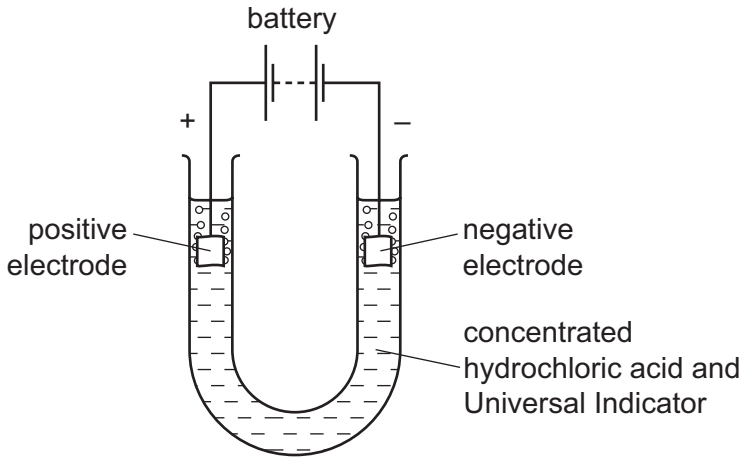
..... [2]

**(d)** Sketch, **on the grid**, the graph you would expect if the experiment was repeated using hydrochloric acid at a temperature of 50 °C. [2]

[Total: 13]

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**3** Electricity was passed through concentrated hydrochloric acid using the apparatus shown.




Effervescence was observed at both electrodes.

**(a)** Name this process used to break down concentrated hydrochloric acid.

..... [1]

**(b)** Suggest why the electrodes are made of platinum and not aluminium.

..... [1]

**(c)** **(i)** Name the gas given off at the positive electrode.

.....

**(ii)** What would be the colour of the Universal Indicator around the positive electrode at the end of the experiment?

.....
[2]

[Total: 4]

**4** A student investigated the solubility of salt **D** in water at various temperatures.

Four experiments were carried out.

**(a)** *Experiment 1*

4 g of salt **D** was added to a boiling tube. A burette was filled with distilled water and 10.0 $cm^3$ of water added to the boiling tube. The mixture of salt **D** and water was heated carefully until all of the solid had dissolved. The boiling tube was removed from the heat and the solution allowed to cool. The solution was stirred gently with a thermometer.

The temperature at which crystals first appeared was noted.

The boiling tube and its contents were kept for the remaining three experiments.

**(b)** *Experiment 2*

From the burette another 2.0 $cm^3$ of water was added to the boiling tube and contents from Experiment 1.

The mixture was heated to dissolve the crystals and allowed to cool as in Experiment 1. The temperature at which crystals first appeared was noted.
Record, in the table, the total volume of water in the boiling tube.

**(c)** *Experiment 3*

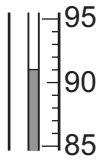
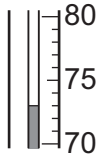
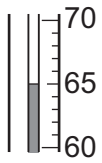
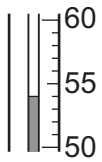
From the burette another 2.0 $cm^3$ of water was added to the boiling tube and contents from Experiment 2. The experiment was repeated exactly as before.
Record, in the table, the total volume of water in the boiling tube.

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**(d)** *Experiment 4*

From the burette another 4.0 $cm^3$ of water was added to the boiling tube and contents from Experiment 3. The experiment was repeated exactly as before.
Record in the table the total volume of water in the boiling tube.

Use the thermometer diagrams in the table to record the temperatures at which crystals first appeared in the four experiments.

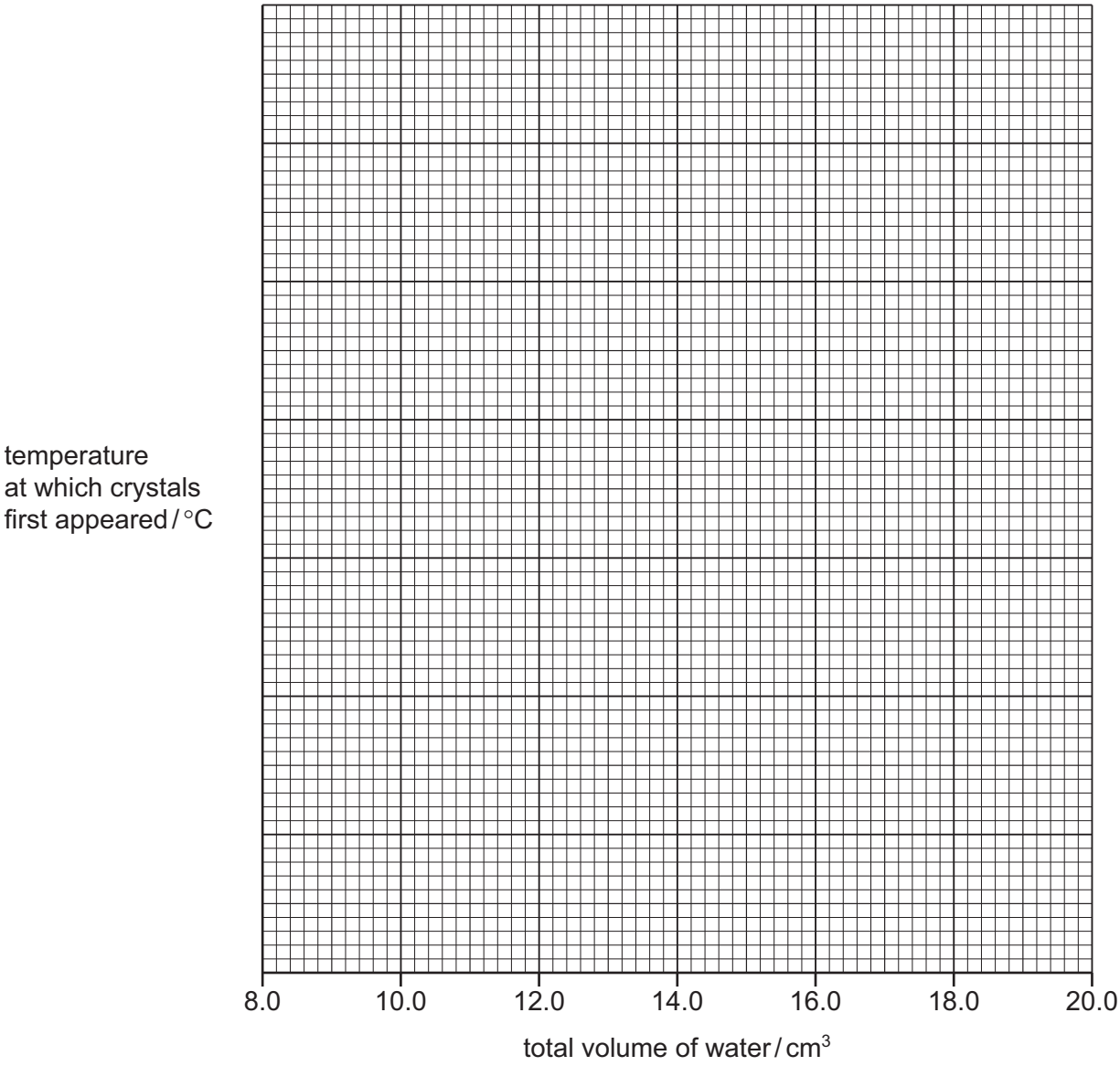
| Experiment number | total volume of water / $cm^3$ | thermometer diagram | temperature at which crystals first appeared / °C |
|---|---|---|---|
| 1 | 10.0 |  | |
| 2 | |  | |
| 3 | |  | |
| 4 | |  | |

[3]

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**[Turn over**

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




[5]

**(f)** **From your graph**, find the temperature at which crystals of **D** would first appear if the total volume of water in the solution was 20.0 $cm^3$.
Show clearly **on the grid** how you worked out your answer.

.....

[3]

**(g)** How would the student know when salt **D** was completely dissolved in the water?

..... [1]

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**(h)** The solubility of salt **D** at 100 °C is 57 g in 100 $cm^3$ of water.
Suggest, with a reason, the effect of using 8 g of salt **D** instead of 4 g in these experiments.

.....

..... [2]

**(i)** Salt **C** is less soluble in water than salt **D**.

Sketch on the grid the graph you would expect for salt **C**. Label this graph. [2]

**(j)** Describe and explain **one** improvement that could be made to the experimental method to obtain more reliable results in this investigation.

improvement .....

explanation .....

.....

..... [2]

[Total: 18]

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**[Turn over**

**5** Two metal salt solutions, **E** and **F**, were analysed.
**E** was a mixture of iron(II) sulfate and ammonium sulfate.
The tests on the solutions and some of the observations are in the following table.
Complete the observations in the table.

| tests | observations |
|---|---|
| <u>tests on solution **E**</u><br><br>**(a)** Appearance of solution **E**. | ..... [1] |
| The solution was divided into three equal portions in separate test-tubes.<br><br>**(b)** Dilute nitric acid and aqueous barium nitrate were added to the first portion of the solution. | ..... [1] |
| **(c)** **(i)** Excess aqueous sodium hydroxide was added to the second portion of the solution. | ..... [2] |
| **(ii)** The mixture was filtered and the filtrate heated.<br>The gas given off was tested with damp litmus paper. | .....<br>..... [2] |
| **(d)** Dilute sulfuric acid and aqueous potassium manganate(VII), an oxidising agent, were added to the third portion of the solution.<br>Aqueous sodium hydroxide was then added to the mixture. | ..... [1] |
| <u>tests on solution **F**</u><br><br>**(e)** Appearance of solution **F**. | yellow liquid |
| **(f)** Zinc powder was added to solution **F**. | rapid effervescence |
| The solution was observed for five minutes. | turned blue, then green and finally light purple |
| The gas given off was tested with a splint. | lighted splint popped |

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**(g)** Identify the gas given off in test **(f)**.

..... [1]

**(h)** What conclusions can you draw about solution **F**?

.....

..... [2]

[Total: 10]

6 **Rhubarb Leaves**



Ethanedioic acid dihydrate, $H_2C_2O_4.2H_2O$, is a white crystalline solid. This acid is water-soluble and is found in rhubarb leaves.

Plan an investigation to obtain crystals of ethanedioic acid dihydrate from some rhubarb leaves. You are provided with common laboratory apparatus, water and sand.

.....

.....

.....

.....

.....

.....

.....

.....

..... [7]

[Total: 7]

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