



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

CANDIDATE  
NAME

CENTRE  
NUMBER

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**CHEMISTRY**

**0620/62**

Paper 6 Alternative to Practical

**May/June 2012**

**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.

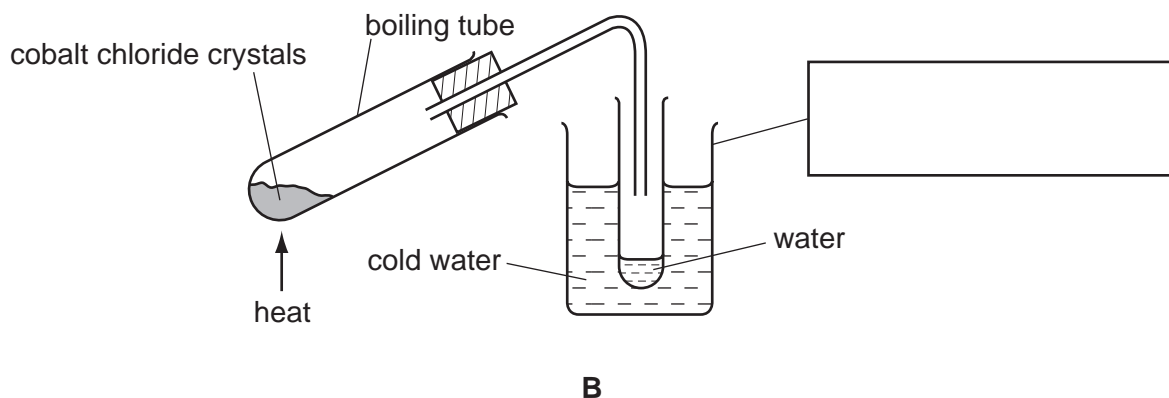
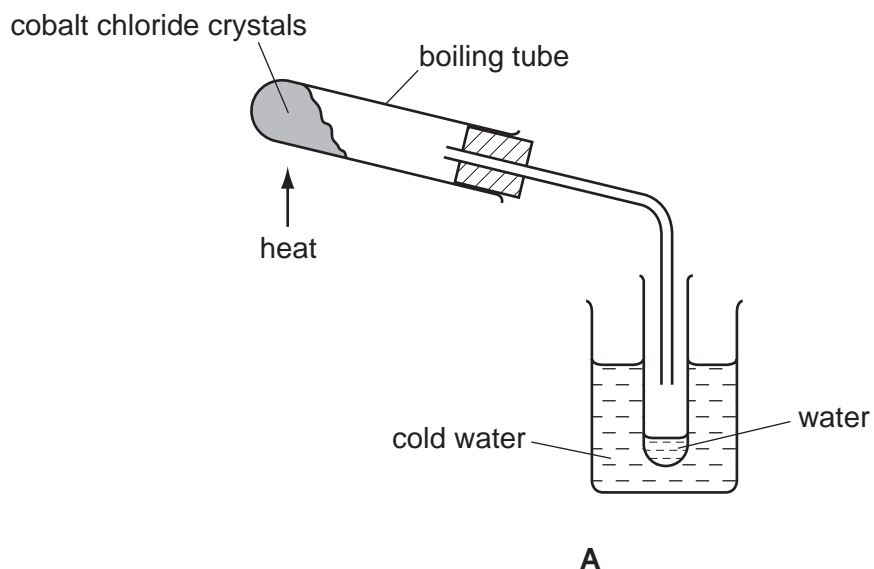
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|              |  |
|--------------|--|
| <b>1</b>     |  |
| <b>2</b>     |  |
| <b>3</b>     |  |
| <b>4</b>     |  |
| <b>5</b>     |  |
| <b>6</b>     |  |
| <b>7</b>     |  |
| <b>Total</b> |  |

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



- 1 A student heated red crystals of hydrated cobalt(II) chloride,  $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ , to obtain a sample of water. He used two different sets of apparatus, **A** and **B**.



- (a) Complete the box to identify the piece of apparatus labelled. [1]
- (b) The steam could have been condensed more efficiently using a condenser. Draw a labelled diagram of a condenser.

[2]

- (c) The colour of the solid remaining in the boiling tube after heating was blue. Predict the effect of adding water to this solid. Explain your answer.

effect .....

explanation ..... [2]

- (d) Suggest why the boiling tube cracked using set of apparatus **B** but not set **A**.

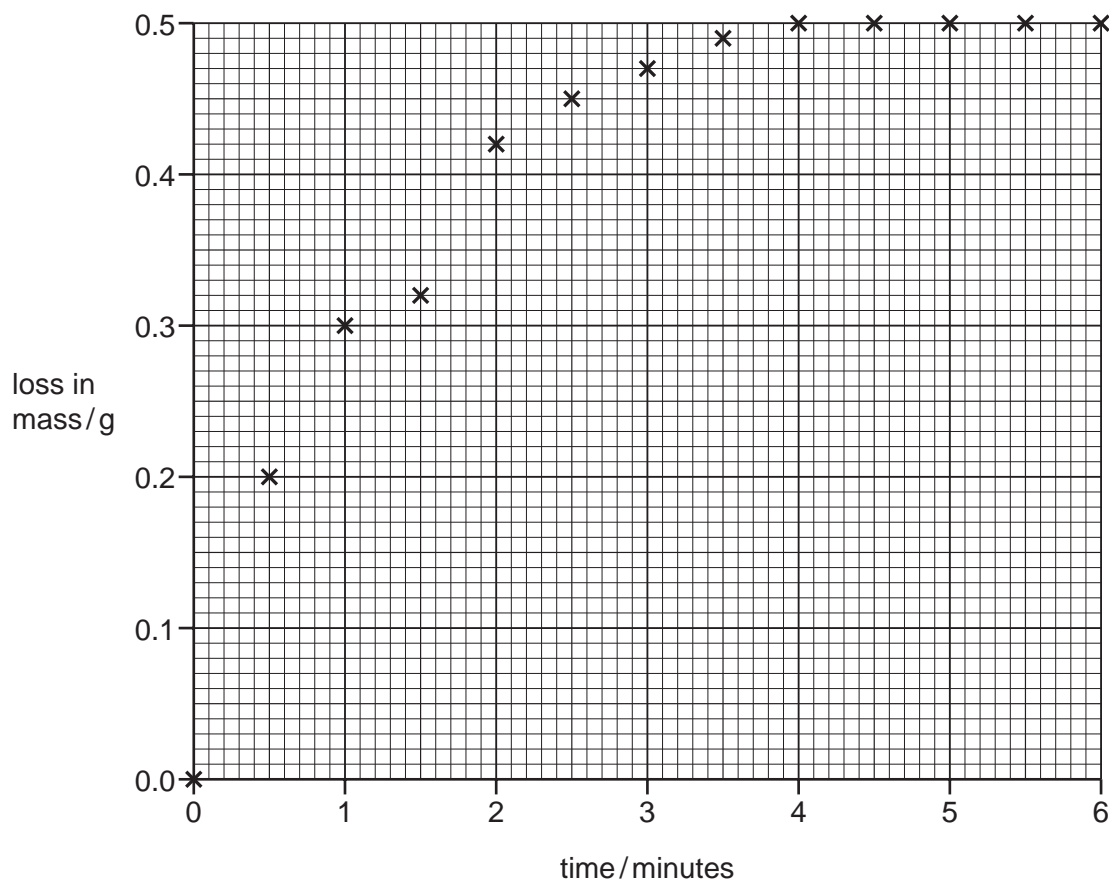
.....

..... [2]

[Total: 7]

- 2 An experiment was carried out to measure the speed (rate) of reaction between magnesium carbonate and excess dilute nitric acid. 50 cm<sup>3</sup> of dilute nitric acid was poured into a conical flask and placed on a balance. 1.0 g of powdered magnesium carbonate was added to the flask. The mass of the flask and contents decreased as a gas was given off. The loss in mass was recorded every half minute for six minutes.

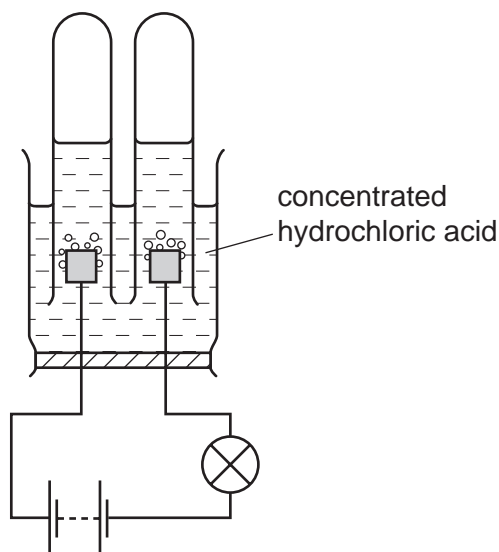
The results of the experiment are shown plotted on the grid below.



- (a) Draw a smooth line graph through the points. [1]
- (b) Which point appears to be inaccurate? [1]
- .....
- (c) Why does the curve level out? Explain your answer. [2]
- .....
- .....
- (d) On the grid, sketch the graph you would expect if the reaction was repeated using 0.5 g of lumps of magnesium carbonate. [2]

[Total: 6]

- 3 Electricity was passed through a solution of concentrated hydrochloric acid as shown below.



Bubbles were observed at both electrodes.

- (a) Give **one** other expected observation.

..... [1]

- (b) Label the electrodes. [1]

- (c) (i) Name the gas given off at the cathode (negative electrode).

..... [1]

- (ii) Give a test for this gas.

test .....

result ..... [2]

- (d) Suggest why, at the beginning of the electrolysis, no gas was collected at the anode (positive electrode).

.....

..... [2]

[Total: 7]

- 4 A student investigated a reaction between a solid and a liquid. The reaction produced a gas. She wanted to know if any of the substances **W**, **X** and **Y** were catalysts for the reaction. Firstly she carried out the reaction without any **W**, **X** or **Y**. Then she repeated the reaction three times adding a small amount of **W**, **X** or **Y**. In each case she timed how long the reaction took to finish. The results are in the table.

| substance added | time of reaction /s |
|-----------------|---------------------|
| none            | 277                 |
| <b>W</b>        | 266                 |
| <b>X</b>        | 279                 |
| <b>Y</b>        | 78                  |

- (a) How would the student know when the reaction had finished?

..... [1]

- (b) (i) State the effect of each substance on the speed (rate) of the reaction.

**W** .....

**X** .....

**Y** ..... [3]

- (ii) Which substance, **W**, **X** or **Y**, is the best catalyst for this reaction?

..... [1]

- (c) How could the student check the reliability of her results?

.....

..... [2]

[Total: 7]

- 5 A student investigated the temperature changes when two different solids, **C** and **D**, dissolved in water.

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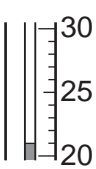
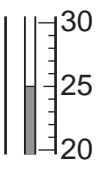
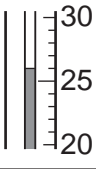
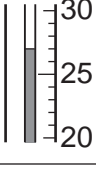
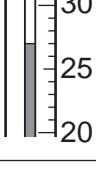
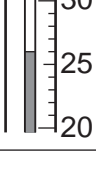
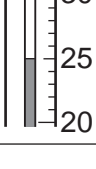
Two experiments were carried out.

*Experiment 1*

Using a measuring cylinder, 25 cm<sup>3</sup> of distilled water was poured into a polystyrene cup. The initial temperature of the water was measured.

Solid **C** was added to the water, the timer started and the mixture stirred with a thermometer. The temperature of the solution was measured every 30 seconds for three minutes.

- (a) Use the thermometer diagrams in the table to record the temperatures.

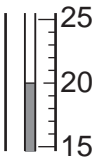
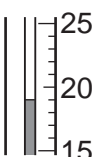
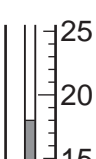




| time / s | thermometer diagram   | temperature / °C |
|----------|---|------------------|
| 0        |    |                  |
| 30       |   |                  |
| 60       |  |                  |
| 90       |  |                  |
| 120      |  |                  |
| 150      |  |                  |
| 180      |  |                  |

[2]

*Experiment 2*For  
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The polystyrene cup was emptied and rinsed with water. Experiment 1 was repeated using solid **D** instead of solid **C**. The temperature of the solution was measured every 30 seconds for three minutes as before.

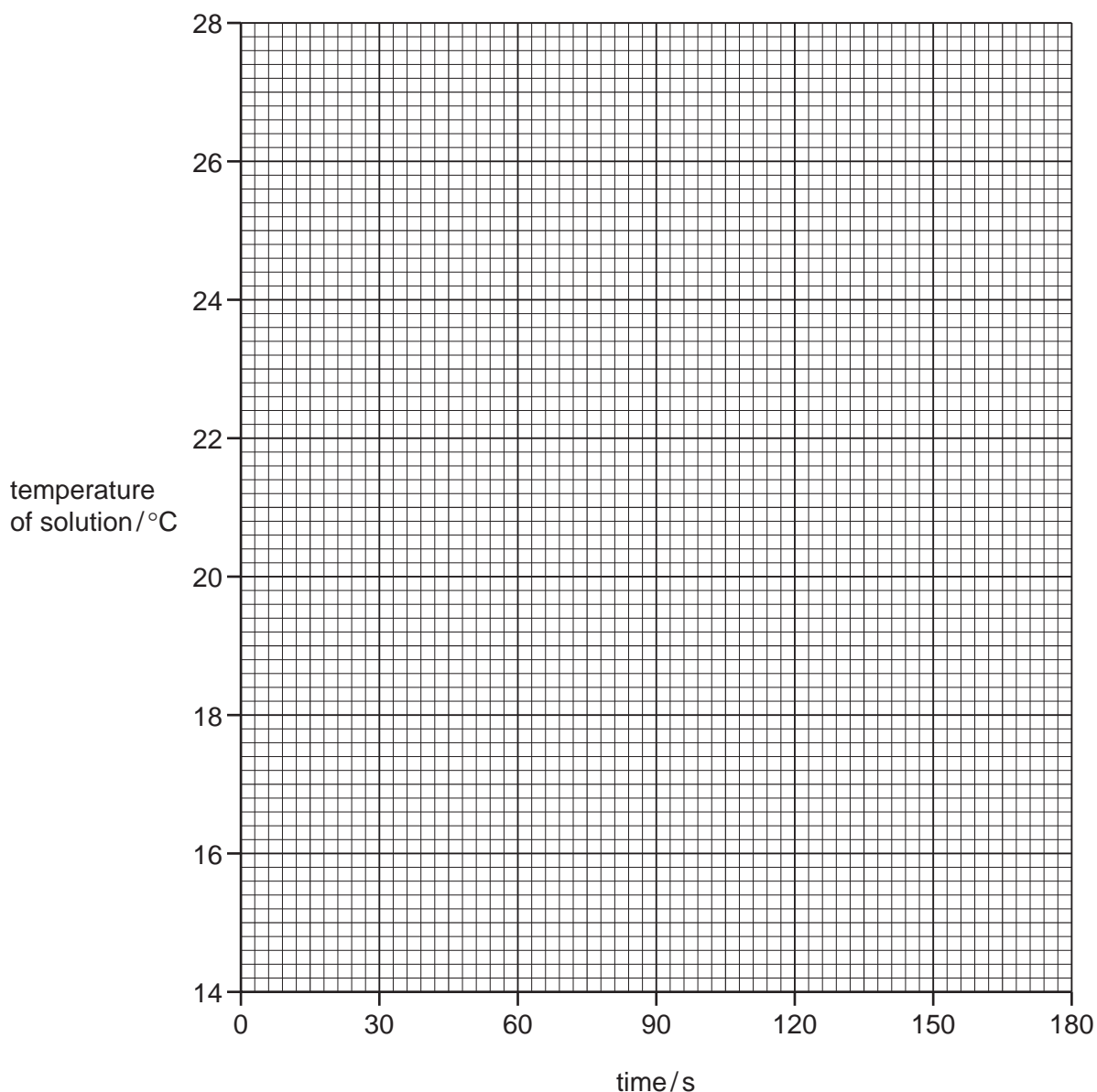
**(b)** Use the thermometer diagrams in the table to record the temperatures.

| time/s | thermometer diagram   | temperature/°C |
|--------|---|----------------|
| 0      |    |                |
| 30     |    |                |
| 60     |   |                |
| 90     |  |                |
| 120    |  |                |
| 150    |  |                |
| 180    |  |                |

[2]



- (c) Plot the results for Experiments 1 and 2 on the grid and draw two smooth line graphs. Clearly label your graphs.



[6]

- (d) (i) **From your graph**, deduce the temperature of the solution in Experiment 1 after 15 seconds.

Show clearly **on the graph** how you worked out your answer.

.....°C

[2]

- (ii) **From your graph**, deduce how long it takes for the **initial** temperature of the solution in Experiment 2 to change by 1.5 °C.

Show clearly **on the graph** how you worked out your answer.

.....s

[2]

- (e) What type of change occurs when substance **D** dissolves in water?

..... [1]

- (f) Suggest the effect on the results if Experiment 1 was repeated using 50 cm<sup>3</sup> of distilled water.

.....

..... [1]

- (g) Predict the temperature of the solution in Experiment 2 after 1 hour. Explain your answer.

.....

..... [2]

- (h) When carrying out the experiments what would be the advantage of taking the temperature readings every 15 seconds?

.....

..... [2]

[Total: 20]

- 6 Two substances, **E** and **F**, were analysed. **E** was a solid compound and **F** was a solution of ethanoic acid.
- The tests on **E** and **F**, and some of the observations, are in the table. Complete the observations in the table.
- Do not write any conclusions in the table.

| tests   | observations   |
|---|--|
| <u>tests on solid E</u>   |  |
| (a) Appearance of solid <b>E</b> .  | green powder   |
| (b) Solid <b>E</b> was heated in a test-tube.<br><br>The gas given off was tested.  | black solid formed<br><br>limewater turned milky   |
| (c) (i) Solid <b>E</b> was added to dilute sulfuric acid.<br><br>The solution was divided into two equal portions in test-tubes.<br><br>(ii) Excess aqueous sodium hydroxide was added to the first portion of the solution.<br><br>(iii) Drops of aqueous ammonia were added to the second portion of the solution.<br><br>Excess aqueous ammonia was then added to the mixture. | effervescence and blue solution formed<br><br><br><br><br>pale blue precipitate formed<br><br><br><br>pale blue precipitate formed<br><br><br>precipitate dissolved to form a dark blue solution |
| <u>tests on liquid F</u>  |  |
| (d) Appearance and smell of liquid <b>F</b> .   | appearance .....<br>smell ..... [2]  |
| (e) pH indicator paper was used to measure the pH of liquid <b>F</b> .  | pH ..... [1]   |

- (f) Identify the gas given off in test (c)(i).

..... [1]

- (g) Identify solid **E**.

..... [2]

[Total: 6]

**Fizzy drinks**

The bubbles in fizzy drinks are bubbles of carbon dioxide. The carbon dioxide is dissolved in the drink under pressure.

When a bottle of fizzy drink is opened the gas escapes and eventually the drink goes flat. The gas is lost more quickly if the fizzy drink is heated.

**(a)** How could the acidity of the fizzy drink be checked?

..... [1]

**(b)** Plan an experiment to find the volume of gas in a bottle of fizzy drink.

You may use common laboratory apparatus.

.....  
.....  
.....  
.....  
.....  
.....  
..... [6]

[Total: 7]