Cambridge IGCSE

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

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**CHEMISTRY** **0620/63**

Paper 6 Alternative to Practical **May/June 2019**

**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.

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

This document consists of **10** printed pages and **2** blank pages.

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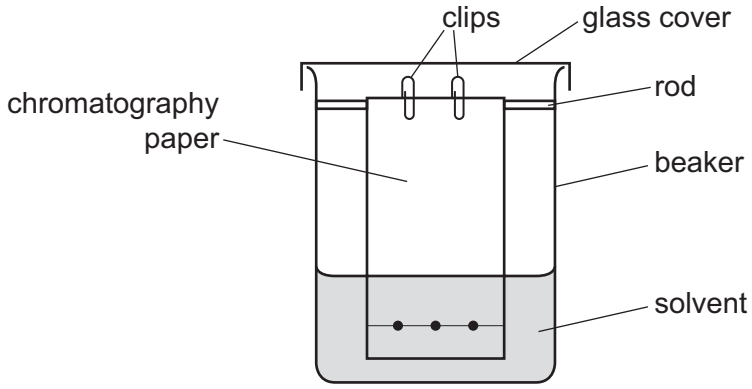
**1** A student investigated the colours present in three hair dyes, **P**, **Q** and **R**, using chromatography. **P**, **Q** and **R** are insoluble in water. The student suggested setting up the apparatus for the experiment as shown.




**(a)** Why is a lid necessary on top of the beaker?

View solution

.....  [1]

**(b) (i)** Identify **one** mistake in the student's diagram.

View solution

.....  [1]

**(ii)** Suggest why this mistake would stop the experiment working.

View solution

.....

.....  [1]

**(c)** Name a suitable solvent that could be used in this experiment.

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.....  [1]

**(d)** A separate chromatography experiment was done using the hair dyes **P**, **Q** and **R**. The chromatogram obtained is shown.

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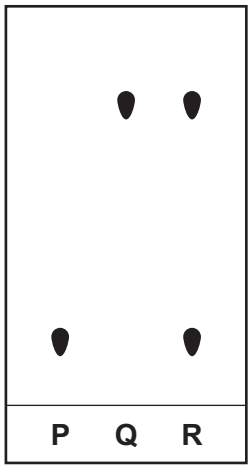


State **three** conclusions about the hair dyes **P**, **Q** and **R** which can be deduced from the chromatogram.

1 .....

2 .....

3 .....

[3]

[Total: 7]

**2** A student investigated the temperature changes when two different metals, zinc and magnesium, reacted with aqueous copper(II) sulfate.

Three experiments were done.

*Experiment 1*

- A measuring cylinder was used to pour 25 $cm^3$ aqueous copper(II) sulfate into a polystyrene cup.
- The initial temperature of the solution was measured and the timer was started.
- The temperature of the solution was measured at 30 seconds and at 60 seconds.
- At 60 seconds, 5 g of zinc powder was added to the aqueous copper(II) sulfate. The mixture was stirred with a thermometer.
- The temperature of the mixture was measured every 30 seconds for 210 seconds. The mixture was stirred continuously.

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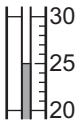
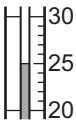
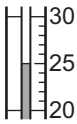
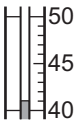
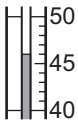
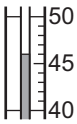
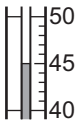
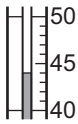
**(a)** Use the thermometer diagrams to record the temperatures in the table.

| time / s | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 |
|---|---|---|---|---|---|---|---|---|
| thermometer diagram |  |  |  |  |  |  |  |  |
| temperature of mixture / °C | | | | | | | | |

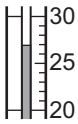
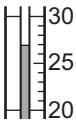
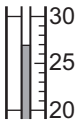
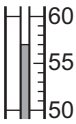
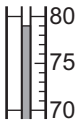
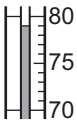
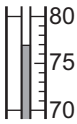
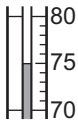
[2]

View solution

*Experiment 2*

- Experiment 1 was repeated using 5 g of magnesium powder instead of zinc powder.

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

| time / s | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 |
|---|---|---|---|---|---|---|---|---|
| thermometer diagram |  |  |  |  |  |  |  |  |
| temperature of mixture / °C | | | | | | | | |

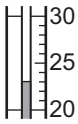
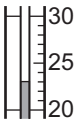
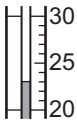
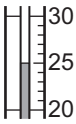
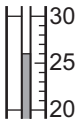
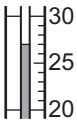
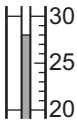
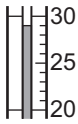
[1]

View solution

*Experiment 3*

- Experiment 1 was repeated using 5 g of zinc granules instead of zinc powder.

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

| time / s | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 |
|---|---|---|---|---|---|---|---|---|
| thermometer diagram |  |  |  |  |  |  |  |  |
| temperature of mixture / °C | | | | | | | | |

[1]

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**(d)** Plot the results for Experiments 1–3 on the grid and draw **three** smooth line graphs. Clearly label your lines.

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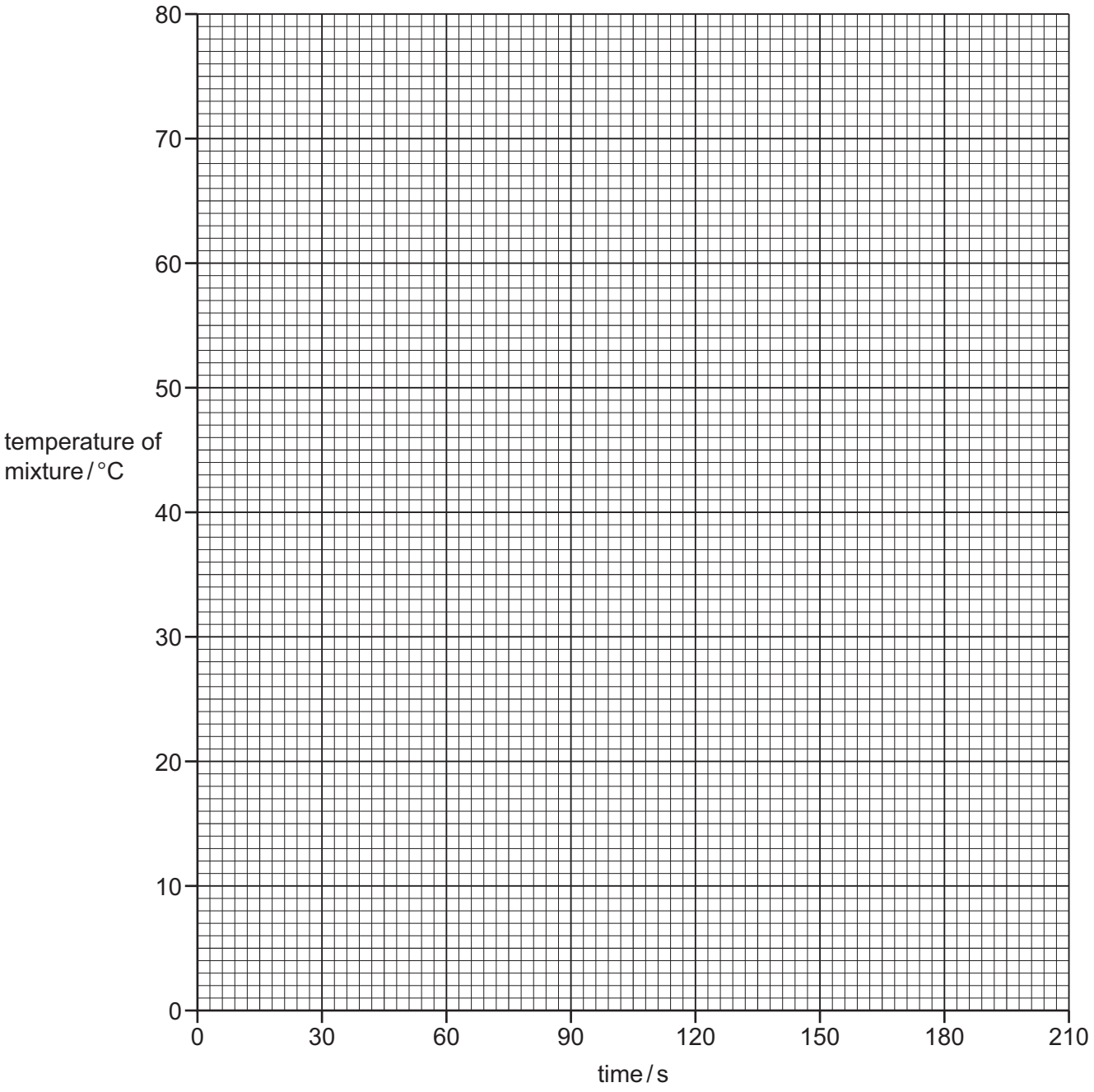


[3]

**(e)** **From your graph**, deduce the temperature of the mixture in Experiment 2 after 75 seconds.

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

..... °C [2]

View solution

**(f)** **(i)** From the results, which Experiment was the most exothermic? Explain your answer.

.....

..... [2]

**(ii)** Compare the rates of reaction in Experiments 1 and 3. Explain why the rates of reaction are different.

.....

.....

..... [2]

**(g)** Predict the temperature of the mixture in Experiment 2 after 2 hours. Explain your answer.

View solution

.....

..... [2]

**(h)** When doing the experiments, what would be the advantage of taking the temperature readings every 15 seconds?

.....

..... [2]

**(i)** Explain why a copper can should **not** be used in place of the polystyrene cup in these experiments.

.....

.....

..... [2]

[Total: 19]

View solution

**3** Two substances, solid **N** and solid **O** were analysed. Solid **N** was hydrated aluminium sulfate. Tests were done on solid **N** and solid **O**.

**tests on solid N**

Complete the expected observations.

**(a)** Describe the appearance of solid **N**.

observation ..... [1]

Solid **N** was divided into two portions.

**(b)** The first portion of solid **N** was heated in a hard-glass test-tube. Any gas produced was tested with cobalt(II) chloride paper.

observations .....

..... [2]

The second portion of solid **N** was added to distilled water. The mixture was shaken to dissolve solid **N** and form solution **N**. Solution **N** was divided into two equal portions in two test-tubes.

**(c) (i)** Drops of aqueous sodium hydroxide were added to the first portion of solution **N** until a change was seen.

observations ..... [1]

**(ii)** An excess of aqueous sodium hydroxide was then added to the mixture from **(c)(i)**.

observations ..... [1]

**(d)** Dilute nitric acid and aqueous barium nitrate were added to the second portion of solution **N**.

observations ..... [1]

**tests on solid O**

Some of the tests and observations are shown.

| tests on solid **O** | observations |
|---|---|
| **test 1**<br><br>A flame test was done on solid **O**. | lilac flame |
| Solid **O** was dissolved in water. The solution was divided into two portions.<br><br>**test 2**<br><br>An excess of aqueous sodium hydroxide was added to the first portion of the solution. | no change |
| **test 3**<br><br>Dilute nitric acid and aqueous silver nitrate were added to the second portion of the solution. | white precipitate formed |

**(e)** Identify solid **O**.

..... [2]

[Total: 8]

View solution

**4** Calcium carbonate, calcium hydroxide and calcium oxide can be used to neutralise the acid in soil.

Plan an investigation to find out which of these calcium compounds neutralises acid most effectively.

You are provided with the three calcium compounds, dilute hydrochloric acid and common laboratory apparatus and chemicals.

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..... [6]

View solution

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