Cambridge IGCSE

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

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

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

Paper 6 Alternative to Practical **October/November 2018**

**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 **9** printed pages and **3** blank pages.

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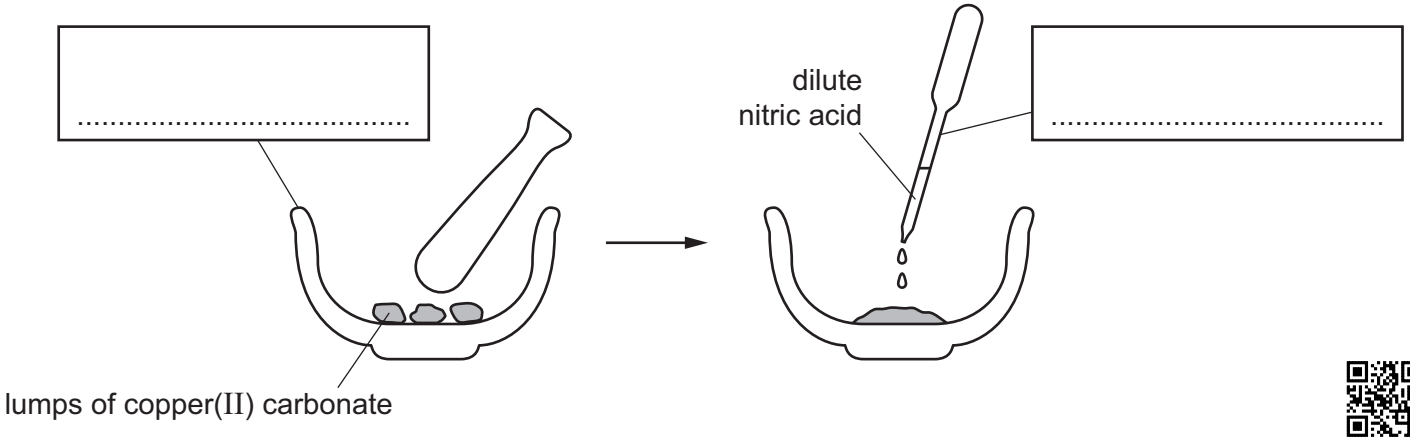
CAMBRIDGE International Examinations

**1** A sample of copper was prepared from lumps of copper(II) carbonate. The first step was to make a solution of copper(II) nitrate as shown. Carbon dioxide was produced.




View solution

**(a)** Complete the boxes to name the apparatus. [2]

View solution

**(b)** Describe a test for carbon dioxide.

test .....

result .....

[2]

**(c)** Explain why the lumps of copper(II) carbonate were crushed before adding the dilute nitric acid.

.....

..... [2]

**(d)** Suggest how a sample of copper could be obtained from the solution of copper(II) nitrate. Explain your suggestion.

.....

.....

..... [2]

[Total: 8]

View solution

**2** A student investigated the rate of reaction between solution **S** and solution **T** at different temperatures. When these chemicals react they form iodine. Sodium thiosulfate solution and starch solution were used to show how fast the reaction proceeded.

Four experiments were done.

*Experiment 1*

- A measuring cylinder was used to add 10 $cm^3$ of solution **S** and 10 $cm^3$ of sodium thiosulfate solution to a conical flask.
- A teat pipette was then used to add 1 $cm^3$ of starch solution to the mixture.
- The temperature of the mixture was measured and recorded in the table.
- The reaction was started by using a measuring cylinder to add 10 $cm^3$ of solution **T** to the conical flask. A timer was started immediately and the mixture was swirled.
- The time taken for the mixture to turn blue-black was measured.
- The final temperature of the mixture was measured and recorded.
- The conical flask was emptied and rinsed with distilled water.

*Experiment 2*

- A measuring cylinder was used to add 10 $cm^3$ of solution **S** and 10 $cm^3$ of sodium thiosulfate solution to the conical flask.
- A teat pipette was then used to add 1 $cm^3$ of starch solution to the mixture.
- The mixture was then heated to about 30 °C.
- The temperature of the mixture was measured and recorded in the table.
- The reaction was started by using a measuring cylinder to add 10 $cm^3$ of solution **T** to the conical flask. The timer was started immediately and the mixture was swirled.
- The time taken for the mixture to turn blue-black was measured.
- The final temperature of the mixture was measured and recorded.
- The conical flask was emptied and rinsed with distilled water.

*Experiment 3*

- Experiment 2 was repeated but the mixture of solution **S**, sodium thiosulfate solution and starch solution in the conical flask was heated to about 40 °C before adding solution **T**.

*Experiment 4*

- Experiment 2 was repeated but the mixture of solution **S**, sodium thiosulfate solution and starch solution in the conical flask was heated to about 50 °C before adding solution **T**.

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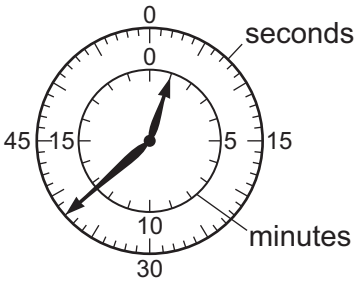
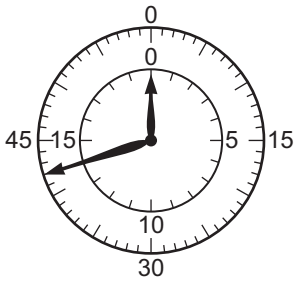
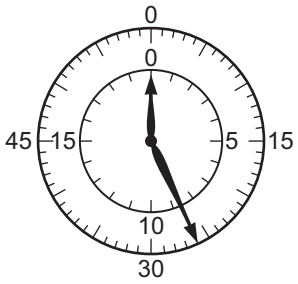
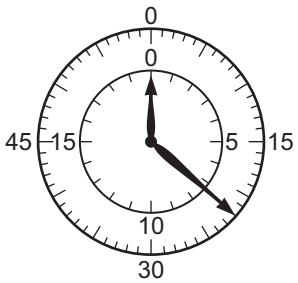
**(a)** Calculate the average temperatures in the table.
Use the stop-clock diagrams to record the time taken for each experiment in the table.

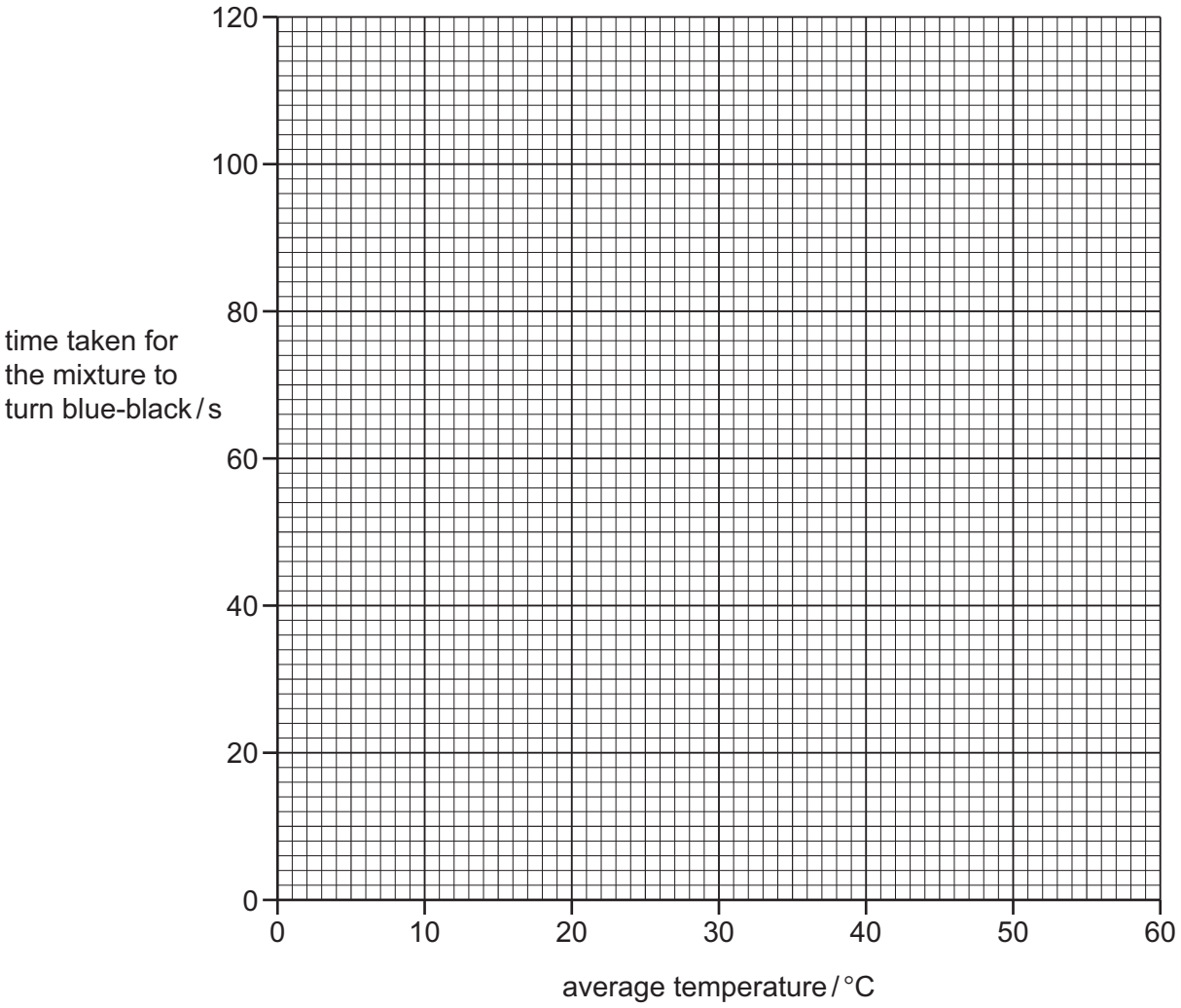
| experiment number | initial temperature / °C | final temperature / °C | average temperature / °C | stop-clock diagram | time taken for the mixture to turn blue-black / s |
|---|---|---|---|---|---|
| 1 | 22 | 22 | |   | |
| 2 | 31 | 29 | |   | |
| 3 | 41 | 37 | |   | |
| 4 | 51 | 45 | |   | |

[4]

View solution

**(b)** Plot the results for Experiments 1–4 on the grid. Draw a smooth line graph.

View solution




[4]

**(c)** **From your graph**, deduce the average temperature needed for the mixture to turn blue-black in 60 s.

View solution

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

..... [3]

**(d)** **(i)** In which experiment, 1, 2, 3 or 4, was the rate of reaction greatest?

View solution

..... [1]

**(ii)** Explain, in terms of particles, why the rate of reaction was greatest in this experiment.

View solution

.....

.....

..... [2]

**(e)** Pipettes or burettes could be used to measure the volumes of solution **S** and the sodium thiosulfate solution more accurately.

State and explain **one other** way to improve the accuracy of the results of these experiments.

way to improve the accuracy .....

explanation .....

.....

View solution  [2]

**(f)** A student predicted that using a burette to add solution **T** would improve the accuracy of the results of these experiments.

Suggest why the student's prediction would **not** improve the accuracy of the results of these experiments.

.....

..... [2]

[Total: 18]


View solution

**3** Solid **P** and solid **Q** were analysed. Solid **P** was lithium nitrate. Tests were done on each solid.

**tests on solid P**

Complete the expected observations.

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

..... [1]

View solution

Solid **P** was divided into three portions.

**(b)** Aqueous sodium hydroxide and a small piece of aluminium foil were added to the first portion of solid **P**. The mixture was heated and the gas produced was tested.

observations .....

.....

..... [3]

**(c)** The second portion of solid **P** was dissolved in distilled water. Dilute nitric acid and aqueous barium nitrate were then added to the solution.

observations ..... [1]

**(d)** A flame test was done on the third portion of solid **P**.

observations ..... [1]

View solution

**tests on solid Q**

Some of the tests and observations are shown.

| tests on solid **Q** | observations |
|---|---|
| The appearance of solid **Q** was studied. | pink crystals |
| Solid **Q** was heated in a hard glass test-tube. | condensation formed at the top of the test-tube |
| Dilute nitric acid and aqueous silver nitrate were added to an aqueous solution of solid **Q**. | white precipitate |

**(e)** What conclusions can you draw about the identity of solid **Q**?

.....

..... [2]

[Total: 8]



View solution

**4** Some cleaning products are mixtures. The three substances present in a cleaning product are listed in the table.

View solution

| substance | state at room temperature | physical property |
|---|---|---|
| sodium carbonate | solid | melts at 858 °C |
| ethanol | liquid | boils at 78 °C |
| limonene | liquid | boils at 176 °C |

Use the information in the table to plan an experiment to obtain a sample of each substance from a mixture of the three substances.

You are provided with a mixture of the three substances and common laboratory apparatus.

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 6]

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