Cambridge IGCSE

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

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

**CHEMISTRY** **0620/52**

Paper 5 Practical Test **May/June 2015**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions

**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.
Practical notes are provided on page 8.

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.

| For Examiner's Use | |
|---|---|
| Total | |

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 **8** printed pages and **1** insert.

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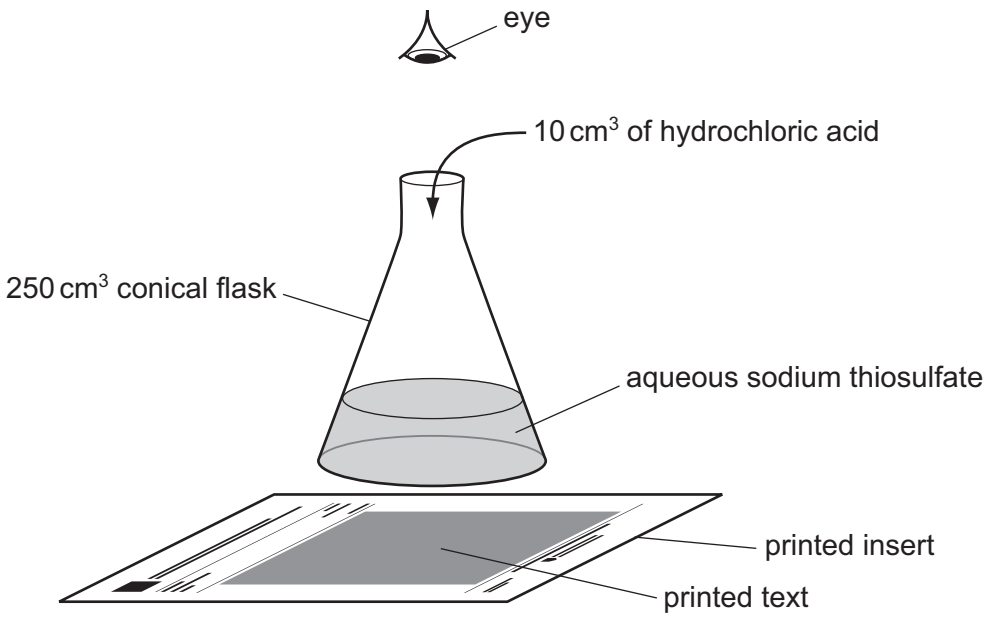
CAMBRIDGE International Examinations

**1** You are going to investigate the rate of reaction between hydrochloric acid and aqueous sodium thiosulfate. When these chemicals react they form a precipitate which makes the solution go cloudy. The formation of this precipitate can be used to show how fast the reaction proceeds.

**Read all the instructions below carefully before starting the experiments.**

**Instructions**
You are going to carry out five experiments using the apparatus shown below.




**(a)** *Experiment 1*

View solution

Use the large measuring cylinder to pour 50 $cm^3$ of aqueous sodium thiosulfate into a conical flask. Place the conical flask on the printed insert provided.
Fill the small measuring cylinder with 10 $cm^3$ of the hydrochloric acid provided.
Add the acid to the solution in the conical flask and immediately start your timer and swirl the mixture.
Measure the time taken for the printed text to disappear from view. Record the time in the table.
Pour the solution away and rinse the conical flask with distilled water.

**(b)** *Experiment 2*

View solution

Use the large measuring cylinder to pour 40 $cm^3$ of aqueous sodium thiosulfate into the conical flask, followed by 10 $cm^3$ of distilled water. Place the conical flask on the printed insert.
Fill the small measuring cylinder with 10 $cm^3$ of the hydrochloric acid provided.
Add the acid to the solution in the flask, start your timer and swirl the mixture.
Measure the time taken for the printed text to disappear from view. Record the time in the table.

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**(c)** *Experiment 3*

Repeat Experiment 2 using 35 $cm^3$ of aqueous sodium thiosulfate and 15 $cm^3$ of distilled water. Record the time in the table.

View solution

**(d)** *Experiment 4*

Repeat Experiment 2 using 30 $cm^3$ of aqueous sodium thiosulfate and 20 $cm^3$ of distilled water. Record the time in the table.

View solution

**(e)** *Experiment 5*

Repeat Experiment 2 using 20 $cm^3$ of aqueous sodium thiosulfate and 30 $cm^3$ of distilled water. Record the time in the table.

View solution

**(f)** Complete the table.

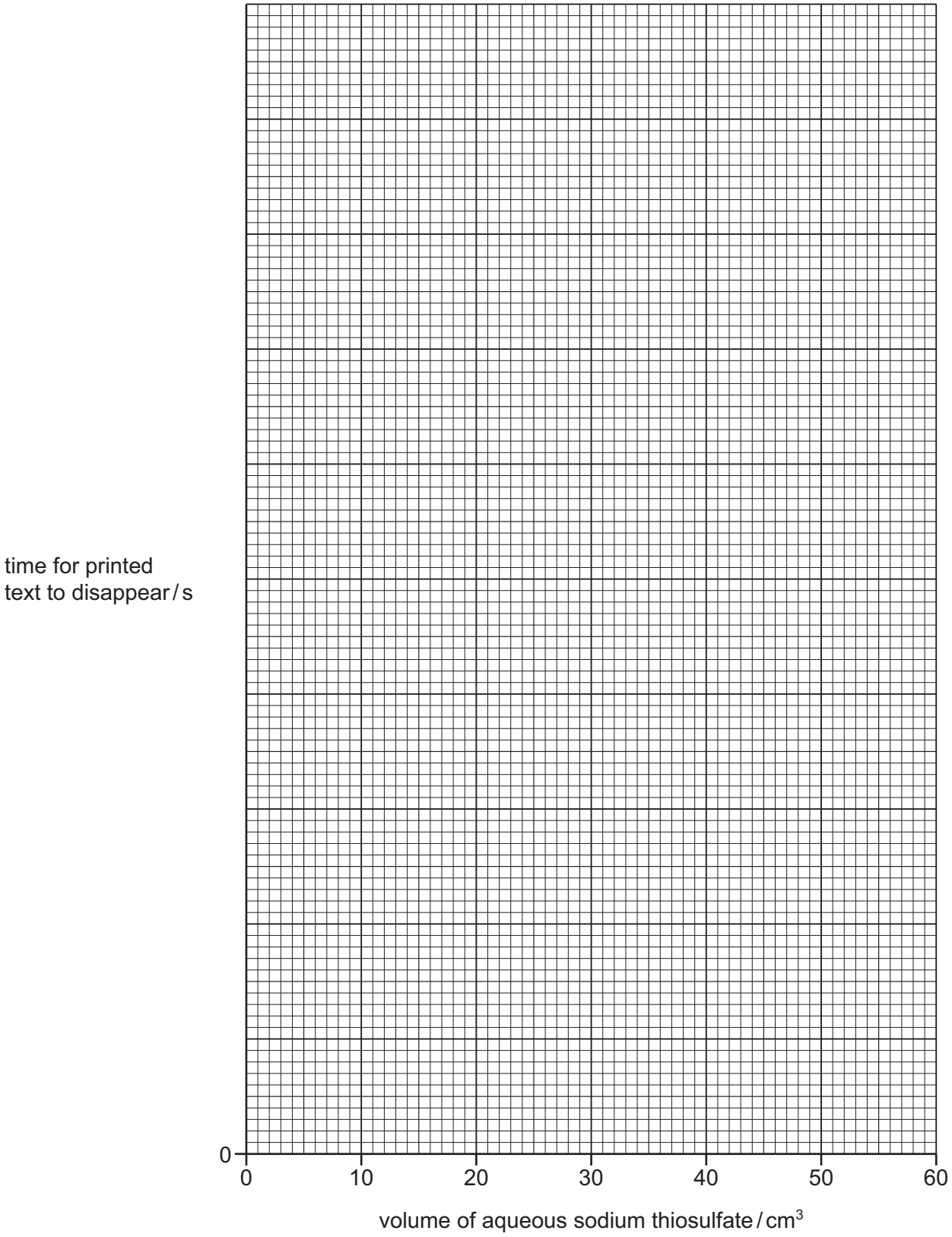
| Experiment | volume of aqueous sodium thiosulfate / $cm^3$ | volume of distilled water / $cm^3$ | time for printed text to disappear / s |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

[4]

View solution

**(g)** Plot the results you have obtained on the grid and draw a smooth line graph.

View solution




[4]

**(h)** Describe the appearance of the solution in the conical flask at the end of each experiment.

..... [1]

**(i)** **(i)** **From your graph**, deduce the time for the printed text to disappear if the experiment was repeated using 25 $cm^3$ of aqueous sodium thiosulfate and 25 $cm^3$ of distilled water. Show clearly **on the grid** how you worked out your answer.

..... [3]

**(ii)** Sketch **on the grid** the curve you would expect if the experiments were repeated at a lower temperature. Label this curve. [1]

View solution

**(j)** **(i)** In which experiment was the rate of reaction greatest?

View solution

..... [1]

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

View solution

.....

.....

..... [1]

**(k)** A student carried out a sixth experiment using 60 $cm^3$ of aqueous sodium thiosulfate.

View solution

Why would this not be an appropriate volume to use in this series of experiments?

.....

..... [2]

**(l)** Suggest and explain the effect of

View solution

**(i)** using a burette to measure the volume of the hydrochloric acid,

.....

..... [2]

**(ii)** using a 100 $cm^3$ conical flask.

View solution

.....

..... [2]

[Total: 21]

**2** You are provided with a mixture of two solids, **J** and **K**, which are both salts. **J** is water soluble and **K** is insoluble.
Carry out the following tests on the mixture, recording all of your observations in the table.
Conclusions must **not** be written in the table.

View solution

| tests | observations |
|---|---|
| **(a)** Describe the appearance of the mixture. | ..... [1] |
| Add 10 $cm^3$ of distilled water to the mixture. Stopper the boiling tube and shake the mixture for a minute. Filter the mixture and keep the residue for tests later.<br><br><u>tests on the filtrate</u><br><br>Divide the solution into three equal portions in three test-tubes.<br><br>**(b)** To the first portion of the solution, add about 1 $cm^3$ of aqueous sodium hydroxide. Heat the mixture gently and test any gas evolved with damp pH indicator paper. | View solution<br>.....<br>..... [3] |
| **(c)** To the second portion of the solution, add a few drops of dilute nitric acid and about 1 $cm^3$ of aqueous silver nitrate solution. | View solution<br>..... [2] |
| **(d)** To the third portion of the solution, add about 1 $cm^3$ of hydrogen peroxide solution.<br><br>Add a spatula measure of starch to the mixture.<br><br>Test the gas given off with a splint. | .....<br>.....<br>..... [5] |
| <u>tests on the residue</u><br><br>Use a spatula to transfer some of the residue into a test-tube.<br><br>**(e)** Add about 3 $cm^3$ of dilute hydrochloric acid to the test-tube. Test the gas given off.<br><br>To the solution add about 1 $cm^3$ of dilute sulfuric acid. | View solution<br>.....<br>..... [3]<br><br>..... [1] |

**(f)** What conclusions can you draw about solid **J**?

.....

..... [2]

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

View solution

.....

.....

..... [2]

[Total: 19]

## NOTES FOR USE IN QUALITATIVE ANALYSIS

### Test for anions

| *anion* | *test* | *test result* |
|---|---|---|
| carbonate ($CO_3^{2-}$) | add dilute acid | effervescence, carbon dioxide produced |
| chloride ($Cl^-$) [in solution] | acidify with dilute nitric acid, then add aqueous silver nitrate | white ppt. |
| iodide ($I^-$) [in solution] | acidify with dilute nitric acid, then add aqueous silver nitrate | yellow ppt. |
| nitrate ($NO_3^-$) [in solution] | add aqueous sodium hydroxide then aluminium foil; warm carefully | ammonia produced |
| sulfate ($SO_4^{2-}$) [in solution] | acidify with dilute nitric acid, then aqueous barium nitrate | white ppt. |

### Test for aqueous cations

| *cation* | *effect of aqueous sodium hydroxide* | *effect of aqueous ammonia* |
|---|---|---|
| aluminium ($Al^{3+}$) | white ppt., soluble in excess giving a colourless solution | white ppt., insoluble in excess |
| ammonium ($NH_4^+$) | ammonia produced on warming | – |
| calcium ($Ca^{2+}$) | white ppt., insoluble in excess | no ppt., or very slight white ppt. |
| copper ($Cu^{2+}$) | light blue ppt., insoluble in excess | light blue ppt., soluble in excess giving a dark blue solution |
| iron(II) ($Fe^{2+}$) | green ppt., insoluble in excess | green ppt., insoluble in excess |
| iron(III) ($Fe^{3+}$) | red-brown ppt., insoluble in excess | red-brown ppt., insoluble in excess |
| zinc ($Zn^{2+}$) | white ppt., soluble in excess giving a colourless solution | white ppt., soluble in excess giving a colourless solution |

### Test for gases

| *gas* | *test and test results* |
|---|---|
| ammonia ($NH_3$) | turns damp red litmus paper blue |
| carbon dioxide ($CO_2$) | turns limewater milky |
| chlorine ($Cl_2$) | bleaches damp litmus paper |
| hydrogen ($H_2$) | ‘pops’ with a lighted splint |
| oxygen ($O_2$) | relights a glowing splint |

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