Cambridge IGCSE

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

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**CHEMISTRY** **0620/61**

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 **8** printed pages and **4** blank pages.

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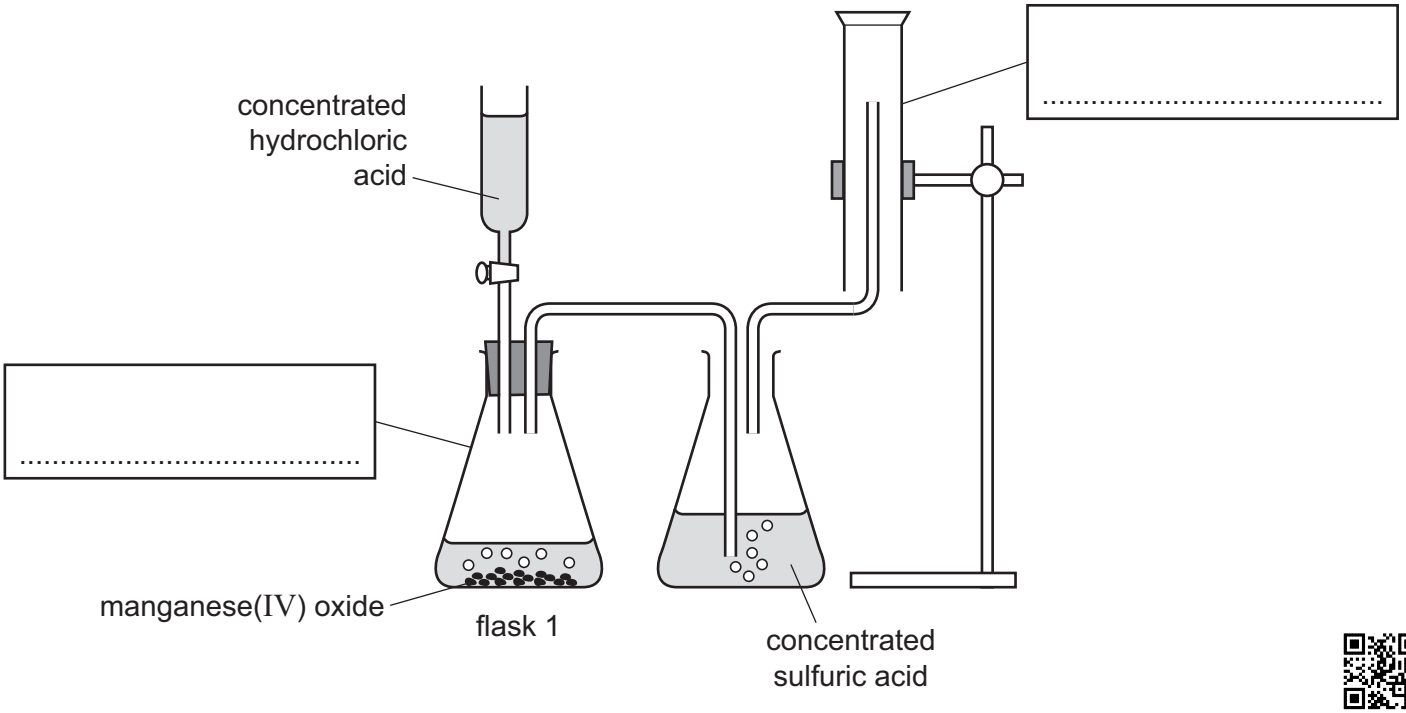
**1** The diagram shows the apparatus a student used to prepare a dry sample of chlorine gas. Chlorine is more dense than air.




View solution

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

View solution

**(b)** Use the diagram to identify **two** mistakes the student made.

1 .....

.....

2 .....

.....

[2]

**(c)** Suggest **one** reason why the gas produced in flask 1 is passed through concentrated sulfuric acid.

..... [1]

View solution

**(d)** Describe a test for chlorine.

test .....

observations .....

[2]

View solution

**(e)** Suggest why this experiment is done in a fume cupboard.

..... [1]

[Total: 8]

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**2** A student investigated the reaction between aqueous sodium carbonate and aqueous barium nitrate.

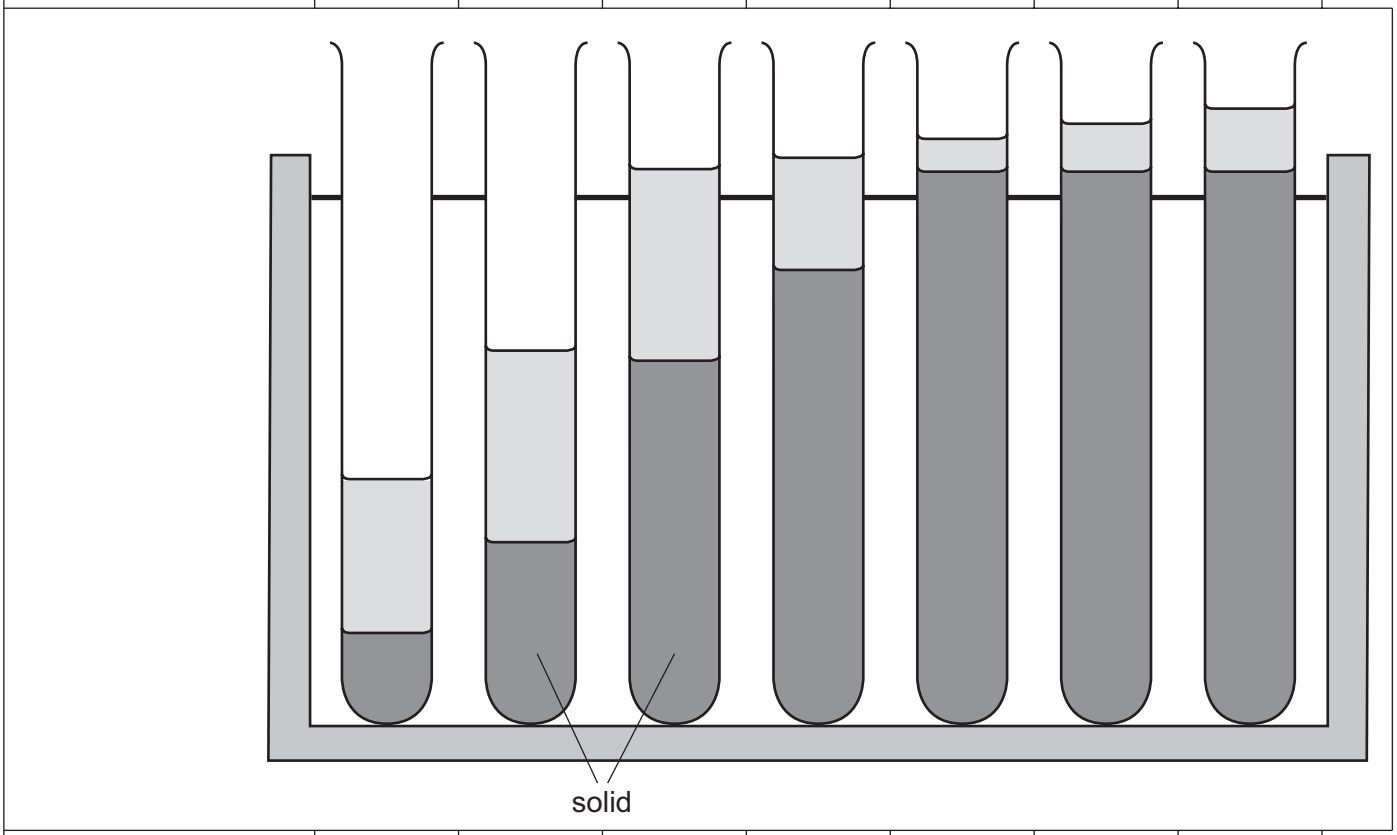
- A burette was filled with aqueous sodium carbonate.
- Seven test-tubes were labelled 1, 2, 3, 4, 5, 6 and 7.
- A measuring cylinder was used to pour 6 $cm^3$ of aqueous barium nitrate into each of the seven test-tubes in a test-tube rack.
- 1.0 $cm^3$ of aqueous sodium carbonate was added from the burette to test-tube 1.
- 2.0 $cm^3$ of aqueous sodium carbonate was added from the burette to test-tube 2.
- 4.0 $cm^3$ of aqueous sodium carbonate was added from the burette to test-tube 3.
- 5.0 $cm^3$ of aqueous sodium carbonate was added from the burette to test-tube 4.
- 6.0 $cm^3$ of aqueous sodium carbonate was added from the burette to test-tube 5.
- 7.0 $cm^3$ of aqueous sodium carbonate was added from the burette to test-tube 6.
- 8.0 $cm^3$ of aqueous sodium carbonate was added from the burette to test-tube 7.

A glass rod was used to stir the contents of each of the test-tubes. The contents of the test-tubes were left to stand until the solid formed had settled. A ruler was used to measure the height of the solid formed in each test-tube.

**(a)** Use a ruler to measure the heights of the solid formed in each test-tube shown in the diagram. Record the heights of the solid formed in the table and complete the table.

View solution

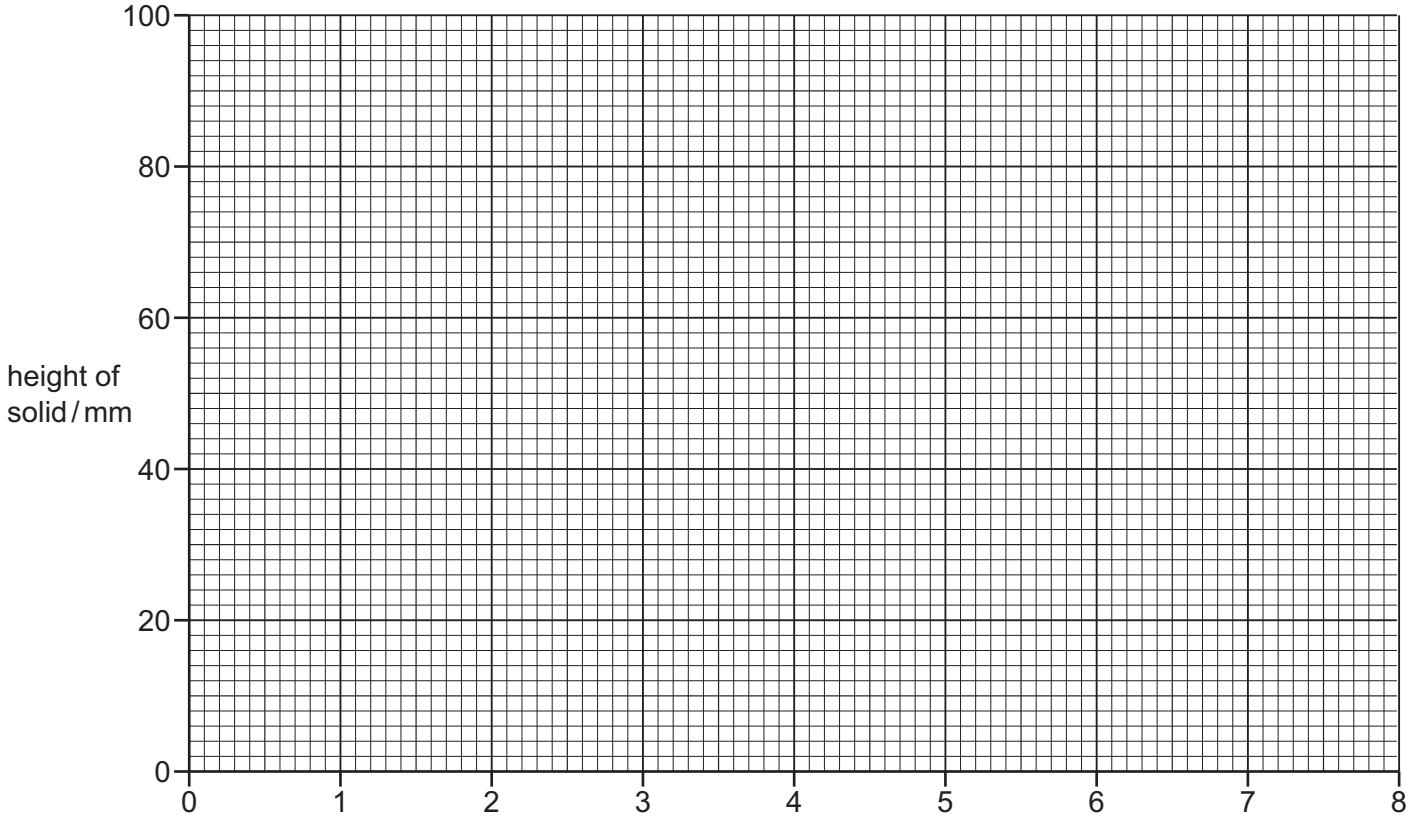
| test-tube number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| volume of aqueous sodium carbonate / $cm^3$ | | | | | | | |




| height of solid / mm | | | | | | | |
|---|---|---|---|---|---|---|---|

[3]

**(b)** Plot the results on the grid. Draw **two** intersecting lines of best fit. Label the *x*-axis.




View solution [4]

**(c)** **From your graph**, deduce the height of the solid formed when 3.0 $cm^3$ of aqueous sodium carbonate is added to 6 $cm^3$ of aqueous barium nitrate.

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

View solution

..... mm [2]

**(d)** Describe the trend in the heights of the solids formed in test-tubes 1–7.

View solution

.....

.....

..... [2]

**(e)** Predict what would happen if the experiment were continued using three further test-tubes each containing 6 $cm^3$ of aqueous barium nitrate and separately adding 9.0 $cm^3$, 10.0 $cm^3$ and 11.0 $cm^3$ of aqueous sodium carbonate to each one.
Explain your answer.

View solution

.....

.....

..... [2]

**(f)** Suggest **one** change to the **apparatus** used which could be made to obtain more accurate results.

..... [1]

**(g)** Suggest a **different** method to measure the amount of solid formed during the experiment.

View solution

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..... [3]

**(h)** Suggest how the reliability of the results could be checked.

View solution

.....

..... [1]

[Total: 18]

**3** Two substances, solution **F** and solid **G**, were analysed. Solution **F** was dilute hydrochloric acid. Tests were done on solution **F** and solid **G**.

**tests on solution F**

Complete the expected observations.

Solution **F** was divided into four equal portions in four test-tubes.

**(a)** The pH of the first portion of solution **F** was tested.

View solution

pH = ..... [1]

**(b)** Magnesium ribbon was added to the second portion of solution **F**. The gas produced was tested.

observations .....

.....

..... [3]

**(c)** Dilute nitric acid and aqueous silver nitrate were added to the third portion of solution **F**.

View solution

observations ..... [1]

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

observations ..... [1]

View solution

**tests on solid G**

Some of the tests and observations are shown.

| tests on solid **G** | observations |
|---|---|
| The appearance of solid **G** was studied. | white solid |
| **test 1**<br><br>Dilute hydrochloric acid was added to solid **G**.<br>The gas produced was tested.<br><br>The solution formed was divided into two portions for **test 2**. | rapid effervescence<br>limewater turned milky |
| **test 2**<br><br>An excess of aqueous sodium hydroxide was added to the first portion of the solution from **test 1**.<br><br>An excess of aqueous ammonia was added to the second portion of the solution from **test 1**. | white precipitate formed which was insoluble in excess<br><br>no precipitate formed |

**(e)** Identify solid **G**.

..... [2]

[Total: 8]

View solution

**4** Steel nails rust in the presence of air and water. Plan an investigation to:

View solution

- show that coating steel nails with paint helps to protect the nails from rusting
- show that coating steel nails with zinc helps to protect the nails from rusting
- determine which coating is more effective at protecting steel nails from rusting.

You are provided with:

- uncoated steel nails
- steel nails coated with paint
- steel nails coated with zinc
- common laboratory apparatus.

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..... [6]

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