Cambridge Assessment International Education

# Cambridge IGCSE™

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

Paper 6 Alternative to Practical **May/June 2020**

**1 hour**

You must answer on the question paper.

No additional materials are needed.

**INSTRUCTIONS**

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

**INFORMATION**

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Blank pages are indicated.

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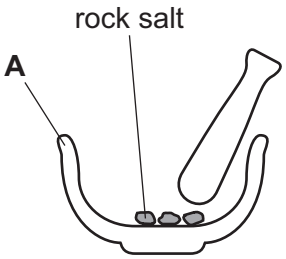
**1** A sample of rock salt contains sodium chloride and sand.

Sodium chloride is soluble in water. Sand is insoluble in water.

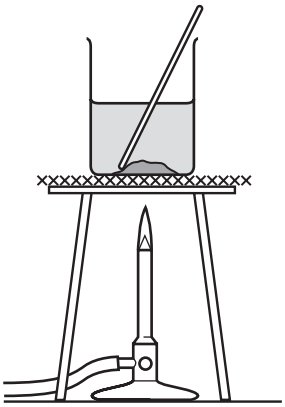
A student obtained dry crystals of pure sodium chloride from a lump of rock salt.
These are some of the steps the student used.

**step 1**



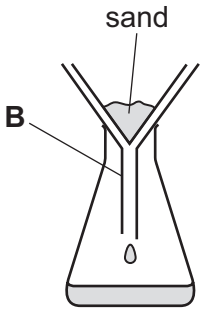

grind the rock salt into smaller pieces

**step 2**



add the rock salt to water and heat while stirring with a glass rod

**step 3**




filter the mixture

**(a)** Name the apparatus labelled **A** in **step 1**.

View solution

..... [1]

**(b)** Explain why the mixture is heated and stirred in **step 2**.

View solution

..... [1]

**(c) (i)** Name the apparatus labelled **B** in **step 3**.

View solution

..... [1]

**(ii)** State the scientific term for the sand left on the filter paper in **step 3**.

View solution

..... [1]

**(d)** Describe what the student must do after **step 3** to obtain dry crystals of pure sodium chloride.

.....

.....

.....

..... [3]

View solution [Total: 7]

**2** A student investigated the temperature change when aqueous sodium hydroxide neutralises dilute hydrochloric acid. The equation for the reaction is shown.

$$NaOH + HCl \rightarrow NaCl + H_2O$$

Eight experiments were done.

*Experiment 1*
- A polystyrene cup was placed into a 250 $cm^3$ beaker for support.
- Using a measuring cylinder, 5 $cm^3$ of aqueous sodium hydroxide was poured into the polystyrene cup.
- Using a measuring cylinder, 45 $cm^3$ of dilute hydrochloric acid was poured into the polystyrene cup.
- The mixture was stirred and the maximum temperature reached was measured using a thermometer.
- The polystyrene cup was rinsed with distilled water.

*Experiment 2*
- Experiment 1 was repeated using 10 $cm^3$ of aqueous sodium hydroxide and 40 $cm^3$ of dilute hydrochloric acid.

*Experiment 3*
- Experiment 1 was repeated using 15 $cm^3$ of aqueous sodium hydroxide and 35 $cm^3$ of dilute hydrochloric acid.

*Experiment 4*
- Experiment 1 was repeated using 20 $cm^3$ of aqueous sodium hydroxide and 30 $cm^3$ of dilute hydrochloric acid.

*Experiment 5*
- Experiment 1 was repeated using 30 $cm^3$ of aqueous sodium hydroxide and 20 $cm^3$ of dilute hydrochloric acid.

*Experiment 6*
- Experiment 1 was repeated using 35 $cm^3$ of aqueous sodium hydroxide and 15 $cm^3$ of dilute hydrochloric acid.

*Experiment 7*
- Experiment 1 was repeated using 40 $cm^3$ of aqueous sodium hydroxide and 10 $cm^3$ of dilute hydrochloric acid.

*Experiment 8*
- Experiment 1 was repeated using 45 $cm^3$ of aqueous sodium hydroxide and 5 $cm^3$ of dilute hydrochloric acid.

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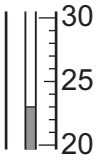
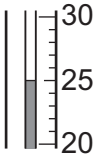
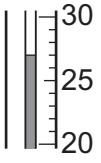
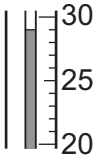
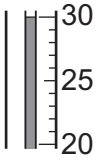
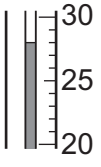
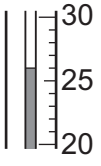
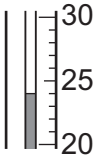
**(a)** Use the information in the description of the experiments and the thermometer diagrams to complete the table.

| experiment | volume of aqueous sodium hydroxide / $cm^3$ | volume of dilute hydrochloric acid / $cm^3$ | thermometer diagram | highest temperature reached / °C |
|---|---|---|---|---|
| 1 | 5 | |  | |
| 2 | 10 | |  | |
| 3 | 15 | |  | |
| 4 | 20 | |  | |
| 5 | 30 | |  | |
| 6 | 35 | |  | |
| 7 | 40 | |  | |
| 8 | 45 | |  | |



[4]

View solution

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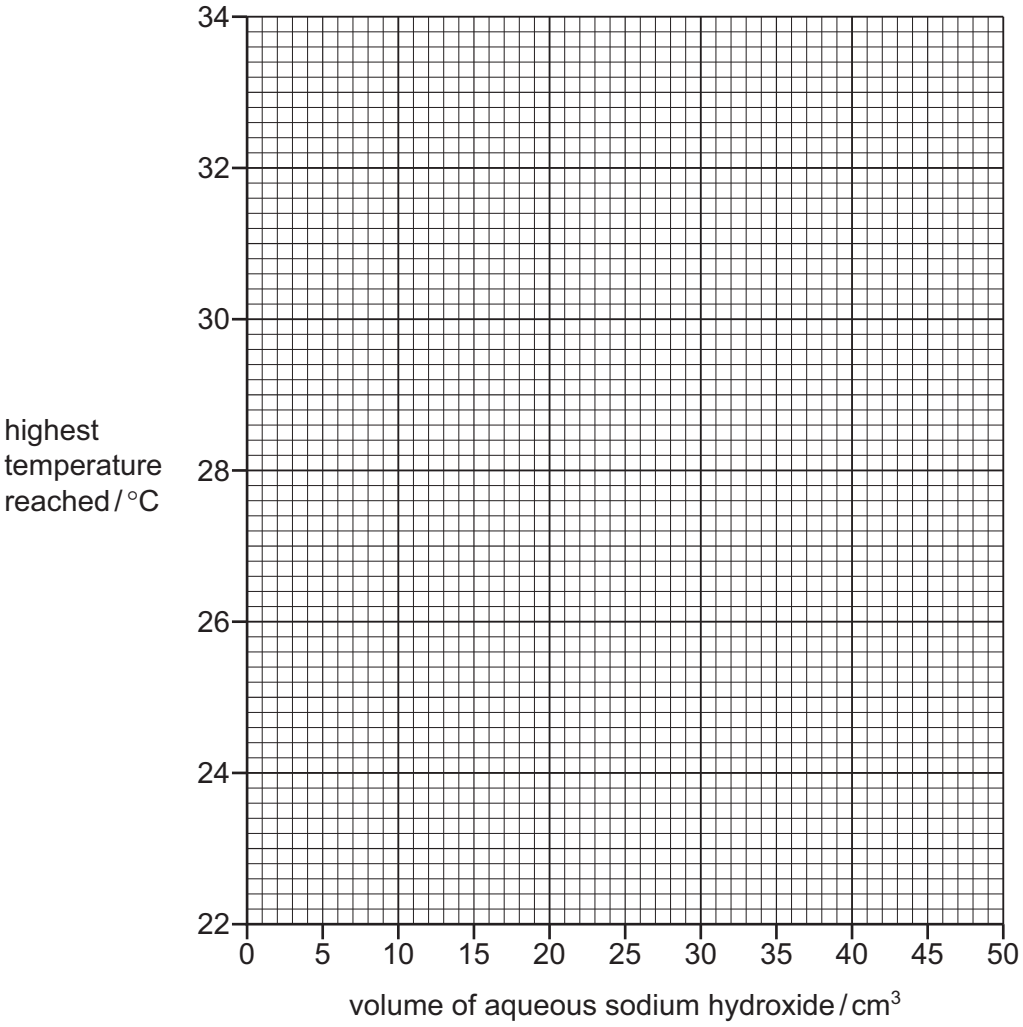
**(b)** Plot the results from Experiments 1 to 8 on the grid. Draw **two** straight lines through the points. Extend your straight lines so that they cross.

View solution




[4]

**(c)** The point on the graph where the two straight lines cross is where all of the aqueous sodium hydroxide reacts with all of the dilute hydrochloric acid to form a neutral solution.

**(i)** **Use your graph** to deduce the volume of aqueous sodium hydroxide and the volume of dilute hydrochloric acid that react together to produce a neutral solution.
Show your working **on the grid**.

View solution

volume of aqueous sodium hydroxide = ..... $cm^3$

volume of dilute hydrochloric acid = ..... $cm^3$

[3]

**(ii)** **Use your graph** to determine the highest temperature reached if the volumes in **(c)(i)** were mixed together.

highest temperature reached = ..... [2]

View solution

**(iii)** Which solution, aqueous sodium hydroxide or dilute hydrochloric acid, was the most concentrated?
Use your answer to **(c)(i)** to explain why.

View solution

most concentrated solution .....

explanation .....

.....

[1]

**(d)** **On the graph**, sketch the lines you would expect to obtain if a copper can was used instead of a polystyrene cup. [2]

View solution

**(e)** Give **one** advantage and **one** disadvantage of using a burette, instead of a measuring cylinder, to add the dilute hydrochloric acid directly into the polystyrene cup.

advantage .....

.....

disadvantage .....

.....

View solution [2]

**(f)** How could the reliability of the results of this investigation be checked?

.....

..... [1]

[Total: 19]

View solution

**3** Two solids, solid **N** and solid **P**, were analysed.
Tests were done on each solid.

**tests on solid N**

Tests were done and the following observations made.

View solution

| tests on solid **N** | observations |
|---|---|
| Solid **N** was dissolved in distilled water to produce solution **N**. The solution was divided into three equal portions in three boiling tubes. | |
| **test 1**<br><br>Aqueous sodium hydroxide was added slowly until in excess to the first portion of solution **N**. | white precipitate formed,<br>the precipitate dissolved in excess aqueous sodium hydroxide forming a colourless solution |
| **test 2**<br><br>Aqueous ammonia was added slowly until in excess to the second portion of solution **N**. | white precipitate formed,<br>the precipitate dissolved in excess aqueous ammonia forming a colourless solution |
| **test 3**<br><br>Aluminium foil and aqueous sodium hydroxide were added to the third portion of solution **N**. The mixture was heated using a Bunsen burner. Any gas produced was tested with damp red litmus paper. | effervescence was seen,<br>the damp red litmus paper turned blue |

**(a)** Name the gas given off in **test 3**.

..... [1]

**(b)** Identify solid **N**.

View solution

.....

..... [2]

**tests on solid P**

Solid **P** was potassium iodide.

Complete the expected observations.

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

View solution

..... [1]

**(d)** A flame test was done on solid **P**.

View solution

observations ..... [1]

**(e)** Solid **P** was dissolved in distilled water to produce solution **P**. Solution **P** was divided into three equal portions in three test-tubes.

**(i)** About 1 cm depth of dilute nitric acid and a few drops of aqueous silver nitrate were added to the first portion of solution **P**.

observations .....

..... [1]

**(ii)** About 1 cm depth of dilute nitric acid and a few drops of aqueous barium nitrate were added to the second portion of solution **P**.

observations .....

..... [1]

**(iii)** A few drops of aqueous bromine were added to the third portion of solution **P**.

View solution

observations .....

..... [1]

[Total: 8]

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**4** Stayclean and Brightwhite are two brands of washing powder. Both contain sodium carbonate. Sodium carbonate is soluble in water and reacts with dilute sulfuric acid to produce carbon dioxide gas.

Plan an investigation to determine which of the two washing powders, Stayclean or Brightwhite, contains the greatest percentage of sodium carbonate.

You are provided with samples of the two washing powders and common laboratory apparatus and chemicals.

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..... [6]

View solution

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