Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

8571205354

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.

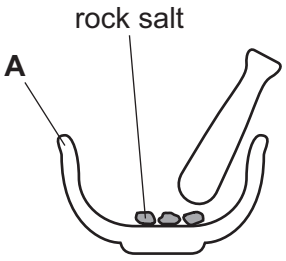
[Turn over

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

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

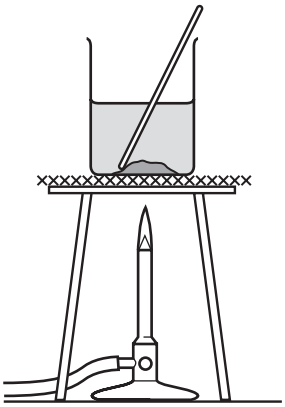
A student obtained dry crystals of pure sodium chloride from a lump of rock salt.
These are some of the steps the student used.

step 1



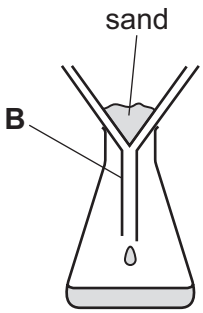
grind the rock salt into smaller pieces

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**.

..... [1]

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

..... [1]

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

..... [1]

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

..... [1]

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

.....

.....

.....

..... [3]

[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.

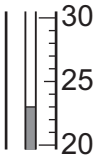
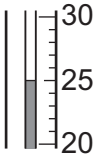
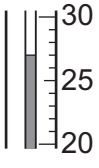
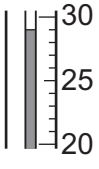
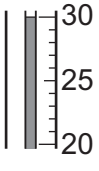
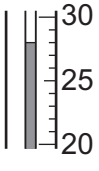
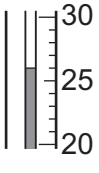
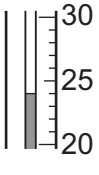
Experiment 5
- Experiment 1 was repeated using 30 cm^3 of aqueous sodium hydroxide and 20 cm^3 of dilute hydrochloric acid.

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.

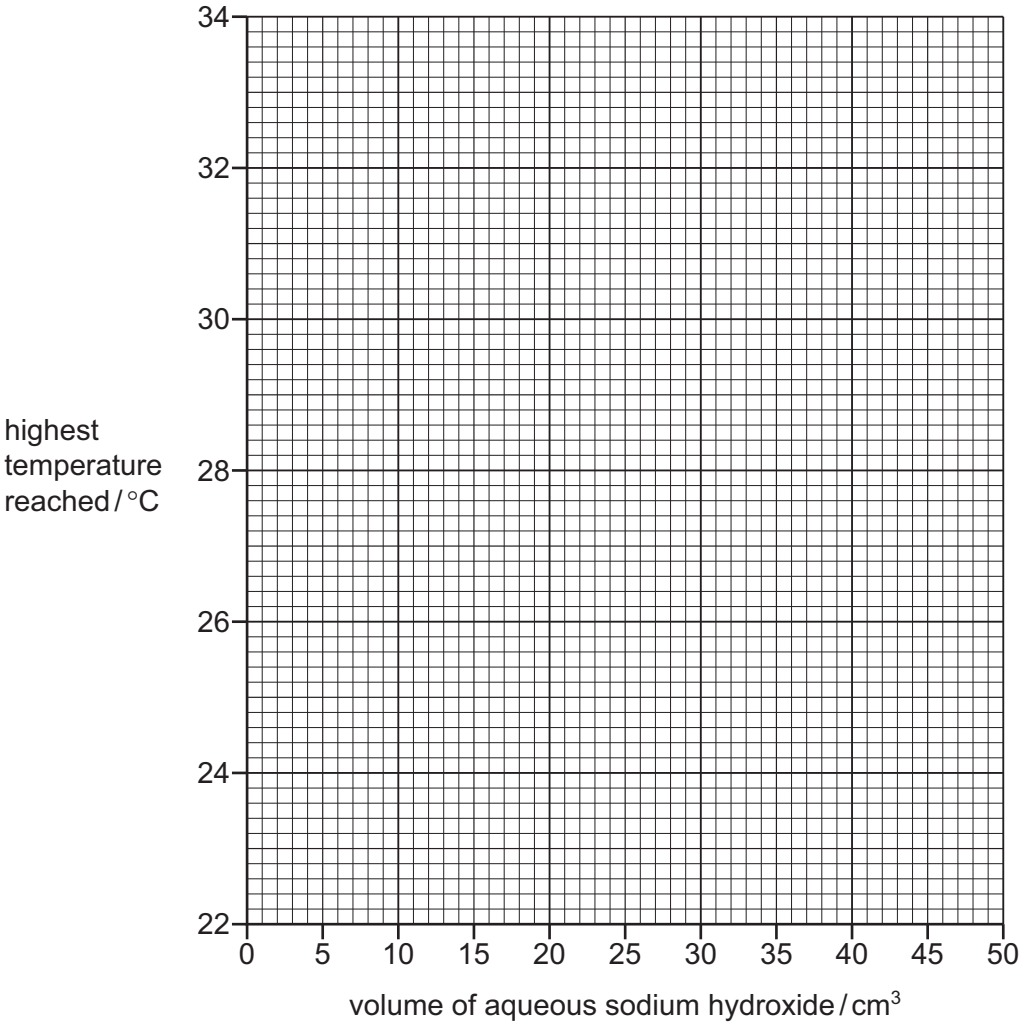
Experiment 8
- Experiment 1 was repeated using 45 cm^3 of aqueous sodium hydroxide and 5 cm^3 of dilute hydrochloric acid.

(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]

(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.



[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**.

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]

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

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]

(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 .....

.....
[2]

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

.....

..... [1]

[Total: 19]

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.

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** Aqueous sodium hydroxide was added slowly until in excess to the first portion of solution **N**.	white precipitate formed, the precipitate dissolved in excess aqueous sodium hydroxide forming a colourless solution
test 2 Aqueous ammonia was added slowly until in excess to the second portion of solution **N**.	white precipitate formed, the precipitate dissolved in excess aqueous ammonia forming a colourless solution
test 3 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, the damp red litmus paper turned blue

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

..... [1]

(b) Identify solid **N**.

.....

..... [2]

tests on solid P

Solid **P** was potassium iodide.

Complete the expected observations.

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

..... [1]

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

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**.

observations .....

..... [1]

[Total: 8]

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]

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