



# Cambridge IGCSE™ (9–1)

CANDIDATE  
NAME

CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**CHEMISTRY**

**0971/62**

Paper 6 Alternative to Practical

**October/November 2022**

**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.

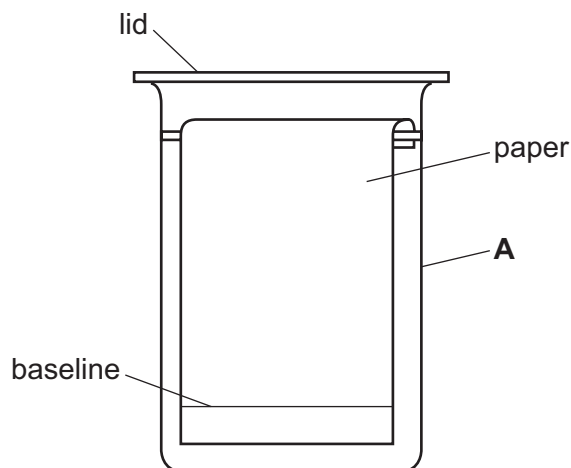
## INFORMATION

- 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. Any blank pages are indicated.



- 1 A mixture of three coloured compounds was separated using the apparatus shown in the diagram.



- (a) Give the name of the item of apparatus labelled **A**.

..... [1]

- (b) One drop of the mixture of coloured compounds was placed on the paper and some solvent was poured into **A**.

Draw **on the diagram**:

- a spot (●) to show where the drop of the mixture of coloured compounds should be placed on the paper at the start of the experiment
- a line to show the level of the solvent in **A** at the start of the experiment.

[2]

- (c) Name an item of apparatus that should be used to place a drop of the mixture of coloured compounds onto the paper.

..... [1]

- (d) State when the paper should be removed from the solvent in **A**.

..... [1]

- (e) Name this method of separation of coloured compounds.

..... [1]

[Total: 6]

- 2 A student investigated the temperature change when two different aqueous solutions of sodium hydroxide, solution **G** and solution **H**, reacted with dilute hydrochloric acid.

Two experiments were done.


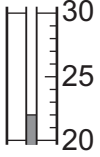
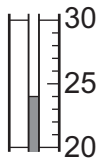
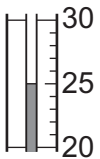
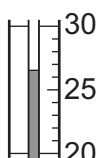
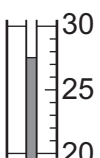
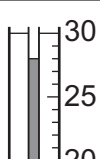
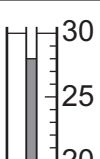
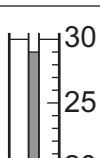
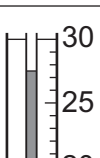
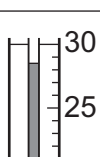
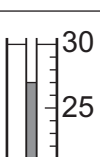
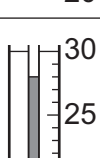
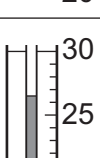
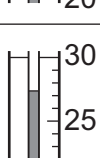
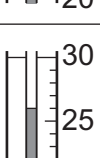
(a) *Experiment 1*

- A burette was rinsed with distilled water and then with dilute hydrochloric acid.
- The burette was filled with the dilute hydrochloric acid. The hydrochloric acid was then run out through the tap until the level was on the  $0.00\text{ cm}^3$  mark.
- A  $50\text{ cm}^3$  measuring cylinder was used to pour  $20\text{ cm}^3$  of solution **G** into a beaker.
- A thermometer was used to measure the initial temperature of solution **G**.
- $5\text{ cm}^3$  of dilute hydrochloric acid was added from the burette into the beaker.
- The mixture in the beaker was stirred using the thermometer and the temperature of the mixture was measured.
- Another  $5\text{ cm}^3$  of dilute hydrochloric acid was added from the burette into the beaker.
- The mixture in the beaker was stirred using the thermometer and the temperature of the mixture was measured.
- $5\text{ cm}^3$  portions of dilute hydrochloric acid continued to be added and the temperature measured until a total of  $35\text{ cm}^3$  of dilute hydrochloric acid had been added.

*Experiment 2*

- Experiment 1 was repeated using solution **H** instead of solution **G**.

Use the thermometer diagrams to complete the table.

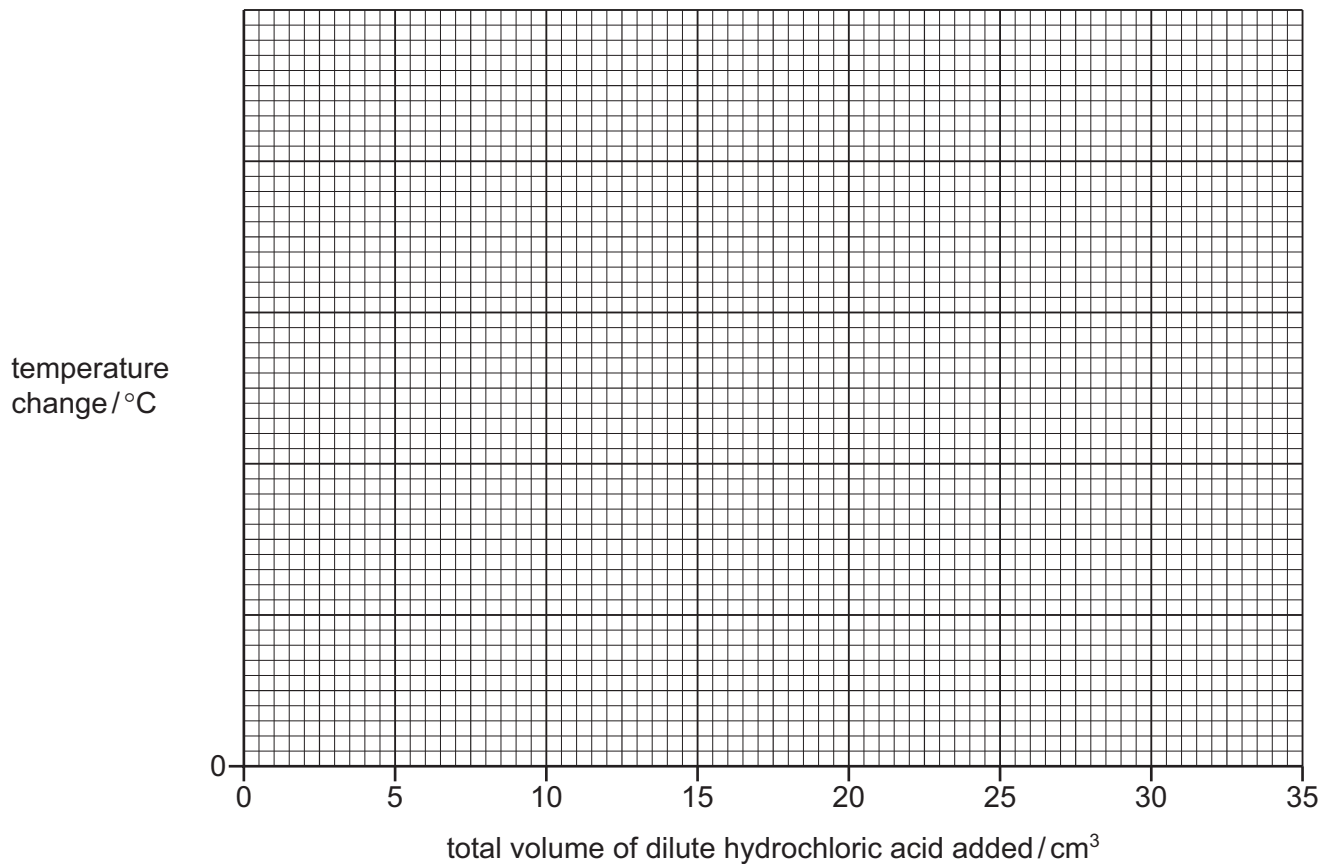
total volume of dilute hydrochloric acid added /cm <sup>3</sup>	Experiment 1 using solution <b>G</b>			Experiment 2 using solution <b>H</b>		
	thermometer diagram	temperature /°C	temperature change since start /°C	thermometer diagram	temperature /°C	temperature change since start /°C
0						
5						
10						
15						
20						
25						
30						
35						

[5]

5

- (b) Complete a suitable scale on the  $y$ -axis and plot the results from Experiments 1 and 2 on the grid.

Draw two smooth line graphs. Both curves must start at (0,0). Clearly label your lines.



[5]

- (c) **From your graph**, deduce the temperature change obtained when a total volume of 13 cm<sup>3</sup> of dilute hydrochloric acid is added in Experiment 1.

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

temperature change = ..... °C [2]

- (d) Explain why the temperature change decreases towards the end of each experiment.

.....  
 ..... [1]

(e) Explain what conclusion about the concentrations of solution **G** and solution **H** can be made from the results of Experiments 1 and 2.

.....  
.....  
.....  
..... [2]

(f) Explain how the results obtained would be different if a polystyrene cup is used instead of the beaker.

.....  
.....  
.....  
..... [2]

(g) Give an advantage and a disadvantage of using a burette rather than a measuring cylinder to add the dilute hydrochloric acid to solution **G** and solution **H**.

advantage .....

.....

disadvantage .....

.....

[2]

[Total: 19]

- 3 Solid **I** and solid **J** were analysed.  
Tests were done on each substance.

**tests on solid I**

tests	observations
<b>test 1</b>  Dilute hydrochloric acid was added to a boiling tube containing solid <b>I</b> .  Any gas produced was tested.	  effervescence was seen, the solid dissolved to form a colourless solution  the gas turned limewater milky
<b>test 2</b>  A flame test was carried out on the solution formed in <b>test 1</b> .	  a red flame was seen

- (a) Identify the gas made in **test 1**.

..... [1]

- (b) Identify solid **I**.

.....

..... [2]

**tests on solid J**

Solid **J** was aluminium chloride.

Solid **J** was dissolved in water to form solution **J**. Solution **J** was divided into four approximately equal portions in four test-tubes.

- (c) Aqueous sodium hydroxide was added dropwise and then in excess to the first portion of solution **J**.

observations .....

..... [2]

- (d) Aqueous ammonia was added dropwise and then in excess to the second portion of solution **J**.

observations .....

..... [2]

- (e) About 1 cm depth of dilute nitric acid followed by a few drops of aqueous barium nitrate were added to the third portion of solution **J**.

observations ..... [1]

- (f) About 1 cm depth of dilute nitric acid followed by a few drops of aqueous silver nitrate were added to the fourth portion of solution **J**.

observations ..... [1]

[Total: 9]





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