Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

0293365347

CHEMISTRY **0620/62**

Paper 6 Alternative to Practical **February/March 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.

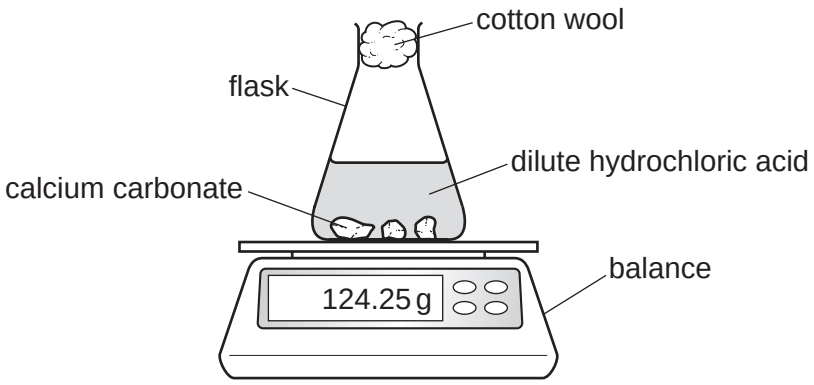
INFORMATION

- 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 Calcium carbonate reacts with dilute hydrochloric acid. The products of the reaction are aqueous calcium chloride, water and carbon dioxide gas.

A student investigated the rate of the reaction between calcium carbonate and dilute hydrochloric acid using the apparatus shown.



The mass of the flask and contents was recorded every 30 seconds.
When the reaction stopped there were still small pieces of calcium carbonate in the flask.

(a) State what happens to the reading on the balance as the reaction takes place.
Explain your answer.

reading on balance .....

explanation .....

.....
[2]

(b) There is a piece of cotton wool in the neck of the flask.

(i) Suggest why a bung is **not** used in the neck of the flask.

.....

..... [1]

(ii) Suggest why cotton wool is placed in the neck of the flask rather than leaving the flask open.

.....

..... [1]

(c) State which reactant is in excess.

..... [1]

(d) Describe how crystals of calcium chloride can be obtained from the mixture left in the flask after the reaction has stopped.

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.....

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..... [3]

[Total: 8]

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2 A student investigated the temperature change when anhydrous lithium chloride dissolves in water.

The student did six experiments.

(a) *Experiment 1*

- Using a measuring cylinder, 30 cm^3 of distilled water was poured into a 100 cm^3 beaker.
- The initial temperature of the water was measured using a thermometer.
- 1.0 g of anhydrous lithium chloride was added to the water in the beaker. At the same time a timer was started.
- The water and lithium chloride mixture was continually stirred using a thermometer.
- The temperature of the mixture was measured after 30 seconds.
- The beaker was rinsed with distilled water.

Experiment 2

- Experiment 1 was repeated using 1.5 g of anhydrous lithium chloride instead of the 1.0 g of anhydrous lithium chloride.

Experiment 3

- Experiment 1 was repeated using 2.0 g of anhydrous lithium chloride instead of the 1.0 g of anhydrous lithium chloride.

Experiment 4

- Experiment 1 was repeated using 2.5 g of anhydrous lithium chloride instead of the 1.0 g of anhydrous lithium chloride.

Experiment 5

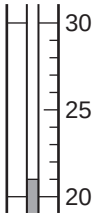
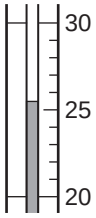
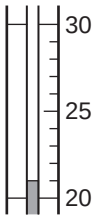
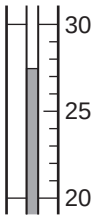
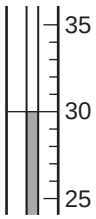
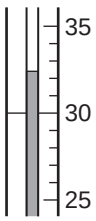
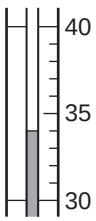
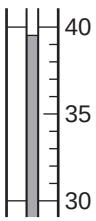
- Experiment 1 was repeated using 3.0 g of anhydrous lithium chloride instead of the 1.0 g of anhydrous lithium chloride.

Experiment 6

- Experiment 1 was repeated using 4.0 g of anhydrous lithium chloride instead of the 1.0 g of anhydrous lithium chloride.

6

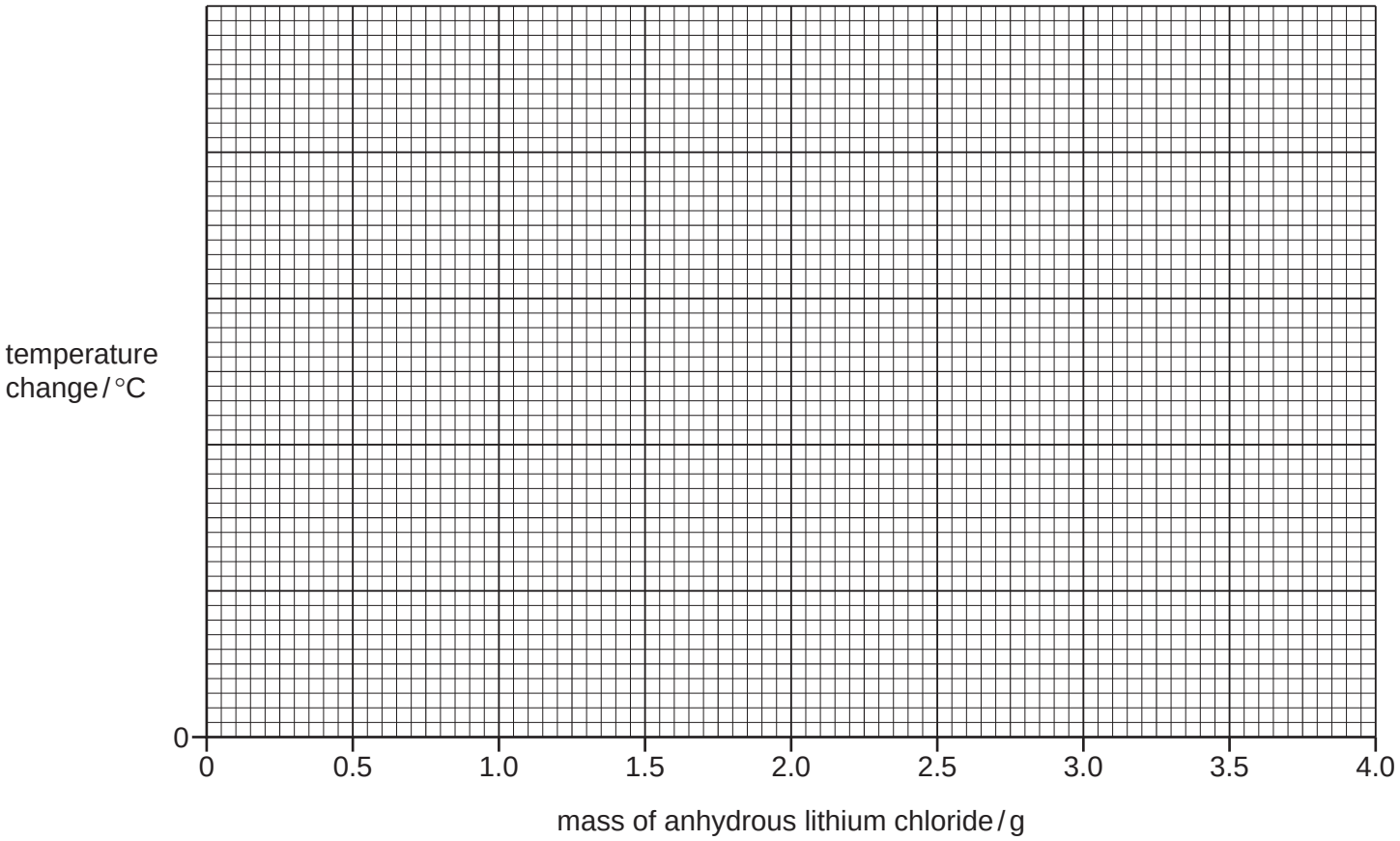
Use the thermometer diagrams to complete the table and calculate the temperature changes.

experiment	mass of anhydrous lithium chloride / g	initial		after 30 seconds		temperature change / °C
		thermometer diagram	temperature / °C	thermometer diagram	temperature / °C	
1	1.0					
2	1.5					
3	2.0					
4	2.5					
5	3.0					
6	4.0					

[5]

(b) Complete a suitable scale on the *y*-axis and plot the results from Experiments 1 to 6 on the grid.

Draw a straight line of best fit through your points. The straight line must pass through (0,0).



[5]

(c) **From your graph**, deduce the temperature change when 3.2 g of anhydrous lithium chloride is dissolved in 30 cm^3 of distilled water.

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

temperature change = ... °C [2]

(d) Estimate the temperature change if Experiment 6 is repeated using 60 cm^3 of water instead of 30 cm^3 of water. Give a reason for your answer.

.....

.....

..... [2]

(e) Suggest **two** changes that could be made to the apparatus to improve the accuracy of the results. For each change explain why it improves the accuracy of the results.

change 1 .....

explanation 1 .....

.....

change 2 .....

explanation 2 .....

.....

[4]

[Total: 18]

3 Solution **A** and solid **B** were analysed. Solution **A** was aqueous copper(II) bromide.
Tests were done on each substance.

Complete the expected observations.

tests on solution A

Solution **A** was divided into three approximately equal portions in three test-tubes.

(a) The end of a piece of wire was dipped into the first portion of solution **A**. The end of the wire was then placed at the edge of a roaring Bunsen burner flame.

observations ..... [1]

(b) To the second portion of solution **A** aqueous ammonia was added dropwise until in excess.

observations .....

.....

..... [3]

(c) To the third portion of solution **A** about 1 cm depth of dilute nitric acid followed by a few drops of aqueous silver nitrate were added.

observations .....

..... [1]

tests on solid B

tests	observations
Solid **B** was added to 15 cm^3 of water in a boiling tube. A bung was placed in the boiling tube and it was shaken to dissolve solid **B** and form solution **B**. Solution **B** was divided into three approximately equal portions in three test-tubes. **test 1** The first portion of solution **B** was tested using universal indicator paper.	the universal indicator paper turned blue
test 2 To the second portion of solution **B** aqueous sodium hydroxide was added dropwise and then in excess.	a white precipitate formed which remained when excess aqueous sodium hydroxide was added
test 3 To the third portion of solution **B** aqueous ammonia was added dropwise and then in excess.	the solution remained colourless

(d) Deduce the pH of solution **B**.

pH = ... [1]

(e) Identify solid **B**.

.....

..... [2]

[Total: 8]

4 Fizzy drinks contain carbon dioxide gas dissolved in a liquid. The carbon dioxide gas can be removed from the fizzy drink by heating.

Plan an investigation to find the volume of carbon dioxide gas in 1 dm^3 of a fizzy drink.
Include in your answer how you will calculate the volume of carbon dioxide gas dissolved in 1 dm^3 of a fizzy drink.

You are provided with a small sample (less than 1 dm^3) of the fizzy drink and common laboratory apparatus.
(1 dm^3 = 1000 cm^3)

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