Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

6396159486

CHEMISTRY **0620/52**

Paper 5 Practical Test **February/March 2022**

1 hour 15 minutes

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

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 [ ].
- Notes for use in qualitative analysis are provided in the question paper.

For Examiner's Use	
1	
2	
3	
Total	

This document has **12** pages. Any blank pages are indicated.

1 You are going to investigate the temperature change when anhydrous lithium chloride dissolves in water.

Read all of the instructions carefully before starting the experiments.

Instructions
You are going to do six experiments.

(a) *Experiment 1*

- Use a measuring cylinder to pour 30 cm^3 of distilled water into a 100 cm^3 beaker.
- Use a thermometer to measure the initial temperature of the water. Record the initial temperature in the table.
- Add the 1.0 g sample of anhydrous lithium chloride to the water in the beaker. At the same time start a timer.
- Continually stir the mixture in the beaker using the thermometer.
- Measure the temperature reached by the mixture after 30 seconds. Record the temperature of the mixture in the table.
- Calculate and record the temperature change in the table.
- Empty and rinse the beaker with distilled water.

Experiment 2

- Repeat Experiment 1 using the 1.5 g sample of anhydrous lithium chloride instead of the 1.0 g sample of anhydrous lithium chloride.

Experiment 3

- Repeat Experiment 1 using the 2.0 g sample of anhydrous lithium chloride instead of the 1.0 g sample of anhydrous lithium chloride.

Experiment 4

- Repeat Experiment 1 using the 2.5 g sample of anhydrous lithium chloride instead of the 1.0 g sample of anhydrous lithium chloride.

Experiment 5

- Repeat Experiment 1 using the 3.0 g sample of anhydrous lithium chloride instead of the 1.0 g sample of anhydrous lithium chloride.

Experiment 6

- Repeat Experiment 1 using the 4.0 g sample of anhydrous lithium chloride instead of the 1.0 g sample of anhydrous lithium chloride.

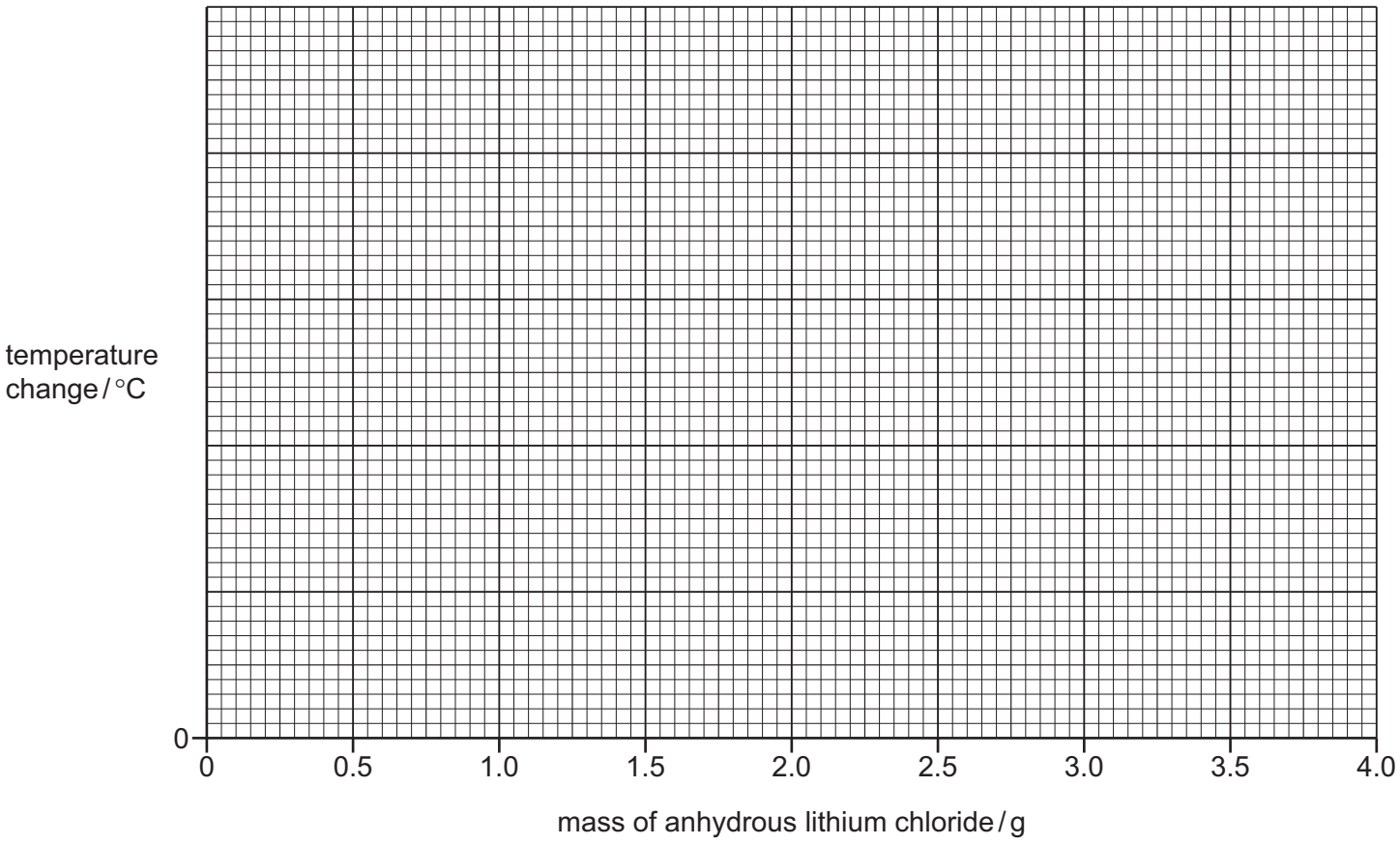
Complete the table.

experiment	mass of anhydrous lithium chloride / g	initial temperature / °C	temperature after 30 seconds / °C	temperature change / °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 your 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]

2 You are provided with solution **A** and solid **B**.
Do the following tests on the substances, recording all of your observations at each stage.

tests on solution A

(a) Carry out a flame test on solution **A**.
Record your observations.

..... [1]

Divide the remaining solution **A** into four approximately equal portions in one boiling tube and three test-tubes.

(b) To the first portion of solution **A** in a boiling tube add aqueous ammonia dropwise until it is in excess.
Record your observations.

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..... [3]

(c) To the second portion of solution **A** add about 1 cm depth of dilute nitric acid followed by a few drops of aqueous silver nitrate.
Record your observations.

.....

..... [1]

(d) Add the third portion of solution **A** to the test-tube containing aqueous chlorine.
Record your observations.

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..... [1]

(e) To the fourth portion of solution **A** add the magnesium ribbon.
Record your observations.

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..... [1]

(f) Identify the **three** ions contained in solution **A**.

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..... [3]

[Turn over

tests on solid B

Add about 15 cm^3 of distilled water to the boiling tube containing solid **B**. Replace the stopper in the boiling tube and shake the boiling tube to dissolve as much solid **B** as possible and form solution **B**.

Filter the mixture formed and collect solution **B** as the filtrate. Divide solution **B** into three approximately equal portions in three test-tubes.

(g) Test the pH of the first portion of solution **B**.

pH = ... [1]

(h) To the second portion of solution **B** add aqueous sodium hydroxide dropwise and then in excess.
Record your observations.

.....

..... [2]

(i) To the third portion of solution **B** add aqueous ammonia dropwise and then in excess.
Record your observations.

.....

..... [1]

(j) Identify solid **B**.

.....

..... [2]

[Total: 16]

3 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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..... [6]

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Notes for use in qualitative analysis
Tests for anions

anion	test	test result
carbonate (CO_3^{2-})	add dilute acid	effervescence, carbon dioxide produced
chloride (Cl^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
bromide (Br^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	cream ppt.
iodide (I^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	yellow ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide, then aluminium foil; warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify, then add aqueous barium nitrate	white ppt.
sulfite (SO_3^{2-})	add dilute hydrochloric acid, warm gently and test for the presence of sulfur dioxide	sulfur dioxide produced will turn acidified aqueous potassium manganate(VII) from purple to colourless

Tests for aqueous cations

cation	effect of aqueous sodium hydroxide	effect of aqueous ammonia
aluminium (Al^{3+})	white ppt., soluble in excess, giving a colourless solution	white ppt., insoluble in excess
ammonium (NH_4^+)	ammonia produced on warming	–
calcium (Ca^{2+})	white ppt., insoluble in excess	no ppt., or very slight white ppt.
chromium(III) (Cr^{3+})	green ppt., soluble in excess	grey-green ppt., insoluble in excess
copper(II) (Cu^{2+})	light blue ppt., insoluble in excess	light blue ppt., soluble in excess, giving a dark blue solution
iron(II) (Fe^{2+})	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) (Fe^{3+})	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc (Zn^{2+})	white ppt., soluble in excess, giving a colourless solution	white ppt., soluble in excess, giving a colourless solution

Tests for gases

gas	test and test result
ammonia (NH_3)	turns damp red litmus paper blue
carbon dioxide (CO_2)	turns limewater milky
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	'pops' with a lighted splint
oxygen (O_2)	relights a glowing splint
sulfur dioxide (SO_2)	turns acidified aqueous potassium manganate(VII) from purple to colourless

Flame tests for metal ions

metal ion	flame colour
lithium (Li^+)	red
sodium (Na^+)	yellow
potassium (K^+)	lilac
copper(II) (Cu^{2+})	blue-green