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CHEMISTRY **0620/51**

Paper 5 Practical Test **May/June 2026**

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. Do **not** use correction fluid or tape.
- 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.

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1 You are going to investigate the temperature change when citric acid reacts with sodium carbonate.

Read all of the instructions carefully before starting the experiments.

Instructions
You are going to do five experiments.

Experiment 1

- Use the 10 cm^3 measuring cylinder to pour 1.0 cm^3 of distilled water into a boiling tube.
- Use the thermometer to measure the initial temperature of the distilled water.
- Record this temperature, to the nearest 0.5 °C, in Table 1.1.
- Add 4 g of solid citric acid and 4 g of solid sodium carbonate to the boiling tube. You may need to gently tap the tube to help the sodium carbonate come out of the tube.
- Stir the contents of the boiling tube with the thermometer and measure the lowest temperature reached by the mixture.
- Record this temperature to the nearest 0.5 °C in Table 1.1.
- Rinse out the boiling tube with distilled water.

Experiment 2

- Repeat Experiment 1 using 2.0 cm^3 of distilled water instead of 1.0 cm^3.

Experiment 3

- Repeat Experiment 1 using 4.0 cm^3 of distilled water instead of 1.0 cm^3.

Experiment 4

- Repeat Experiment 1 using 6.0 cm^3 of distilled water instead of 1.0 cm^3.

Experiment 5

- Repeat Experiment 1 using 8.0 cm^3 of distilled water instead of 1.0 cm^3.

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(a) Complete Table 1.1.

View solution

Calculate the temperature decrease using the equation shown.

temperature decrease = initial temperature – lowest temperature

Table 1.1

experiment	volume of distilled water / cm^3	initial temperature / °C	lowest temperature / °C	temperature decrease / °C
1	1.0			
2				
3				
4				
5				

[5]

View solution

(b) Write a suitable scale on the *y*-axis and plot your results from Experiments 1 to 5 on Figure 1.1.
Draw a line of best fit.

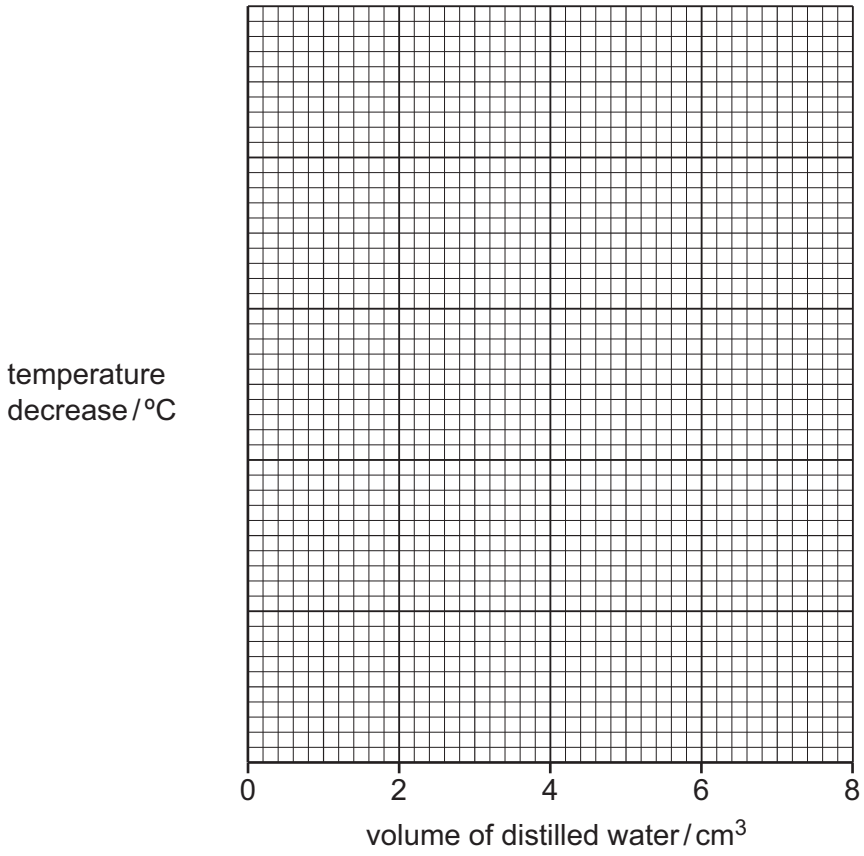

Figure 1.1

[4]

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(c) State if the energy change in the reaction is exothermic or endothermic.

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Explain your answer using the results in Table 1.1.

energy change .....

explanation .....

.....

[1]

(d) Use your graph in Figure 1.1 to predict the temperature decrease if the experiment is repeated using 5.5 cm^3 of distilled water.

View solution

Show your working on Figure 1.1.

temperature decrease = ... °C

[2]

(e) Describe the relationship between the volume of distilled water and the temperature decrease.

View solution

.....

..... [1]

(f) **(i)** Explain why wrapping the boiling tube in cotton wool would improve the accuracy of the results.

View solution

.....

.....

..... [2]

(ii) Explain why placing the boiling tube in a water-bath at room temperature would **not** improve the accuracy of the results.

View solution

.....

..... [1]

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(g) Explain why the volume of distilled water was measured using a 10 cm^3 measuring cylinder rather than a 25 cm^3 measuring cylinder.

.....

..... [1]

(h) Sketch on Figure 1.1 the graph obtained if all of the experiments were repeated using 2 g of solid citric acid and 2 g of solid sodium carbonate. [1]

[Total: 18]

View solution

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2 You are provided with two substances: solid **A** and solution **B**.

Do the following tests on solid **A** and solution **B**. Record all of your observations at each stage.

Tests on solid A

Add about a 5 cm depth of water to the boiling tube containing solid **A**. Replace the stopper in the boiling tube. Shake the boiling tube to dissolve solid **A** and form solution **A**. Divide solution **A** into two approximately equal portions in one boiling tube and one test-tube.

(a) (i) To the first portion of solution **A** in a boiling tube, add aqueous sodium hydroxide dropwise until it is in excess.

View solution

Keep the solution formed for use in 2(a)(ii).

Record your observations.

.....

.....

..... [2]

(ii) To the product from **2(a)(i)**, add about a 4 cm depth of aqueous hydrogen peroxide. Test any gas given off.

View solution

Record your observations.

.....

.....

.....

..... [3]

(b) To the second portion of solution **A** in a test-tube, add about a 1 cm depth of nitric acid followed by a few drops of aqueous barium nitrate.

View solution

Record your observations.

.....

..... [1]

(c) Identify solid **A**.

View solution

.....

..... [2]

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Tests on solution B

Divide solution **B** into two approximately equal portions in two boiling tubes.

(d) To the first portion of solution **B**, add aqueous ammonia dropwise until it is in excess.

View solution

Record your observations.

.....

..... [2]

(e) **(i)** To the second portion of solution **B**, add aqueous sodium hydroxide dropwise until it is in excess.

View solution

Keep the solution formed for use in 2(e)(ii).

Record your observations.

.....

..... [2]

(ii) To the product from **2(e)(i)**, add a piece of aluminium foil. Warm the mixture gently. Test any gas produced.

View solution

Record your observations.

.....

..... [2]

(f) Identify the **two** ions in solution **B**.

View solution

.....

..... [2]

[Total: 16]

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3 Iron nails rust slowly in the presence of water and air.
When an iron nail rusts, insoluble solid hydrated iron(III) oxide forms.
The solid hydrated iron(III) oxide falls off the iron nail.

View solution

The rusting of iron nails is slowed down by coating the nails with oil or paint.

Plan an investigation to show which of the two coatings, oil or paint, slows down rusting the most.
Your plan must include how the results will show which coating slows down rusting the most.

You are provided with iron nails, oil, paint, water and common laboratory apparatus.

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Notes for use in qualitative analysis

Tests for anions

anion	test	test result
carbonate, CO_3^{2-}	add dilute acid, then test for carbon dioxide gas	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 with dilute nitric acid, then add aqueous barium nitrate	white ppt.
sulfite, SO_3^{2-}	add a small volume of acidified aqueous potassium manganate(VII)	the acidified aqueous potassium manganate(VII) changes colour 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	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, ppt. turns brown near surface on standing	green ppt., insoluble in excess, ppt. turns brown near surface on standing
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

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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
calcium, Ca^{2+}	orange-red
barium, Ba^{2+}	light green
copper(II), Cu^{2+}	blue-green

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