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CHEMISTRY **0620/63**

Paper 6 Alternative to Practical **May/June 2026**

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. 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.

This document has **12** pages.

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1 A student uses the apparatus in Figure 1.1 to investigate the electrolysis of sodium chloride.

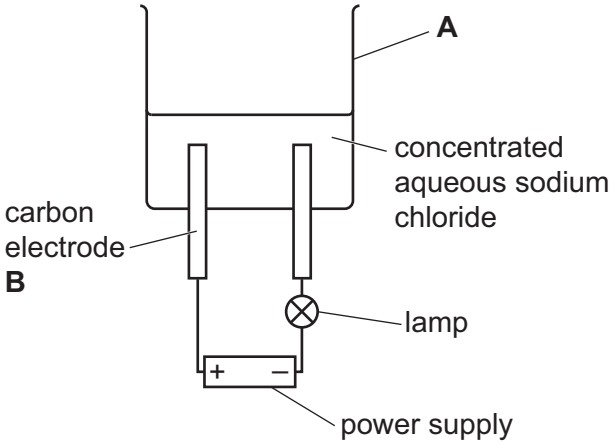

Figure 1.1

(a) Name the item of apparatus labelled **A** in Figure 1.1.

View solution

..... [1]

(b) State the general term used for the positive electrode, **B**, in Figure 1.1.

View solution

..... [1]

(c) Give **one** observation, other than effervescence, during the electrolysis in Figure 1.1.

View solution

..... [1]

(d) Suggest **one** change to the apparatus so the student can collect the gas made at electrode **B** in Figure 1.1.

View solution

.....

..... [1]

(e) Describe how the student can confirm that chlorine is made at electrode **B** in Figure 1.1.

View solution

.....

..... [2]

(f) Suggest **one** safety precaution the student must take when carrying out the experiment shown in Figure 1.1.

View solution

..... [1]

[Total: 7]

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Turn over

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2 A student investigates the temperature change when sodium thiosulfate is dissolved in water.

The student does five experiments.

Experiment 1

- Place a polystyrene cup into a 250 cm^3 beaker for support.
- Use a 25 cm^3 measuring cylinder to pour 20 cm^3 of distilled water into the polystyrene cup.
- Use a thermometer to measure the initial temperature of the distilled water.
- Add 1.0 g of sodium thiosulfate powder to the distilled water in the polystyrene cup and immediately start a stop-watch. Stir the mixture with the thermometer.
- Measure the temperature of the solution at 1 minute.
- Rinse out the polystyrene cup with distilled water.

Experiment 2

- Repeat Experiment 1 using 2.0 g of sodium thiosulfate powder instead of 1.0 g.

Experiment 3

- Repeat Experiment 1 using 3.0 g of sodium thiosulfate powder instead of 1.0 g.

Experiment 4

- Repeat Experiment 1 using 4.0 g of sodium thiosulfate powder instead of 1.0 g.

Experiment 5

- Repeat Experiment 1 using 5.0 g of sodium thiosulfate powder instead of 1.0 g.

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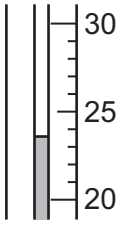
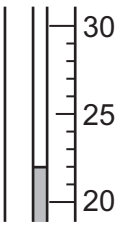
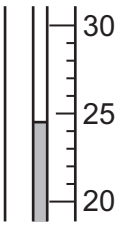
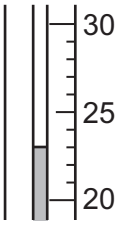
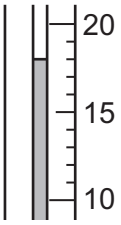
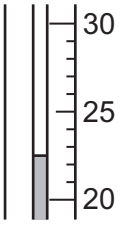
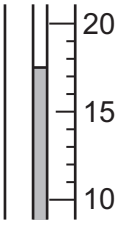
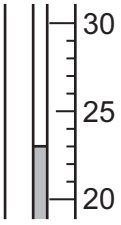
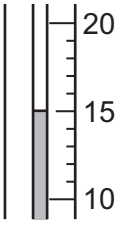
(a) Use the information in the description of the experiments and the thermometer diagrams to complete Table 2.1.

View solution

Calculate the temperature change using the equation shown.

temperature change = initial temperature – final temperature

Table 2.1

experiment	mass of sodium thiosulfate / g	initial thermometer diagram	initial temperature / °C	final thermometer diagram	final temperature / °C	temperature change / °C
1						
2						
3						
4						
5						

[5]

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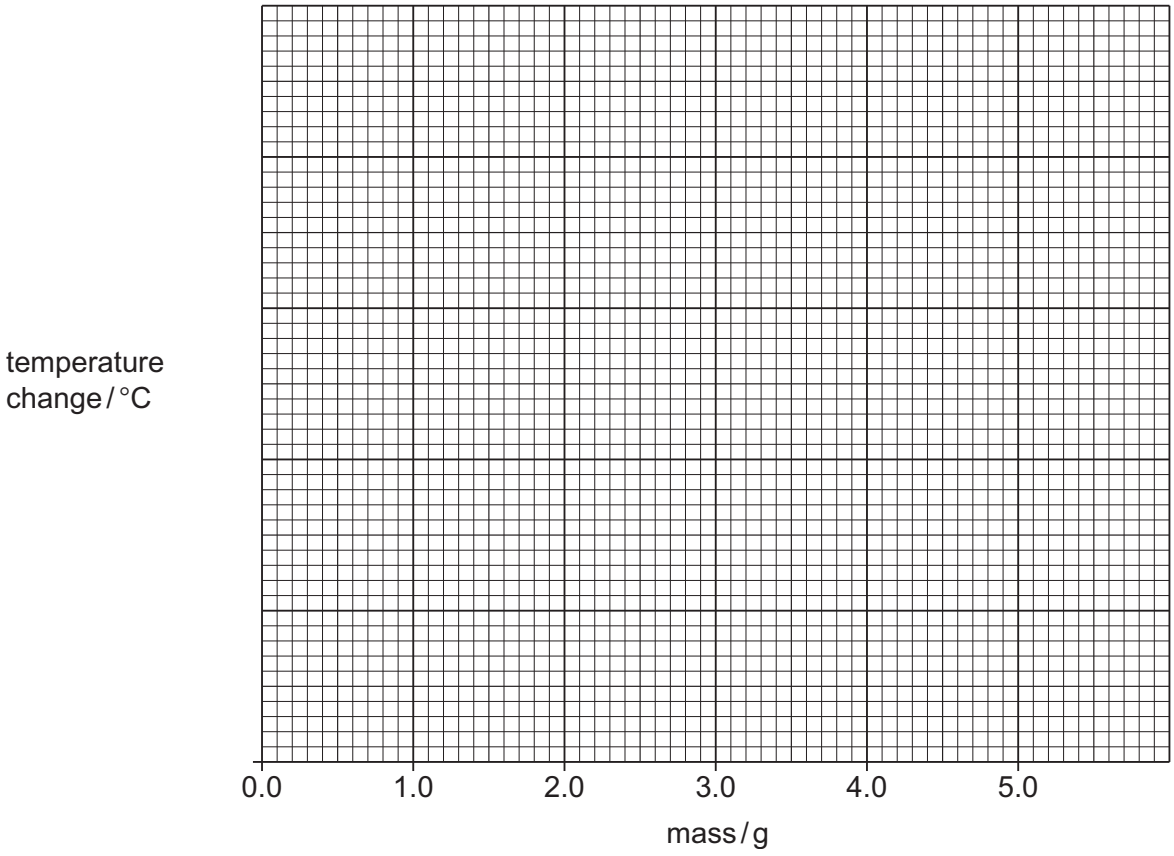
(b) On Figure 2.1, write a suitable scale on the *y*-axis and plot your results from Experiments 1 to 5. Draw a line of best fit.



View solution

Figure 2.1

[4]

(c) On Figure 2.1, extrapolate your line of best fit to deduce the temperature change if 5.7 g of sodium thiosulfate powder is added to 20 cm^3 of distilled water.

View solution

Show clearly on Figure 2.1 how you worked out your answer.

temperature change = ...°C

[3]

(d) Suggest why sodium thiosulfate powder is used in the experiments rather than large lumps.

..... [1]

(e) Explain why it would be an improvement to measure the volume of distilled water in a burette rather than a measuring cylinder.

View solution

..... [1]

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(f) State if the energy change when sodium thiosulfate powder is dissolved in distilled water is exothermic or endothermic.

View solution

Use the results in Table 2.1 to explain your answer.

energy change .....

explanation .....

.....

[1]

(g) Suggest why it is an improvement to use a lid on the polystyrene cup.

View solution

.....

..... [1]

(h) Suggest why the initial temperature of the distilled water does **not** need to be the same in each experiment.

View solution

.....

..... [1]

(i) The energy change in a reaction is calculated using the equation shown.

View solution

energy change = volume of water × 4.18 × temperature change

Calculate the energy change when sodium thiosulfate powder dissolves in Experiment 3.

energy change = ... J [1]

[Total: 18]

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3 A student tests two substances: solution **A** and solid **B**.

Tests on solution A

Table 3.1 shows the tests and the student's observations for solution **A**.

View solution

Table 3.1

tests	observations
Divide solution **A** into three portions. **test 1** To the first portion of solution **A**, add sodium hydroxide dropwise and then in excess.	 white precipitate precipitate remains in excess
test 2 To the second portion of solution **A**, add 1 cm^3 of dilute nitric acid and a few drops of aqueous silver nitrate.	 white precipitate
test 3 To the third portion of solution **A**, add an equal depth of dilute sulfuric acid and leave to stand for 5 minutes. Keep the contents of the test-tube for use in **test 4**.	 white precipitate
test 4 Add an equal depth of aqueous sodium carbonate to the contents of the test-tube from **test 3**. Any gas given off is tested.	 effervescence gas turns limewater milky

(a) State what conclusion can be made about solution **A** from the observations in **test 1**.

.....

..... [1]

(b) State what conclusion can be made about solution **A** from the observations in **test 2**.

View solution

.....

..... [1]

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(c) A flame test is used to confirm the identity of the cation in solution **A**.

View solution

Describe how to carry out a flame test.

.....

.....

..... [2]

(d) Suggest what the sodium carbonate reacts with in **test 4** to produce carbon dioxide gas.

View solution

..... [1]

Tests on solid B

Solid **B** is zinc sulfate.

The student dissolves solid **B** in water to form solution **B**. The student divides solution **B** into three approximately equal portions into one boiling tube and two test-tubes.

Complete the expected observations.

(e) To the first portion of solution **B** in the boiling tube, the student adds aqueous sodium hydroxide dropwise and then in excess.

View solution

observations .....

..... [2]

(f) To the second portion of solution **B** in a test-tube, the student adds 1 cm^3 of dilute nitric acid followed by a few drops of aqueous barium nitrate.

observations ..... [1]

(g) To the third portion of solution **B** in a test-tube, the student adds 1 cm^3 of dilute nitric acid followed by a few drops of aqueous silver nitrate.

View solution

observations ..... [1]

[Total: 9]

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4 Rhubarb plant leaves contain oxalic acid. Oxalic acid is soluble in water.

Acidified aqueous potassium manganate(VII) changes from purple to colourless when it reacts with oxalic acid.

View solution

Plan an experiment to find which of two rhubarb plant leaves, **A** and **B**, contains the highest concentration of oxalic acid.

You are provided with two rhubarb plant leaves, **A** and **B**, acidified aqueous potassium manganate(VII) and common laboratory apparatus.

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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, 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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