Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

5553398427

CHEMISTRY **0620/52**

Paper 5 Practical Test **October/November 2018**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
Notes for use in qualitative analysis are provided on pages 11 and 12.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
Total	

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **10** printed pages and **2** blank pages.

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1 You are going to investigate the rate of reaction between solution **L**, solution **M** and hydrochloric acid. When these chemicals react they form iodine. Sodium thiosulfate solution and starch solution can be used to show how fast the reaction proceeds.

Read all the instructions carefully before starting the experiments.

Instructions
You are going to do five experiments.

Experiment 1

- Place the conical flask on the white tile. Use measuring cylinder **A** to add 10 cm^3 of solution **L** to the conical flask.
- Now use measuring cylinder **A** to add 10 cm^3 of dilute hydrochloric acid and 10 cm^3 of sodium thiosulfate solution to the conical flask.
- Use the teat pipette to add about 1 cm^3 of starch solution to the mixture.
- Use measuring cylinder **B** to start the reaction by adding 10 cm^3 of solution **M** to the conical flask. Start the timer immediately and swirl the mixture.
- Measure the time taken for the mixture to turn blue-black and record the time taken in the table on page 4.
- Empty the conical flask and rinse it with distilled water.

Experiment 2

- Place the conical flask on the white tile. Use measuring cylinder **A** to add 8 cm^3 of solution **L** and 2 cm^3 of distilled water to the conical flask.
- Now use measuring cylinder **A** to add 10 cm^3 of dilute hydrochloric acid and 10 cm^3 of sodium thiosulfate solution to the conical flask.
- Use the teat pipette to add about 1 cm^3 of starch solution to the mixture.
- Use measuring cylinder **B** to add 10 cm^3 of solution **M** to the conical flask. Start the timer immediately and swirl the mixture.
- Measure the time taken for the mixture to turn blue-black and record the time taken in the table on page 4.
- Empty the conical flask and rinse it with distilled water.

Experiment 3

- Repeat Experiment 2 but add 6 cm^3 of solution **L** and 4 cm^3 of distilled water to the conical flask before adding the other reagents.

Experiment 4

- Repeat Experiment 2 but add 5 cm^3 of solution **L** and 5 cm^3 of distilled water to the conical flask before adding the other reagents.

Experiment 5

- Repeat Experiment 2 but add 3 cm^3 of solution **L** and 7 cm^3 of distilled water to the conical flask before adding the other reagents.

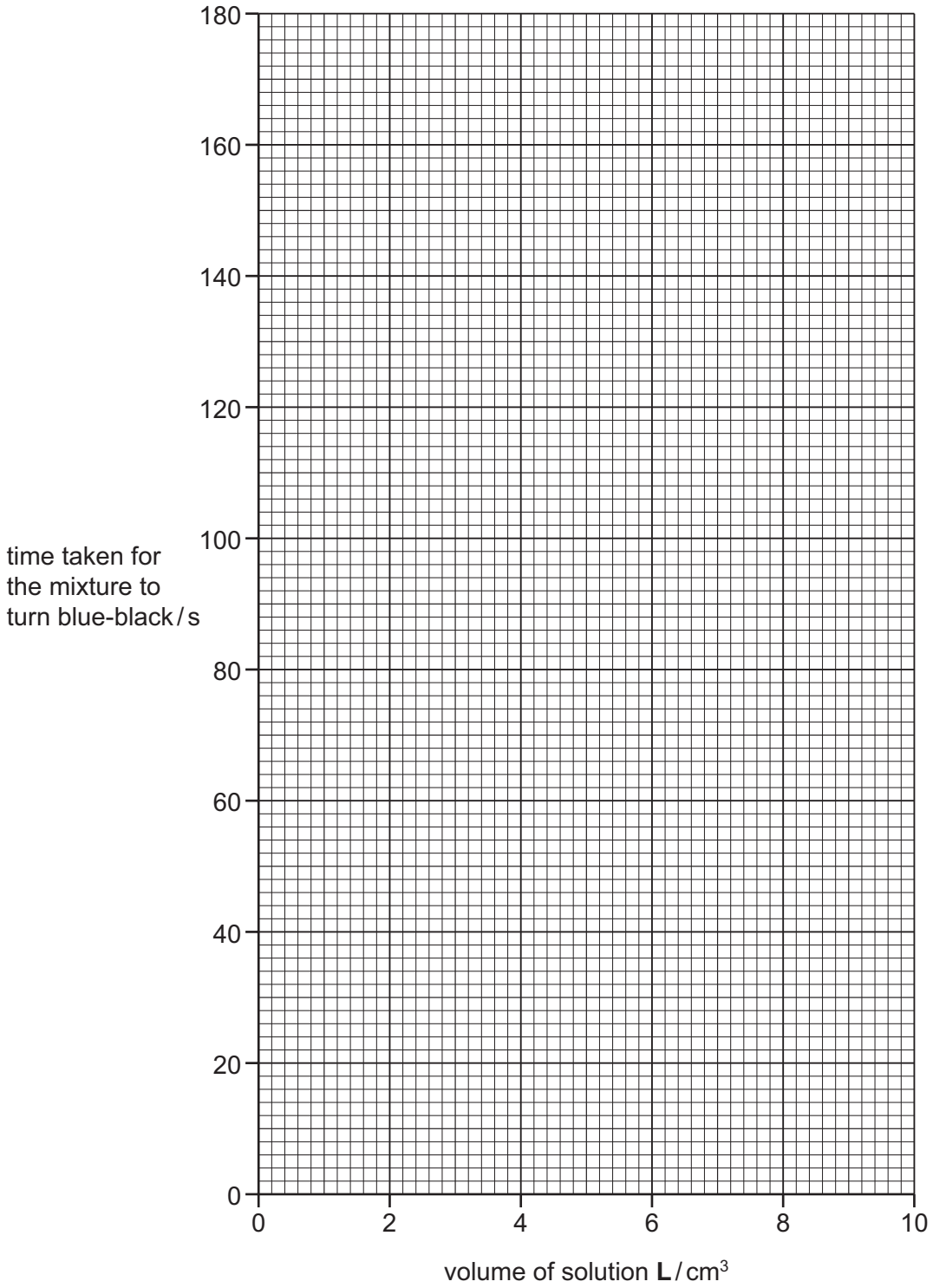
[Turn over

(a) Record your results from Experiments 1–5 in the table.

experiment number	volume of solution **L** / cm^3	volume of distilled water / cm^3	time taken for the mixture to turn blue-black / s
1	10	0	
2	8	2	
3	6	4	
4	5	5	
5	3	7	

[4]

(b) Plot your results for Experiments 1–5 on the grid. Draw a smooth line graph.



[4]

(c) **From your graph**, deduce the time taken for the mixture to turn blue-black if Experiment 2 were repeated using 4 cm^3 of solution **L** and 6 cm^3 of distilled water.

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

..... [3]

(d) (i) In which experiment, 1, 2, 3, 4 or 5, was the rate of reaction greatest?

..... [1]

(ii) Explain, in terms of particles, why the rate of reaction was greatest in this experiment.

.....

.....

..... [2]

(e) (i) Suggest an advantage of using a graduated pipette instead of measuring cylinder **A**.

..... [1]

(ii) Suggest and explain a disadvantage of using a graduated pipette instead of measuring cylinder **B**.

.....

..... [2]

(f) Suggest **one** way to improve the reliability of the results of these experiments.

..... [1]

[Total: 18]

2 You are provided with two solids, solid **N** and solid **O**. Do the following tests on solid **N** and solid **O**, recording all of your observations at each stage.

(a) Describe the appearance of:

solid **N** .....

solid **O** .....
[1]

tests on solid N

Divide solid **N** into three portions.

(b) Place the first portion of solid **N** in a hard glass test-tube. Heat solid **N** gently and then strongly. Test the gas produced with indicator paper.
Record your observations.

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..... [3]

(c) Place the second portion of solid **N** in a test-tube. Add about 2 cm^3 of distilled water to the test-tube. Stopper and shake the test-tube to dissolve solid **N**. Add a few drops of dilute nitric acid and about 1 cm^3 of aqueous barium nitrate.
Record your observations.

..... [2]

(d) Place the third portion of solid **N** in a boiling tube. Add an excess of aqueous sodium hydroxide to the boiling tube. Heat the mixture and test the gas produced.
Record your observations.

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..... [2]

(e) Name the gas produced in **(d)**.

..... [1]

(f) Identify solid **N**.

..... [2]

[Turn over

tests on solid O

Divide solid **O** into two portions.

Place the first portion of solid **O** in a test-tube. Add about 4 cm^3 of distilled water to the test-tube. Stopper and shake the test-tube to dissolve solid **O**.

Divide the solution into two equal portions in two test-tubes.

(g) Add an excess of aqueous sodium hydroxide to the first portion of the solution.
Record your observations.

..... [1]

(h) Add a few drops of dilute nitric acid and about 1 cm^3 of aqueous silver nitrate to the second portion of the solution.
Record your observations.

..... [1]

(i) Do a flame test on the rest of solid **O**.
Record your observations.

..... [1]

(j) Identify solid **O**.

..... [2]

[Total: 16]

3 When solid **C** and solid **D** separately react with dilute hydrochloric acid, one reaction is exothermic and one reaction is endothermic.

Plan an investigation to determine:

- which reaction is exothermic and which reaction is endothermic
- which energy change is greater.

You are provided with solid **C** and solid **D**, dilute hydrochloric acid and common laboratory apparatus.

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..... [6]

[Total: 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