Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

3068860685

CHEMISTRY **0620/52**

Paper 5 Practical Test **May/June 2016**

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.
Practical notes 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	
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 **9** printed pages and **3** blank pages.

CAMBRIDGE International Examinations

1 You are going to investigate the rate of reaction between hydrogen peroxide and aqueous potassium iodide. When these chemicals react they form iodine. Sodium thiosulfate solution reacts with iodine and can be used to show how fast the reaction proceeds.

Read all the instructions carefully before starting the experiment.

Instructions

(a) Fill the burette up to the 40.0 cm^3 mark with sodium thiosulfate solution.
Use the large measuring cylinder to pour 100 cm^3 of distilled water into the conical flask.
Use the small measuring cylinder to add 6 cm^3 of sulfuric acid, 1 cm^3 of starch solution and 4 cm^3 of aqueous potassium iodide to the flask.
Add 1.0 cm^3 of sodium thiosulfate solution from the burette to the mixture in the flask and swirl to mix.

Several measurements will be taken during this experiment. Once the timer has been started leave it running until the experiment is complete.

Use the small measuring cylinder to start the reaction by adding 3 cm^3 of hydrogen peroxide solution to the flask. Immediately start your timer and swirl the mixture.

Note the time taken for a blue colour to appear and record the time in the table.

Add a further 0.5 cm^3 of sodium thiosulfate solution to the mixture in the conical flask and swirl until the blue colour disappears.

Note the time when the blue colour reappears and record the time in the table below.

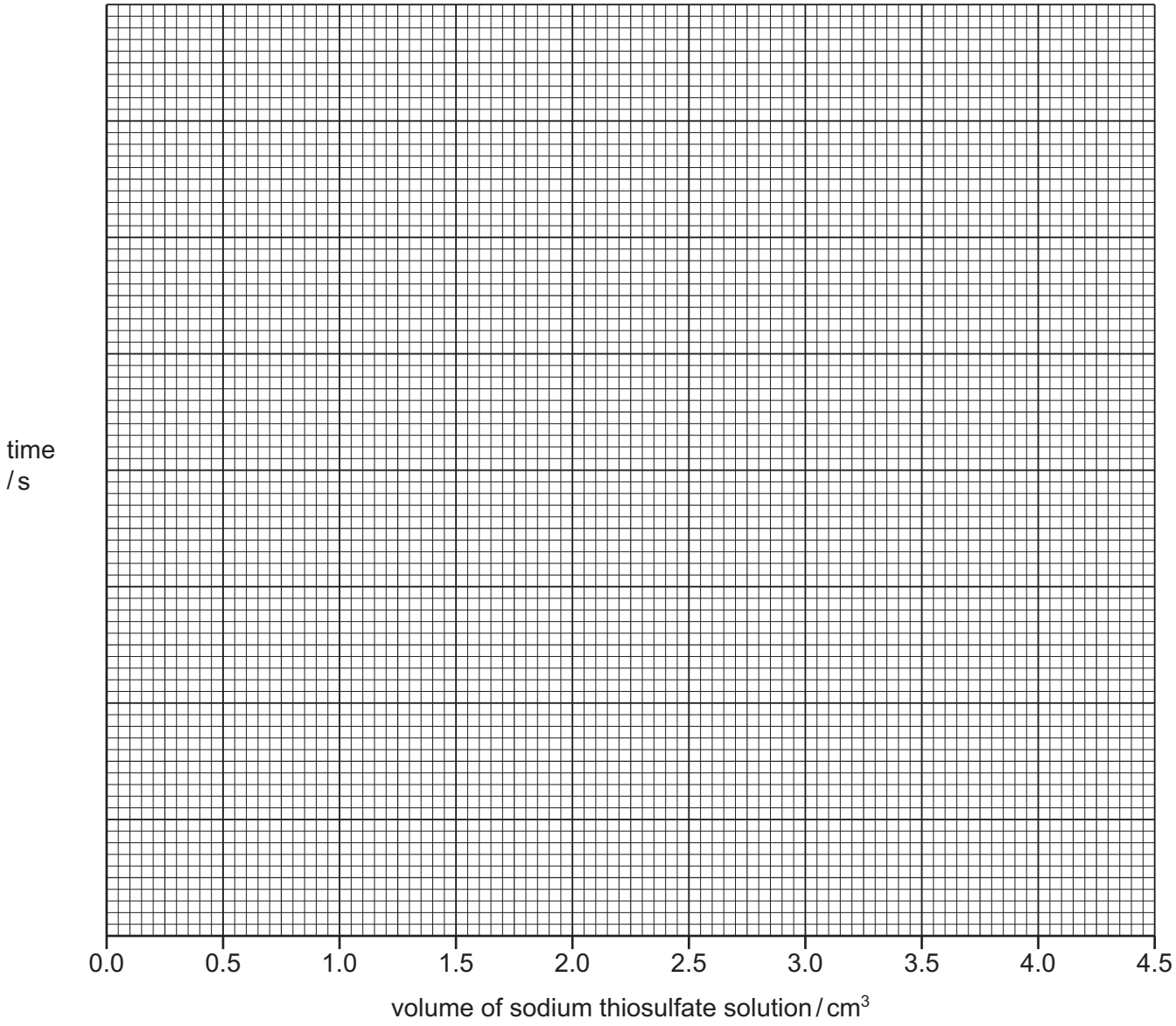
Continue the experiment adding a further 0.5 cm^3 of sodium thiosulfate solution at a time until a total of 4.0 cm^3 of sodium thiosulfate solution has been added, noting the times for the blue colour to appear after each addition and recording the times in the table.

Complete the table.

total volume of sodium thiosulfate solution added / cm^3	time at which blue colour appears / s
1.0	
1.5	
4.0	

[4]

(b) Plot the results you have obtained on the grid and draw a best-fit straight-line graph.



[5]

(c) (i) **From your graph** deduce the time for the blue colour to appear if only 0.5 cm^3 of sodium thiosulfate solution had been added to the mixture in the conical flask.
Show clearly **on the grid** how you worked out your answer.

..... [3]

(ii) Sketch **on the grid** the graph you would expect if the experiment was repeated at a higher temperature. [1]

(d) Suggest the purpose of the starch solution.

..... [1]

(e) (i) Suggest **one** advantage of using a pipette to measure the volume of the hydrogen peroxide.

..... [1]

(ii) Suggest and explain **one** disadvantage of using a pipette to measure the volume of the hydrogen peroxide.

.....

..... [2]

(f) Explain **one** disadvantage of using a beaker instead of a conical flask.

.....

..... [1]

[Total: 18]

2 You are provided with two solids, **E** and **F**, which are both water soluble.
Carry out the following tests on the solids, recording all of your observations at each stage.

tests on solid E

(a) Use a spatula to place half of solid **E** into a test-tube.
Add about 10 cm^3 of distilled water to the solid and shake the mixture to dissolve.

Divide the solution into three equal portions in three test-tubes and carry out the following tests.

(i) Add about 1 cm^3 of aqueous sodium hydroxide to the first portion of the solution.
Record your observations.

..... [1]

(ii) Add about 1 cm^3 of aqueous barium nitrate to the second portion of the solution.
Now add excess dilute nitric acid to the mixture.
Record your observations.

.....

..... [2]

(iii) Pour the third portion of the solution into a boiling tube and add about 1 cm^3 of dilute hydrochloric acid. Warm the mixture gently. Test the gas given off with a piece of filter paper soaked in aqueous potassium manganate(VII) solution.
Record your observations.

.....

..... [2]

(b) Carry out a flame test on the rest of solid **E**.
Record your observations.

..... [1]

(c) What conclusions can you draw about solid **E**?

.....

..... [2]

[Turn over

tests on solid F

Use a spatula to divide solid **F** into two portions in two test-tubes.

(d) Describe the appearance of solid **F**.

..... [1]

(e) (i) Heat the first portion of solid **F**, gently then strongly.
Test the gas given off with damp red litmus paper.
Record your observations.

.....

..... [3]

(ii) Let the solid residue cool down for a few minutes. To the residue add a few drops of copper(II) sulfate solution followed by a few drops of aqueous sodium hydroxide and shake the mixture.
Record your observations.

..... [1]

(f) Tip the second portion of solid **F** into a boiling tube.
Add about 3 cm^3 of aqueous sodium hydroxide to the boiling tube and heat the mixture gently.
Test the gas given off.
Record your observations.

.....

..... [2]

(g) Identify **one** of the ions in solid **F**.

..... [1]

[Total: 16]

3 Potassium sulfate is the salt made when sulfuric acid is neutralised by potassium hydroxide solution. The correct amount of potassium hydroxide solution must be added to neutralise all of the sulfuric acid.

Plan an experiment to obtain pure crystals of potassium sulfate from sulfuric acid and potassium hydroxide solution.

You are provided with common laboratory apparatus.

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..... [6]

[Total: 6]

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NOTES FOR USE IN QUALITATIVE ANALYSIS
Test 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

Test 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 (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

Test for gases

gas	test and test results
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 acidifed 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