UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

7579196361

CHEMISTRY **0620/51**

Paper 5 Practical Test **October/November 2012**

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 a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Practical notes are provided on page 8.

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	

This document consists of **7** printed pages and **1** blank page.

For Examiner's Use

1 You are going to investigate the speed of reaction when iodine is produced by the reaction of solution **L** with potassium iodide at different temperatures.

Read all the instructions below carefully before starting the experiments.

Instructions
You are going to carry out five experiments.

(a) *Experiment 1*

Fill the burette with the aqueous solution **L** provided to the 0.0 cm^3 mark.
Add 10 cm^3 of solution **L** from the burette into a boiling tube. Record the initial temperature of the solution in the table.

Use a measuring cylinder to pour 5 cm^3 of the aqueous potassium iodide and 3 cm^3 of aqueous sodium thiosulfate provided into a second boiling tube. Add 2 cm^3 of the starch solution provided to this boiling tube and shake the mixture.

Add the mixture in the second boiling tube to the solution **L** in the first boiling tube, shake the mixture and start the clock. These chemicals react to form iodine which reacts with starch. When a blue colour first appears stop the clock and record the time in the table. Measure and record the final temperature of the mixture in the table.

(b) *Experiment 2*

Discard the contents of the boiling tube and rinse both boiling tubes with distilled water.

Use a measuring cylinder to pour 5 cm^3 of aqueous potassium iodide and 3 cm^3 of aqueous sodium thiosulfate into the first boiling tube. Add 2 cm^3 of the starch solution and shake the mixture.

Add 10 cm^3 of solution **L** from the burette into the second boiling tube. Heat solution **L** to about 40 °C stirring with a thermometer. Record the temperature of solution **L** in the table.

Add the mixture in the first boiling tube to the solution **L**, shake the mixture and start the clock. When a blue colour first appears, stop the clock and record the time in the table. Measure and record the final temperature of the mixture in the table.

(c) *Experiment 3*

Repeat Experiment 2, heating solution **L** to about 50 °C.

(d) *Experiment 4*

Repeat Experiment 2, heating solution **L** to about 60 °C.

(e) Experiment 5

Repeat Experiment 2, heating solution **L** to about 70 °C.

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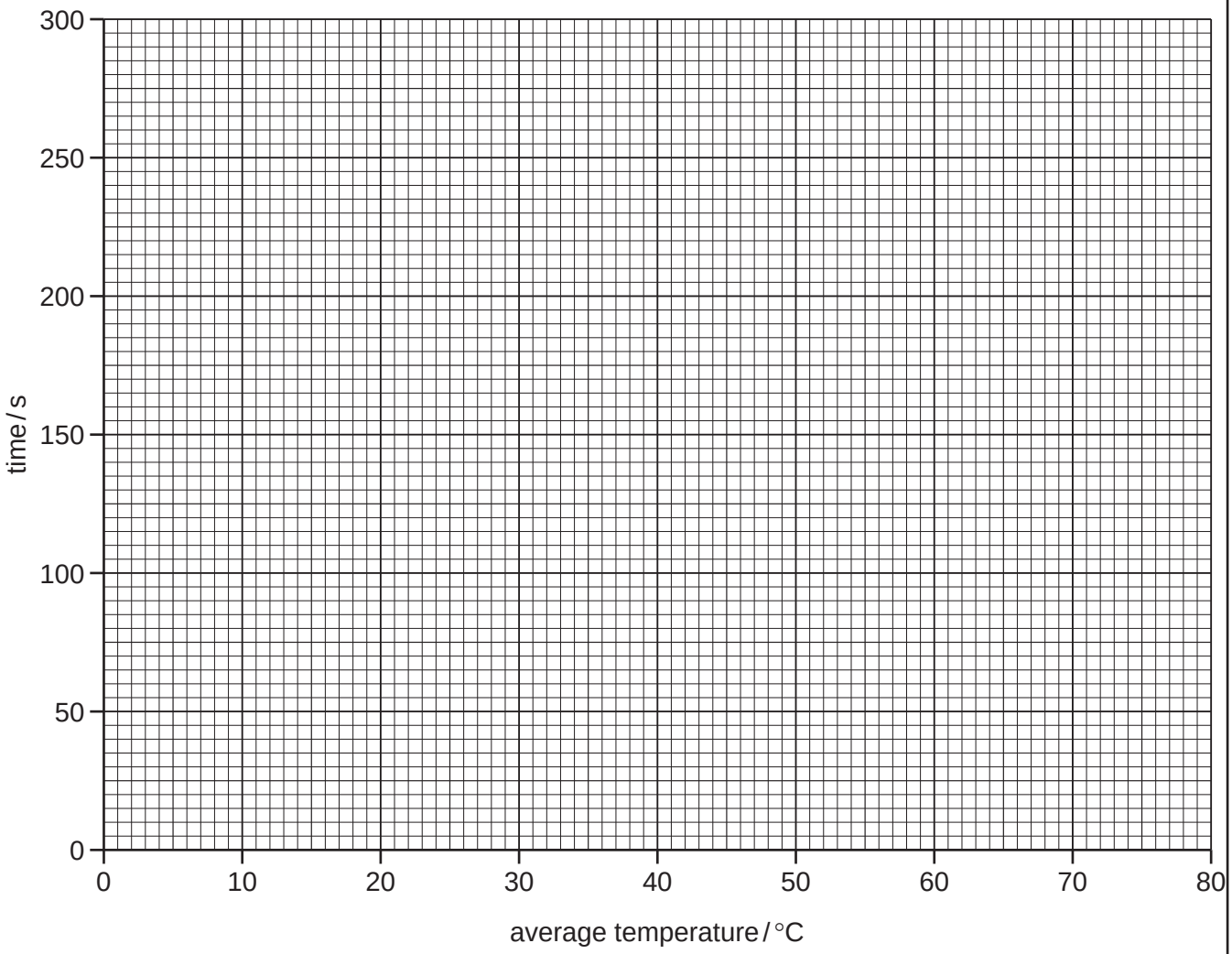
(f) Complete the table of results.

experiment	temperature of solution **L** / °C	final temperature of mixture / °C	average temperature / °C	time for blue colour to appear / s
1				
2				
3				
4				
5				

[5]

(g) Plot the results on the grid below and draw a smooth line graph.



[5]

(h) **From your graph**, work out the time taken for the blue colour to first appear if solution **L** was heated to 80 °C. The final temperature of the reaction mixture was 64 °C.
Show **on the grid** how you obtained your answer.

..... [3]

(i) Suggest the purpose of the starch solution in the experiments.

..... [1]

(j) **(i)** In which experiment was the reaction speed fastest?

..... [1]

(ii) Explain, using ideas about particles, why this experiment was the fastest.

.....

..... [2]

(k) Predict the effect on the time and speed of the reaction in Experiment 5 if it was repeated using a less concentrated solution of **L**.

time .....

speed ..... [2]

(l) Why was a burette used to measure solution **L** instead of a measuring cylinder?

.....

..... [1]

[Total: 20]

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2 You are provided with a mixture of two solids, **M** and **N**.
Solid **M** is water-soluble and solid **N** is insoluble.
Carry out the following tests on the mixture, recording all of your observations in the table.
Conclusions must **not** be written in the table.

tests	observations
Add about 15 cm^3 of distilled water to the mixture in a boiling tube. Stopper and shake the boiling tube for one minute. Filter the contents of the boiling tube, keeping the filtrate and residue for the following tests.	
<u>tests on the filtrate</u> Divide the filtrate into five portions in five test-tubes. **(a)** Use pH indicator paper to test the pH of the filtrate.	..... [1]
(b) (i) To the second portion of the filtrate, add drops of aqueous sodium hydroxide and shake the mixture. Now add excess aqueous sodium hydroxide to the test-tube. **(ii)** To the third portion of the filtrate, add drops of aqueous ammonia and shake the mixture. Now add excess aqueous ammonia to the test-tube.	.... [3] .... [3]
(c) To the fourth portion of the filtrate, add about 1 cm^3 of dilute nitric acid followed by silver nitrate solution.	..... [1]
(d) To the fifth portion of the filtrate, add about 1 cm^3 of dilute nitric acid followed by barium nitrate solution.	..... [2]

[Turn over

tests	observations
<u>tests on the residue</u> Use a spatula to transfer some of the residue into two test-tubes. **(e)** To the first sample of the residue, add about 3 cm^3 of dilute hydrochloric acid. Boil the mixture for about two minutes and test the gas given off with damp blue litmus paper.	.... [2]
(f) To the second sample of the residue, add about 3 cm^3 of aqueous hydrogen peroxide. Test the gas given off.	.... [3]

(g) What conclusions can you draw about solid **M**?

.....

..... [2]

(h) Identify the gas given off in test **(f)**.

..... [1]

(i) What conclusions can you draw about solid **N**?

.....

.....

..... [2]

[Total: 20]

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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.
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 aqueous barium nitrate	white ppt.

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.
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