UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

4238227109

CHEMISTRY **0620/52**

Paper 5 Practical Test **October/November 2011**

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	
1	
2	
Total	

This document consists of **6** printed pages and **2** blank pages.

UNIVERSITY of CAMBRIDGE International Examinations

For Examiner's Use

1 You are going to investigate what happens when iodine reacts with two different solutions of sodium thiosulfate, **F** and **G**.

Read all the instructions below carefully before starting the experiments.

Instructions
You are going to carry out two experiments.

(a) *Experiment 1*

Fill the burette with the aqueous sodium thiosulfate **F** provided to the 0.0 cm^3 mark.

Using a measuring cylinder, pour 20 cm^3 of the aqueous potassium iodate into a conical flask. Add 1 g of potassium iodide (an excess) and 5 cm^3 of the dilute sulfuric acid provided to the flask and shake the mixture. These chemicals react to form iodine.

Add the sodium thiosulfate from the burette 1 cm^3 at a time while shaking the flask. When the colour of the mixture is pale yellow add 2 cm^3 of starch solution to the flask. Continue to add sodium thiosulfate solution until the colour changes. Record, in the table, the volume of sodium thiosulfate solution added.

final volume / cm^3	
initial volume / cm^3	
difference / cm^3	

[3]

(b) *Experiment 2*

Empty the burette and rinse with the solution **G** of sodium thiosulfate.
Fill the burette with the aqueous sodium thiosulfate **G** to the 0.0 cm^3 mark.
Empty the conical flask and rinse it with distilled water.

Repeat Experiment 1 using solution **G** instead of solution **F**.
Record, in the table, the volume of sodium thiosulfate solution added.

final volume / cm^3	
initial volume / cm^3	
difference / cm^3	

[3]

(c) What was the colour of the mixture in the flask before the sodium thiosulfate solution was added?

..... [1]

(d) The final volume reading was taken when the colour of the mixture in the flask changed

from …… to …… [2]

(e) Suggest the purpose of the starch in the experiments.

..... [1]

(f) **(i)** In which Experiment was the greater volume of sodium thiosulfate solution used?

..... [1]

(ii) Compare the volumes of sodium thiosulfate solution used in Experiments 1 and 2.

..... [1]

(iii) Suggest an explanation for the difference in volumes.

.....

.....

..... [2]

(g) If Experiment 1 was repeated using 10 cm^3 of aqueous potassium iodate, what volume of solution **F** would be used? Explain your answer.

.....

..... [2]

(h) **(i)** State **two** sources of error in the Experiments.

1. .....

2. ..... [2]

(ii) Suggest **two** improvements to reduce the sources of error in the Experiments.

1. .....

2. ..... [2]

[Total: 20]

2 You are provided with two different liquids, **H** and **J**.
Carry out the following tests on each liquid, recording all of your observations in the table.
Conclusions must **not** be written in the table.

tests	observations
(a) (i) Pour 1 cm^3 of liquid **H** into a test-tube. Describe the appearance and smell of liquid **H**.	..... [1]
Test the pH of liquid **H**.	..... [1]
(ii) Pour 1 cm^3 of liquid **J** into a test-tube. Describe the colour and smell of liquid **J**.	..... [2]
Add 1 cm^3 of distilled water to the test-tube and shake the contents. Insert a piece of pH indicator paper so that it touches the bottom of the test-tube.	.... [2]
(b) To about 1 cm^3 of liquid **H** add about 1 cm^3 of dilute hydrochloric acid and then aqueous barium chloride.	..... [1]
(c) (i) To about 1 cm^3 of liquid **H**, add about 1 cm^3 of aqueous sodium hydroxide.	..... [2]
Heat the mixture gently until no further change is observed.	..... [1]
(ii) To about 1 cm^3 of liquid **H**, add about 1 cm^3 of aqueous ammonia solution.	.....
Now add excess aqueous ammonia solution.	..... [3]
(d) (i) Using a teat pipette, transfer a few drops of liquid **H** to a dry watch glass. Touch the liquid with a lighted splint.	..... [1]
(ii) Repeat test **(d)(i)** using liquid **J**.	.... [2]

(e) What conclusions can you draw about liquid **H**?

.....

..... [2]

(f) What conclusions can you draw about liquid **J**?

.....

.....

..... [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