UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

CHEMISTRY **0620/05**

Paper 5 Practical Test **May/June 2007**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in Instructions to Supervisors

READ THESE INSTRUCTIONS FIRST

Write your name, Centre number and candidate number in the spaces at the top of this page.
Write in dark blue or black pen in the spaces provided on the Question Paper.
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.
The number of marks is given in brackets [ ] at the end of each question or part question.
Practical notes are provided on page 8.

For Examiner's Use	
1	
2	
Total	

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

For Examiner's Use

1 You are going to investigate the reaction between sodium thiosulphate and potassium iodate.

Read **all** the instructions below carefully **before** starting the two experiments.

Instructions

Experiment 1

Fill the burette provided up to the 0.0 cm^3 mark with the solution of sodium thiosulphate. By using a measuring cylinder, pour 20 cm^3 of the solution **A** of potassium iodate into the conical flask provided. Add 10 cm^3 of dilute sulphuric acid into the flask and 1 g of potassium iodide. Swirl the flask to mix the contents.

From the burette add the sodium thiosulphate solution to the flask and swirl to mix thoroughly. When the contents of the flask are yellow, add 1 cm^3 of starch solution to the flask. Continue to add sodium thiosulphate solution **slowly** to the flask until the solution becomes colourless. Record the burette readings in the table.

Experiment 2

Pour away the contents of the flask and rinse with distilled water. Fill the burette up to the 0.0 cm^3 mark with the solution of sodium thiosulphate. Repeat Experiment 1 exactly, using solution **B** of potassium iodate instead of solution **A**. Record your burette readings and complete the table.

Normally you would be required to carry out repeat titrations. However, owing to time considerations **you are only required to carry out one titration for each experiment.**

Table of results

Burette readings / cm^3

	Experiment 1	Experiment 2
final reading		
initial reading		
difference		

[6]

For Examiner's Use

(a) Describe the appearance of the solution in the conical flask before adding the sodium thiosulphate solution.

.....

[1]

(b) What happens to the colour of the solution in the flask as the sodium thiosulphate solution is added?

.....

[1]

(c) **(i)** What was the colour change when the starch was added to the flask?

from ..... to .....

[2]

(ii) Suggest why the starch was used.

.....

[1]

(d) **(i)** In which experiment was the greatest volume of sodium thiosulphate solution used?

.....

[1]

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

.....

[1]

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

.....

.....

[2]

(e) Predict the volume of sodium thiosulphate solution which would be needed to react completely with 10 cm^3 of solution **B**.

.....

.....

[2]

(f) Explain one change you could make to the experimental **method** to obtain more accurate results, without changing the apparatus.

change .....

explanation .....

[2]

[Total:19]

For Examiner's Use

2 You are provided with a sample of solid **C** which is a mixture of two salts, **D** and **E**. Solid **D** is insoluble in water and solid **E** is water-soluble.
Carry out the following tests on **C**, recording all of your observations in the table. Do not write any conclusions in the table.

tests	observations
(a) Describe the appearance of **C**.	.....[1]
(b) Using a spatula, place a little of **C** in a hard glass test-tube. Inside the top of the tube suspend a piece of damp indicator paper. Heat **C** gently until gas comes out of the tube. Leave the tube to cool and study its appearance.	..... pH .....[2] .....[1]
(c) Using a spatula, place a little of **C** in a test-tube. Add about 2 cm^3 of dilute nitric acid and test the gas.	....[2]

Add the rest of solid **C** to a boiling tube containing 10 cm^3 of distilled water. Stopper the tube and shake the contents gently for 2 minutes. Filter the contents of the boiling tube. Keep both the filtrate and the residue on the filter paper in the funnel.
Carry out the following tests, recording all your observations in each case.

tests on the residue in the filter paper	observations
(d) Place the funnel in a test-tube. Pour about 3 cm^3 of dilute nitric acid onto the residue contained in the funnel. Add about 2 cm^3 of potassium iodide to the solution collected in the tube.	.....[2]

tests on the filtrate	observations
(e) Divide the filtrate from **C** into three test-tubes.	
(i) To the first portion, add a few drops of dilute hydrochloric acid and about 1 cm^3 of aqueous barium nitrate.	.....[2]
(ii) To the second portion of filtrate, add excess aqueous ammonia and shake.	.....[2]
(iii) To the third portion of filtrate, add an equal volume of aqueous sodium hydroxide.	.....[1]
Warm the mixture gently. Test the gas with indicator paper.	....[2]

For Examiner's Use

(f) What conclusions can you draw about salt **D**?

.....[2]

(g) What conclusions can you draw about salt **E**?

.....

.....[4]

[Total:21]

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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 aqueous lead(II) nitrate	yellow ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide then aluminium foil; warm carefully	ammonia produced
sulphate (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