



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

CANDIDATE  
NAME

CENTRE  
NUMBER

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**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	
<b>Total</b>	

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



- 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<sup>3</sup> mark.

Using a measuring cylinder, pour 20 cm<sup>3</sup> of the aqueous potassium iodate into a conical flask. Add 1 g of potassium iodide (an excess) and 5 cm<sup>3</sup> 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<sup>3</sup> at a time while shaking the flask. When the colour of the mixture is pale yellow add 2 cm<sup>3</sup> 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 <sup>3</sup>	
initial volume / cm <sup>3</sup>	
difference / cm <sup>3</sup>	

[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<sup>3</sup> 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 <sup>3</sup>	
initial volume / cm <sup>3</sup>	
difference / cm <sup>3</sup>	

[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<sup>3</sup> 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
<p><b>(a) (i)</b> Pour 1 cm<sup>3</sup> of liquid <b>H</b> into a test-tube. Describe the appearance and smell of liquid <b>H</b>.</p> <p>Test the pH of liquid <b>H</b>.</p> <p><b>(ii)</b> Pour 1 cm<sup>3</sup> of liquid <b>J</b> into a test-tube. Describe the colour and smell of liquid <b>J</b>.</p> <p>Add 1 cm<sup>3</sup> 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.</p>	<p>..... [1]</p> <p>..... [1]</p> <p>..... [2]</p> <p>..... [2]</p>
<p><b>(b)</b> To about 1 cm<sup>3</sup> of liquid <b>H</b> add about 1 cm<sup>3</sup> of dilute hydrochloric acid and then aqueous barium chloride.</p>	<p>..... [1]</p>
<p><b>(c) (i)</b> To about 1 cm<sup>3</sup> of liquid <b>H</b>, add about 1 cm<sup>3</sup> of aqueous sodium hydroxide.</p> <p>Heat the mixture gently until no further change is observed.</p> <p><b>(ii)</b> To about 1 cm<sup>3</sup> of liquid <b>H</b>, add about 1 cm<sup>3</sup> of aqueous ammonia solution.</p> <p>Now add excess aqueous ammonia solution.</p>	<p>..... [2]</p> <p>..... [1]</p> <p>..... [3]</p>
<p><b>(d) (i)</b> Using a teat pipette, transfer a few drops of liquid <b>H</b> to a dry watch glass. Touch the liquid with a lighted splint.</p> <p><b>(ii)</b> Repeat test <b>(d)(i)</b> using liquid <b>J</b>.</p>	<p>..... [1]</p> <p>..... [2]</p>

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

.....  
..... [2]

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

.....  
.....  
..... [2]

[Total: 20]





## NOTES FOR USE IN QUALITATIVE ANALYSIS

## Test for anions

<i>anion</i>	<i>test</i>	<i>test result</i>
carbonate ( $\text{CO}_3^{2-}$ )	add dilute acid	effervescence, carbon dioxide produced
chloride ( $\text{Cl}^-$ ) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
iodide ( $\text{I}^-$ ) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	yellow ppt.
nitrate ( $\text{NO}_3^-$ ) [in solution]	add aqueous sodium hydroxide then aluminium foil; warm carefully	ammonia produced
sulfate ( $\text{SO}_4^{2-}$ ) [in solution]	acidify with dilute nitric acid, then aqueous barium nitrate	white ppt.

## Test for aqueous cations

<i>cation</i>	<i>effect of aqueous sodium hydroxide</i>	<i>effect of aqueous ammonia</i>
aluminium ( $\text{Al}^{3+}$ )	white ppt., soluble in excess giving a colourless solution	white ppt., insoluble in excess
ammonium ( $\text{NH}_4^+$ )	ammonia produced on warming	–
calcium ( $\text{Ca}^{2+}$ )	white ppt., insoluble in excess	no ppt., or very slight white ppt.
copper ( $\text{Cu}^{2+}$ )	light blue ppt., insoluble in excess	light blue ppt., soluble in excess giving a dark blue solution
iron(II) ( $\text{Fe}^{2+}$ )	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) ( $\text{Fe}^{3+}$ )	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc ( $\text{Zn}^{2+}$ )	white ppt., soluble in excess giving a colourless solution	white ppt., soluble in excess giving a colourless solution

## Test for gases

<i>gas</i>	<i>test and test results</i>
ammonia ( $\text{NH}_3$ )	turns damp red litmus paper blue
carbon dioxide ( $\text{CO}_2$ )	turns limewater milky
chlorine ( $\text{Cl}_2$ )	bleaches damp litmus paper
hydrogen ( $\text{H}_2$ )	'pops' with a lighted splint
oxygen ( $\text{O}_2$ )	relights a glowing splint

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