



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

CANDIDATE  
NAME

CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**CHEMISTRY**

**0620/05**

Paper 5 Practical Test

**May/June 2008**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

Additional Materials: As listed in 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 you work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
<b>1</b>	
<b>2</b>	
<b>Total</b>	

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



- 1 You are going to investigate the reaction between potassium manganate(VII) and a metallic salt solution.

For  
Examiner's  
Use

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

*Experiment 1*

- (a) Pour a little of the metal salt solution **A** into a test-tube. Add about 1 cm<sup>3</sup> of aqueous sodium hydroxide and note your observation.

observation ..... [1]

- (b) Fill the burette provided up to the 0.0 cm<sup>3</sup> mark with the potassium manganate(VII) solution. Using a measuring cylinder, pour 25 cm<sup>3</sup> of solution **A** of the salt solution into the conical flask provided. Shake the flask to mix the contents.

From the burette add 1 cm<sup>3</sup> of the potassium manganate(VII) solution to the flask, and shake to mix thoroughly. Continue to add potassium manganate(VII) solution to the flask until there is a pale pink colour in the contents of the flask. Record the burette readings in the table.

*Experiment 2*

- (c) Pour away the contents of the flask and rinse with distilled water. Fill the burette up to the 0.0 cm<sup>3</sup> mark with the potassium manganate(VII) solution. Repeat Experiment **1(b)** exactly using solution **B** instead of solution **A**. Record your burette readings in the table and complete the table.

- (d) Pour a little of the solution in the flask into a test-tube. Add about 1 cm<sup>3</sup> of aqueous sodium hydroxide and note your observation.

observation ..... [1]

*Table of results*

Burette readings / cm<sup>3</sup>

	<b>Experiment 1</b>	<b>Experiment 2</b>
final reading		
initial reading		
difference		

[6]

- (e) Describe the appearance of the solution in the conical flask before adding the potassium manganate(VII) solution.

..... [1]

- (f) What happens to the colour of the solution in the flask as the potassium manganate(VII) solution is added?

..... [1]

- (g) (i) In which Experiment was the greatest volume of potassium manganate(VII) solution used?

..... [1]

- (ii) Compare the volumes of potassium manganate(VII) solution used in Experiments 1 and 2.

.....  
..... [1]

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

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

- (h) Predict the volume of potassium manganate solution which would be needed to react completely with 50 cm<sup>3</sup> of solution B.

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

- (i) Explain one change that could be made to the experimental method to obtain more accurate results.

change .....

explanation ..... [2]

- (j) What conclusion can you draw about the salt solution from

(i) Experiment 1(a), ..... [1]

(ii) Experiment 2(d)? ..... [1]

[Total: 20]

- 2 You are provided with two solids, solid **T** and solid **V**.  
Carry out the following tests on **T** and **V**, recording all of your observations in the table.  
Conclusions must not be written in the table.

For  
Examiner's  
Use

tests	observations
<p><u>tests on solid T</u></p> <p>(a) Describe the appearance of solid <b>T</b>.</p>	<p>..... [1]</p>
<p>(b) Place a little of solid <b>T</b> in a test-tube. Heat the solid gently, then more strongly. Test the gas given off with a lighted splint.</p>	<p>.....</p> <p>..... [2]</p>
<p>(c) Dissolve one spatula measure of solid <b>T</b> in about 3 cm<sup>3</sup> of distilled water and shake to dissolve. Leave to stand for 1 minute. Decant the liquid into another test-tube. Divide the solution into 3 equal portions in test-tubes.</p> <p>(i) Test the pH of the solution using Universal Indicator solution.</p> <p>(ii) To the second portion add aqueous sodium hydroxide in drops, then add excess sodium hydroxide solution.</p> <p>(iii) To the third portion of solution add about 1 cm<sup>3</sup> of iron(III) chloride solution. Note the colour.</p> <p>Heat the solution.</p>	<p>colour .....</p> <p>pH ..... [2]</p> <p>.....</p> <p>..... [2]</p> <p>..... [1]</p> <p>..... [1]</p>

tests	observations
<u>tests on solid V</u>	
(d) Describe the appearance of solid V.	.....[1]
(e) Place a little of solid V in a test-tube. Heat the solid gently, then more strongly.	.....[1]
(f) Dissolve one spatula measure of solid V in about 3 cm <sup>3</sup> of distilled water in a test-tube and shake to dissolve. Divide the solution into 3 equal portions in test-tubes. Note the smell of the solution.	.....[1]
(i) Repeat (c)(i) using the first portion of the solution.	colour ..... pH .....[2]
(ii) Repeat (c)(ii) using the second portion of the solution.	..... .....[2]
(iii) Repeat (c)(iii) using the third portion of the solution. Do not heat the solution.	.....[1]

(g) What conclusion can you draw about solid T?

..... [1]

(h) What conclusions can you draw about solid V?

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

[Total: 20]

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## 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 aqueous lead(II) nitrate	yellow ppt.
nitrate ( $\text{NO}_3^-$ ) [in solution]	add aqueous sodium hydroxide then aluminium foil; warm carefully	ammonia produced
sulphate ( $\text{SO}_4^{2-}$ ) [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., 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