UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

7326112403

CHEMISTRY **0620/52**

Paper 5 Practical Test **May/June 2013**

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.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
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 **6** printed pages and **2** blank pages.

1 You are going to investigate the reaction between solution **A**, aqueous pot
manganate(VII), and two different solutions, **B** and **C**, of an acidic solution of a sodium

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 solution **A** of potassium manganate(VII) to the 0.0 cm^3 mark.

Using a measuring cylinder, pour 25 cm^3 of solution **B** into the conical flask.
Place the flask on a tripod and gauze and heat the mixture in the flask to about 80 °C.

Remove the flask from the tripod and place it on the white tile under the burette. Slowly add 1 cm^3 of the solution **A** to the flask, with shaking. Continue to add solution **A** to the flask until the mixture just turns permanently pink. Record the burette reading in the table and complete the table.
Pour away the contents of the conical flask and rinse the flask with distilled water.

final burette reading / cm^3	
initial burette reading / cm^3	
difference / cm^3	

[3]

(b) *Experiment 2*

Refill the burette with the solution **A** of potassium manganate(VII).

Using a measuring cylinder, pour 25 cm^3 of solution **C** into the conical flask. Heat the mixture in the flask to about 80 °C.

Remove the flask from the tripod and place it on the white tile under the burette. Slowly add 1 cm^3 of the solution **A** to the flask, with shaking. Continue to add solution **A** to the flask until the mixture just turns permanently pink. Record the burette readings in the table and complete the table.

final burette reading / cm^3	
initial burette reading / cm^3	
difference / cm^3	

[3]

(c) **(i)** Suggest why the mixture in the flask is heated before adding the pot manganate(VII) solution.

..... [1]

(ii) What colour change was observed when potassium manganate(VII) solution was added to the flask in Experiment 1?

from ..... to ..... [2]

(iii) Why is an indicator not added to the flask?

..... [1]

(d) **(i)** In which experiment was the greater volume of potassium manganate(VII) solution used?

..... [1]

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

..... [1]

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

.....

.....

..... [2]

(e) If Experiment 2 was repeated using 12.5 cm^3 of solution **C**, what volume of potassium manganate(VII) solution would be used? Explain your answer.

.....

..... [3]

(f) A redox reaction occurs when potassium manganate(VII) reacts with solutions **B** and **C**. Explain the term *redox reaction*.

.....

..... [2]

(g) Give **one** advantage and **one** disadvantage of using a measuring cylinder for solution **C**.

advantage .....

disadvantage ..... [2]

[Total: 21]

2 You are provided with a mixture of two solids, **R** and **S**.
Solid **R** is water-soluble and solid **S** 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. Shake the boiling tube for one minute. Filter the contents of the boiling tube, keeping the filtrate and residue for the following tests. Divide the filtrate into five test-tubes.	..... [1]
<u>tests on the filtrate</u> **(a)** Use pH indicator paper to measure the pH of the first portion of the filtrate.	..... [1]
(b) (i) Add several drops of aqueous sodium hydroxide to the second portion of the solution and shake the test-tube. Now add a large excess of aqueous sodium hydroxide. **(ii)** Using the third portion of solution, repeat test **(b)(i)** using aqueous ammonia instead of aqueous sodium hydroxide.	.... [2] .... [2]
(c) Add about 1 cm^3 of dilute nitric acid to the fourth portion of the solution followed by aqueous silver nitrate.	..... [1]
(d) To the fifth portion of the solution add about 1 cm^3 of dilute nitric acid followed by aqueous barium nitrate.	..... [2]

tests	observations
<u>tests on the residue</u> Use a spatula to transfer some of the residue into the bottom of a test-tube. **(e)** To the residue, add about 2 cm^3 of dilute hydrochloric acid. Test the gas given off. Now add a large excess of aqueous sodium hydroxide to the mixture.	.... [3] ..... [2]

(f) What conclusions can you draw about solid **R**?

.....

..... [2]

(g) Name the gas given off in test **(e)**.

..... [1]

(h) Identify solid **S**.

..... [2]

[Total: 19]

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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