UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

7606081731

CHEMISTRY **0620/53**

Paper 5 Practical Test **October/November 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.
Practical notes are provided on page 8.
You may lose marks if you do not show your working or if you do not use appropriate units.

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.

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Total	

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

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1 You are going to investigate the reaction between aqueous potassium manganate(VII), solution **C**, and two different acidic solutions, **D** and **E**.

Read all the instructions below carefully before starting the experiments.

Instructions
You are going to carry out three experiments.

(a) *Experiment 1*

Fill the burette with the solution **C** of potassium manganate(VII) to the 0.0 cm^3 mark. Using a measuring cylinder, pour 25 cm^3 of solution **D** into the conical flask.
Add 1.0 cm^3 of the solution **C** to the flask, with shaking. Continue to add solution **C** 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.

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

[3]

(b) *Experiment 2*

Repeat Experiment 1 using 25 cm^3 of solution **E** instead of solution **D**.
Record the burette readings in the table and complete the table.

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

[3]

(c) *Experiment 3*

To about 2 cm^3 of solution **E** in a test-tube, add an equal volume of aqueous ammonia. Shake the test-tube and note any observations. Leave the mixture to stand for 5 minutes and note any changes.

.....

..... [2]

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(d) (i) What colour change was observed as potassium manganate(VII) solution was added to the flask in Experiment 1?

.....[1]

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

..... [1]

(e) (i) In which experiment was the greatest 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]

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

.....

..... [2]

(g) Give **one** advantage and **one** disadvantage of using a measuring cylinder for solutions **D** and **E**.

advantage .....

disadvantage ..... [2]

(h) Explain your observations in Experiment 3.

.....

..... [3]

[Total: 21]

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[Turn over

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2 You are provided with liquid **F**.
Carry out the following tests on the liquid, recording all of your observations in the table.
Conclusions must **not** be written in the table.

tests	observations
Divide liquid **F** into five equal portions in separate test-tubes.	
(a) Describe the appearance of liquid **F**.	..... [1]
Test the pH of the liquid.	..... [1]
To the first portion of liquid **F**, add an equal volume of dilute sulfuric acid. Now add excess aqueous sodium hydroxide and shake the mixture.	.... [2]
(b) To the second portion of liquid **F**, add an equal volume of dilute sulfuric acid followed by about 2 cm^3 of hydrogen peroxide.	.... [1]
Shake the mixture and test the gas given off with a splint.	..... [2]
(c) To the third portion of liquid **F**, add aqueous silver nitrate followed by excess dilute nitric acid. Shake the mixture.	.... [3]
(d) To the fourth portion of liquid **F**, add aqueous barium nitrate followed by excess dilute nitric acid. Shake the mixture.	.... [3]
(e) To the fifth portion of liquid **F**, add an equal volume of sulfuric acid and one spatula measure of iron filings.	.... [2]

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(f) What type of reaction happened in test **(a)**? Explain your answer.

type of reaction .....

explanation .....

..... [2]

(g) Identify the gas given off in test **(b)**.

..... [1]

(h) Draw **one** conclusion about liquid **F**.

..... [1]

[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

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