Centre Number	Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
CAMBRIDGE INTERNATIONAL EXAMINATIONS

CHEMISTRY 0620/5

PAPER 5 Practical Test

MAY/JUNE SESSION 2002
1 hour 15 minutes

Candidates answer on the question paper.
Additional materials:
As listed in Instructions to Supervisors

TIME 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **both** questions.
Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

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 question paper consists of 6 printed pages and 2 blank pages.

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate
[Turn over

1 You are going to investigate the redox reaction between potassium manganate(VII) and iron(II) ions.

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 **A** of potassium manganate(VII). By using a measuring cylinder, pour 25 cm^3 of the solution of iron(II) ions into the conical flask provided.

From the burette add 1.0 cm^3 of solution **A** to the flask and shake to mix thoroughly. Continue to add solution **A** slowly to the flask until there is just a **permanent** pale pink colour in the contents of the flask. Record the burette readings in the table .

Experiment 2

Pour away the contents of the burette and rinse with distilled water.

Fill the burette up to the 0.0 cm^3 mark with the solution **B** of potassium manganate(VII). Repeat Experiment 1 exactly using solution **B** instead of solution **A**. Record your burette readings in the table and complete the table. Pour a little of the contents of the flask into a test-tube. Add excess aqueous sodium hydroxide to the tube. Record your observation.

..... [2]

Table of results

Burette readings/cm^3

	Experiment 1	Experiment 2
Final reading		
Initial reading		
Difference		

[6]

(a) Describe the appearance of solution **A**.

..... [1]

(b) How did the colour of the solution of iron(II) ions change when 15.0 cm^3 of solution **A** was added?

From ..... to ..... [2]

(c) **(i)** In which Experiment was the greatest volume of aqueous potassium manganate(VII) used?

..... [1]

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

.....

..... [2]

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

.....

..... [1]

(iv) Predict the volume of solution **B** which would be needed to react completely with 50.0 cm^3 of the solution of iron(II) ions.

.....

..... [2]

(d) What product is formed in the flask at the end of the reaction? Give a reason for your answer.

product .....

reason..... [2]

(e) Explain **one** change you could make to the **apparatus** used in the experiments to obtain more accurate results.

change .....

explanation ..... [2]

2 You are provided with two solid compounds **S** and **T**. Carry out the following tests on **S** and **T**, recording all of your observations in the table. Do **not** write any conclusions in the table.

tests	observations
(a) Describe the appearance of **S** and **T**.	**S** ..... **T** ..... [2]
(b) (i) Add about half of the sample of solid **S** to about 4 cm^3 of aqueous hydrogen peroxide. Note your observation. Heat the mixture to boiling and test any gas given off with a glowing splint. **(ii)** Add about half of the sample of solid **T** to about 4 cm^3 of aqueous hydrogen peroxide. Note any observations. Test any gas given off with a glowing splint.	..... [1] ..... [1] ..... [2] ..... [1]
(c) (i) Add the rest of solid **T** to about 3 cm^3 hydrochloric acid. Heat the mixture carefully to boiling point. Test any gas given off with damp blue litmus paper. **(ii)** Repeat test **(c)(i)** using the rest of solid **S** **without** testing the gas. Note the colour of the solution. Leave the mixture to settle for 2 minutes. Decant the solution into another test-tube.	.... [2] ..... [1]

tests	observations
(d) Divide the solution from **(c)(ii)** into two approximately equal portions of 1cm^3.	
(i) To the first portion add excess aqueous sodium hydroxide, a little at a time.	.... [2]
(ii) To the second portion add excess aqueous ammonia a little at a time.	.... [3]

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

..... [1]

(f) Name the gas given off in test **(c)(i)**.

..... [1]

(g) What conclusions can you draw about solid **S**?

.....

.....

..... [2]

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NOTES FOR USE IN QUALITATIVE ANALYSIS

Test for anions

anion	*test*	*test result*
carbonate (CO_3^{2-})	add dilute acid	effervesence, 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 aqeous 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, then add aqueous barium chloride *or* 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	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	white ppt., soluble in excess

Test for gases

gas	*test and test results*
ammonia (NH_3)	turns damp red litmus paper blue
carbon dioxide (CO_2)	turns limewater milky
chloride (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	"pops" with a lighted splint
oxygen (O_2)	relights a glowing splint