UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

7955098426

CHEMISTRY **5070/32**

Paper 3 Practical Test **May/June 2010**

1 hour 30 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 ink.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Qualitative Analysis Notes are printed on page 8.
You should show the essential steps in any calculations and record experimental results in the spaces provided on the question paper.

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	
Total	

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

DC (NF) 25904

UNIVERSITY *of* CAMBRIDGE International Examinations

[Turn over

1 An organic acid has the molecular formula $C_3H_4O_5$.

You are required to find by experiment the number of moles of sodium hydroxide that react with 1 mole of this organic acid.

P is 0.300 mol/dm^3 sodium hydroxide.
Q is an aqueous solution of the organic acid, $C_3H_4O_5$, containing 18.0 g/dm^3.

(a) Put **Q** into the burette.

Pipette a 25.0 cm^3 (or 20.0 cm^3) portion of **P** into a flask and titrate with **Q**, using the indicator provided.

Record your results in the table, repeating the titration as many times as you consider necessary to achieve consistent results.

Results

Burette readings

titration number	1	2	
final reading / cm^3			
initial reading / cm^3			
volume of **Q** used / cm^3			
best titration results (✓)			

Summary

Tick (✓) the best titration results.

Using these results, the average volume of **Q** required was …………… cm^3.

Volume of **P** used was …………… cm^3.

[12]

For Examiner's Use

(b) **P** is 0.300 mol/dm^3 sodium hydroxide.

Calculate the number of moles of sodium hydroxide in the volume of **P** used.

moles of sodium hydroxide in the volume of **P** used .... [1]

(c) **Q** is an aqueous solution of $C_3H_4O_5$ containing 18.0 g/dm^3.

Calculate the concentration, in mol/dm^3, of $C_3H_4O_5$ in **Q**.
[The relative molecular mass of $C_3H_4O_5$ is 120.]

concentration of $C_3H_4O_5$ in **Q** ……………… mol/dm^3 [1]

(d) Calculate the number of moles of $C_3H_4O_5$ in the average volume of **Q** used in the titration.

moles of $C_3H_4O_5$ ……………… [1]

(e) Using your answers from **(b)** and **(d)** calculate the number of moles of sodium hydroxide which react with 1 mole of $C_3H_4O_5$.

moles of sodium hydroxide ……………… [1]

(f) Using your answer to **(e)** write an equation for the reaction of the organic acid, $C_3H_4O_5$, with sodium hydroxide.

....[2]

[Total: 18]

2 You are provided with three solutions **R**, **S**, and **T**. Carry out the following tests and record your observations in the table. You should test and name any gas evolved.

For Examiner's Use

test no.	test	observations with solution **R**
1	**(a)** To 2 cm depth of the solution in a test-tube, add an equal volume of dilute sulfuric acid. **(b)** Add 2 cm depth of aqueous hydrogen peroxide to the mixture from **(a)** and leave to stand.	
2	**(a)** To 2 cm depth of the solution in a test-tube, add a few drops of aqueous silver nitrate. **(b)** Add an equal volume of dilute nitric acid to the mixture from **(a)**.	
3	**(a)** To 2 cm depth of the solution in a test-tube, add a few drops of aqueous barium chloride. **(b)** Add an equal volume of dilute hydrochloric acid to the mixture from **(a)**.	

For Examiner's Use

observations with solution **S**	observations with solution **T**

[19]

Conclusion

The formula of the anion present in **R** is ………………………………

The formula of the anion present in **S** is ………………………………

Suggest the type of element in the compound present in **T**.

....[3]

[Total: 22]

BLANK PAGE

BLANK PAGE

QUALITATIVE ANALYSIS NOTES

Tests 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 lead(II) nitrate	yellow ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide then add aluminium foil; warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify with dilute nitric acid, then add aqueous barium nitrate	white ppt.

Tests 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(II) (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

Tests for gases

gas	*test and test result*
ammonia (NH_3)	turns damp 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
sulfur dioxide (SO_2)	turns acidified aqueous potassium dichromate(VI) from orange to green