UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

6686368564

CHEMISTRY **0620/52**

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.

For Examiner's Use	
Total	

This document consists of **7** printed pages and **1** blank page.

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UNIVERSITY *of* CAMBRIDGE
International Examinations

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1 You are going to investigate what happens when aqueous sodium hydroxide reacts with

Read all the instructions below carefully before starting the experiments.

Instructions
You are going to carry out two experiments.

(a) *Experiment 1*

Use a measuring cylinder to pour 25 cm^3 of acid **K** into a conical flask. Add five drops of phenolphthalein to the flask.

Fill the burette with the aqueous sodium hydroxide to the 0.0 cm^3 mark.
Slowly add the aqueous sodium hydroxide to acid **K** in the flask and shake the mixture.
Continue to add aqueous sodium hydroxide to the flask until the solution shows a permanent colour change.
Measure and record the volume in the table. Complete the table.
Pour the solution away and rinse the conical flask.

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

[3]

(b) *Experiment 2*

Use a measuring cylinder to pour 50 cm^3 of acid **K** into a conical flask. Add the 0.3 g of powdered calcium carbonate to the flask and shake the flask until no further reaction is observed.
Add five drops of phenolphthalein to the mixture in the flask.

Fill the burette with aqueous sodium hydroxide and record the burette reading. Slowly add aqueous sodium hydroxide from the burette to the flask and shake the mixture. Continue to add aqueous sodium hydroxide to the flask until the solution shows a permanent colour change.
Measure and record the volume in the table. Complete the table.

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

[3]

(c) What colour change was observed after the sodium hydroxide solution was added to the flask?

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

(d) What type of chemical reaction occurs when acid **K** reacts with sodium hydroxide?

.... [1]

(e) If Experiment 1 was repeated using 50 cm^3 of acid **K**, what volume of sodium hydroxide would be required to change the colour of the indicator?

.... [2]

(f) **(i)** What is the effect of adding 0.3 g of powdered calcium carbonate to acid **K**?

....

.... [2]

(ii) Use your answers from **(b)** and **(e)** to work out the difference in the volume of sodium hydroxide added when 0.3 g of calcium carbonate is mixed with 50 cm^3 of acid **K** in Experiment 2.

....

.... [2]

(iii) Estimate the mass of calcium carbonate that would need to be added to 50 cm^3 of acid **K** to require 0.0 cm^3 of sodium hydroxide.

[1]

(g) What would be the effect on the results if the solutions of acid **K** were warmed before adding the sodium hydroxide? Give a reason for your answer.

effect on results ....

reason .... [2]

(h) Suggest the advantage, if any, of

(i) using a pipette to measure the volume of acid **K**.

....

.... [2]

(ii) using a polystyrene cup instead of a flask.

....

.... [2]

[Total: 22]

2 You are provided with two liquids, **L** and **M**.
Carry out the following tests on **L** and **M**, recording all of your observations in the table.
Conclusions must **not** be written in the table.

tests	**observations**
<u>tests on liquid **L**</u> **(a)** Describe the appearance of liquid **L**.	.... [1]
Divide liquid **L** into five equal portions in separate test-tubes. **(b) (i)** Add the first portion of liquid **L** to the test-tube containing the iodine crystal. Stopper the test-tube and shake the contents. Now add an equal volume of liquid **M** to the test-tube, stopper and shake the contents. Leave to stand for five minutes and continue to part **(c)**. **(ii)** After five minutes, remove most of the top layer using a teat pipette and add ethanol to the liquid which you have removed. Stopper the test-tube and shake the contents. Leave to stand for five minutes.	.... [1] .... [2] .... [2]
(c) To the second portion of liquid **L**, add a few drops of dilute nitric acid and about 1 cm^3 of barium nitrate solution.	.... [1]
(d) To the third portion of liquid **L**, add a few drops of dilute nitric acid and about 1 cm^3 of silver nitrate solution.	.... [2]
(e) To the fourth portion of liquid **L**, add about 1 cm^3 of aqueous copper sulfate, shake and leave to stand for five minutes.	.... [2]
(f) To the fifth portion of liquid **L**, add about 2 cm^3 of aqueous hydrogen peroxide. Now add about 1 cm^3 of starch solution.	.... [3]

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(g) Why does the colour of liquid **L** change in test **(b)(i)**?

....

.... [1]

(h) What conclusions can you draw about liquid **M** from test **(b)(i)**?

....

.... [2]

(i) What conclusions can you draw about liquid **L**?

....

....

.... [1]

[Total: 18]

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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