Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

3364232586

CHEMISTRY **0620/51**

Paper 5 Practical Test **October/November 2014**

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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, 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	

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

CAMBRIDGE International Examinations

1 You are going to investigate the reaction between two different solutions of dilute hydrochloric acid, **A** and **B**, and a solution of substance **C** which is an alkali.

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 dilute hydrochloric acid to the 0.0 cm^3 mark. Using a measuring cylinder, pour 20 cm^3 of solution **C** into the conical flask. Add a few drops of methyl orange to the flask.

Add solution **A** to the flask, with shaking. Continue to add solution **A** to the flask until the mixture just changes colour. 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*

Empty the burette and rinse it first with distilled water, and then with a little of solution **B**. Fill the burette with the solution **B** of dilute hydrochloric acid to the 0.0 cm^3 mark.

Repeat Experiment 1 using solution **B**.

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) What colour change was observed when dilute hydrochloric acid was added to solution **C**?

from ..... to ..... [1]

(ii) Why is methyl orange added to the flask?

..... [1]

(iii) What type of chemical reaction takes place when hydrochloric acid reacts with alkaline solutions?

..... [1]

(d) (i) In which experiment was the greater volume of dilute hydrochloric acid used?

..... [1]

(ii) Compare the volumes of dilute hydrochloric acid used in Experiments 1 and 2.

..... [1]

(iii) Suggest, in terms of the concentration of solutions **A** and **B**, an explanation for the difference in volumes used.

.....

.....

..... [2]

(e) If Experiment 2 was repeated using 10 cm^3 of solution **C**, what volume of dilute hydrochloric acid would be used? Explain your answer.

.....

..... [2]

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

advantage .....

disadvantage .....
[2]

[Turn over

(g) Describe a method other than titration, using a **different** reactant, that could be used to compare the concentrations of the two solutions of dilute hydrochloric acid, **A** and **B**.

.....

.....

.....

.....

.....

..... [4]

[Total: 21]

2 You are provided with solid **D** which is a salt.
Carry out the following tests on solid **D**, recording all of your observations in the table.
Conclusions must **not** be written in the table.

tests	**observations**
<u>tests on the solid</u> **(a)** **(i)** Describe the appearance of solid **D**.	.... [2]
(ii) Place about half of solid **D** into a test-tube. Heat the test-tube gently and then strongly. Leave to stand for two minutes.	.... [2]
<u>tests on the aqueous solution</u> Add the rest of solid **D** to about 10 cm^3 of distilled water in a boiling tube and shake to dissolve. Divide the solution into five equal portions in separate test-tubes.	
(b) **(i)** Using a teat pipette, add several drops of aqueous sodium hydroxide to the first portion of the solution.	.... [2]
Now add excess aqueous sodium hydroxide to the mixture.	.... [1]
(ii) Using a teat pipette, add several drops of aqueous ammonia to the second portion of the solution. Now add excess aqueous ammonia to the mixture.	.... [2]

tests	observations
(c) To the third portion of the solution, add about 1 cm^3 of hydrogen peroxide solution. Heat the mixture to boiling. Leave to stand for one minute. Test any gases given off with a splint.	.... [3]
(d) To the fourth portion of the solution, add about 1 cm^3 of dilute nitric acid and aqueous silver nitrate.	..... [1]
(e) To the fifth portion of solution, add about 1 cm^3 of dilute nitric acid and aqueous barium nitrate. Shake and leave to stand for one minute.	.... [2]

(f) What does test **(a)(ii)** tell you about solid **D**?

..... [1]

(g) What conclusions can you draw about the identity of solid **D**?

.....

.....

..... [3]

[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