Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

5760352473

CHEMISTRY **0620/51**

Paper 5 Practical Test **May/June 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 **6** printed pages and **2** blank pages.

CAMBRIDGE International Examinations

1 You are going to investigate what happens when dilute hydrochloric acid reacts with an aqueous solution **R**, containing two different substances **S** and **T**.

Read all the instructions below carefully before starting the experiments.

Instructions
You are going to carry out three experiments.

(a) *Experiment 1*

Using a measuring cylinder, pour 25 cm^3 of solution **R** into the conical flask. Add five drops of the phenolphthalein indicator to the flask.

Fill the burette with hydrochloric acid to the 0.0 cm^3 mark. Using the burette, add hydrochloric acid to solution **R** and shake the flask. Continue to add hydrochloric acid to the flask until the colour just disappears.
Record the volume of hydrochloric acid added when the indicator changes colour.
Keep the mixture in the flask for Experiment 2.

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

[3]

(b) *Experiment 2*

Add four drops of methyl orange indicator to the mixture in the flask from Experiment 1.
Check that the burette reading is the same as your final reading in Experiment 1. This is the initial volume reading for Experiment 2.
Using the burette, add hydrochloric acid to the mixture in the flask and shake the mixture.
Record the volume of hydrochloric acid added when the indicator just changes colour.

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

[4]

(c) *Experiment 3*

Pour about 5 cm^3 of solution **R** into a test-tube. Using a teat pipette, add hydrochloric acid to the solution. Note any observations.

..... [1]

(d) (i) When phenolphthalein indicator was used in Experiment 1 the colour changed

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

(ii) What was the colour of the indicator at the end-point in Experiment 2?

..... [1]

(e) (i) What type of substances are **S** and **T**?

..... [1]

(ii) What conclusion can you draw from Experiment 3?

..... [1]

(f) The volume of hydrochloric acid added in Experiment 1 reacted with all of substance **S** and half of substance **T**.
The volume of hydrochloric acid in Experiment 2 reacted with half of substance **T**.

(i) Work out the volume of hydrochloric acid which reacted with substance **S**.

..... [2]

(ii) Work out the volume of hydrochloric acid which reacted with substance **T**.

..... [1]

(iii) Compare the volumes of hydrochloric acid which reacted with substances **S** and **T**.

.....

..... [1]

(g) (i) Predict the volume of hydrochloric acid which would be added in Experiments 1 and 2 if the experiments were repeated using 100 cm^3 of solution **R**. Explain your answer.

Experiment 1 .....

Experiment 2 .....

Explanation ..... [3]

(ii) Suggest a practical problem that would occur when carrying out these repeat experiments and how you could solve this problem.

.....

..... [2]

[Total: 22]

[Turn over

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

tests	observations
<u>tests on solid **U**</u> **(a)** Describe the appearance of solid **U**.	..... [2]
(b) Place half of solid **U** in a test-tube. Heat the test-tube gently at first and then more strongly.	.... [2]
(c) Add the rest of solid **U** to about 8 cm^3 of distilled water in a test-tube. Stopper the test-tube and shake the contents until dissolved. Divide the solution into four equal portions in separate test-tubes and carry out the following tests. Add several drops of aqueous sodium hydroxide to the first portion of the solution and shake the test-tube. Then add about 1 cm^3 of hydrogen peroxide solution to the mixture. Test the gas given off.	.... [5]
(d) Add excess aqueous ammonia to the second portion of the solution.	..... [1]
(e) Add about 1 cm^3 of dilute nitric acid to the third portion of the solution followed by about 1 cm^3 of barium nitrate solution.	..... [2]
(f) Add about 1 cm^3 of dilute nitric acid to the fourth portion of the solution followed by about 1 cm^3 of silver nitrate solution.	..... [1]

(g) What does test **(f)** tell you about solid **U**?

..... [1]

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

..... [1]

(i) What conclusions can you draw about solid **U**?

.....

..... [3]

[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