Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

5444126075

CHEMISTRY **0620/52**

Paper 5 Practical Test **February/March 2017**

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.
Notes for use in qualitative analysis are provided on pages 7 and 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 **8** printed pages.

CAMBRIDGE International Examinations

[Turn over

1 You are going to investigate the reaction between dilute hydrochloric acid and two different aqueous solutions of sodium hydroxide labelled solution **O** and solution **P**.

Read all the instructions carefully before starting the experiments.

Instructions
You are going to carry out two experiments.

(a) *Experiment 1*

- Fill the burette up to the 0.0 cm^3 mark with dilute hydrochloric acid.
- Use the measuring cylinder to pour 20 cm^3 of solution **O** into the conical flask.
- Add 10 drops of thymolphthalein indicator to the conical flask.
- Add the dilute hydrochloric acid from the burette 1 cm^3 at a time, while swirling the flask, until the solution just changes colour.
- Record the burette readings in the table.

(b) *Experiment 2*

- Fill the burette up to the 0.0 cm^3 mark with dilute hydrochloric acid.
- Empty the conical flask and rinse it with distilled water.
- Use the measuring cylinder to pour 20 cm^3 of solution **P** into the conical flask.
- Add 10 drops of thymolphthalein indicator to the conical flask.
- Add the dilute hydrochloric acid from the burette 1 cm^3 at a time, while swirling the flask, until the solution just changes colour.
- Record the burette readings in the table and complete the table.

	Experiment 1	Experiment 2
final burette reading / cm^3		
initial burette reading / cm^3		
difference / cm^3		

[4]

(c) What colour change was observed in the conical flask in Experiment 1?

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

(d) What type of chemical reaction occurs when dilute hydrochloric acid reacts with sodium hydroxide solution?

..... [1]

(e) **(i)** Which solution of sodium hydroxide, solution **O** or solution **P**, is the more concentrated? Explain your answer.

.....

..... [2]

(ii) How many times more concentrated is this solution of sodium hydroxide than the other solution of sodium hydroxide?

..... [1]

(f) If Experiment 2 were repeated using 10 cm^3 of solution **P**, what volume of dilute hydrochloric acid would be needed?

..... [2]

(g) What would be the effect, if any, on the volume of dilute hydrochloric acid used in Experiment 1 if the solution of sodium hydroxide were **warmed** before adding the dilute hydrochloric acid? Give a reason for your answer.

effect on volume .....

reason .....
[2]

(h) **(i)** What would be a more accurate method of measuring the volume of the sodium hydroxide solution?

..... [1]

(ii) Suggest how the reliability of the results could be checked.

..... [1]

(i) Aqueous sodium hydroxide reacts with aqueous calcium chloride to form a precipitate of calcium hydroxide.

Use this information to suggest a **different** method of finding out which of the solutions of sodium hydroxide is the more concentrated.

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.....

.....

..... [3]

[Total: 18]

[Turn over

2 You are provided with two solids **Q** and **R** which are both salts.
Carry out the following tests on each solid, recording all of your observations at each stage.

tests on solid Q

(a) Describe the appearance of solid **Q**.

..... [1]

Add about 10 cm^3 of distilled water to all of solid **Q** in the test-tube and shake to dissolve the solid.

Divide the solution into three equal portions in three test-tubes and carry out the following tests.

(b) (i) To the first portion of the solution, add drops of aqueous sodium hydroxide until a change is seen.
Record your observations.

..... [2]

(ii) Now add an excess of aqueous sodium hydroxide to the mixture.
Record your observations.

..... [1]

(c) (i) To the second portion of the solution, add drops of aqueous ammonia until a change is seen.
Record your observations.

..... [2]

(ii) Now add an excess of aqueous ammonia to the mixture.
Record your observations.

..... [1]

(d) To the third portion of the solution, add a few drops of dilute nitric acid and about 1 cm^3 of aqueous silver nitrate.
Record your observations.

..... [1]

Keep your mixture from test (d) to compare the result with test (h).

(e) Identify solid **Q**.

..... [2]

tests on solid R

(f) Carry out a flame test on solid **R**.
Record your observations.

..... [1]

Dissolve the rest of solid **R** in about 5 cm^3 of distilled water in a test-tube. Shake the mixture to dissolve the solid. Divide the solution into two equal portions in two test-tubes.

(g) To the first portion of the solution, add a few drops of dilute nitric acid and about 1 cm^3 of aqueous barium nitrate.
Record your observations.

..... [1]

(h) To the second portion of the solution, add a few drops of dilute nitric acid and about 1 cm^3 of aqueous silver nitrate.
Compare the result with test **(d)**. Record your observations for test **(h)**.

..... [2]

(i) Identify solid **R**.

..... [2]

[Total: 16]

[Turn over

3 When solid barium hydroxide is added to solid ammonium chloride a reaction takes place.

(a) Describe an experiment to show that this reaction is endothermic.

.....

.....

.....

.....

.....

..... [4]

(b) How could you show whether or not the final mixture contains ammonium ions?

.....

.....

.....

..... [2]

[Total: 6]

Notes for use in qualitative analysis
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.
bromide (Br^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	cream 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, then add aqueous barium nitrate	white ppt.
sulfite (SO_3^{2-})	add dilute hydrochloric acid, warm gently and test for the presence of sulfur dioxide	sulfur dioxide produced will turn acidified aqueous potassium manganate(VII) from purple to colourless

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.
chromium(III) (Cr^{3+})	green ppt., soluble in excess	grey-green ppt., insoluble in excess
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 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
sulfur dioxide (SO_2)	turns acidified aqueous potassium manganate(VII) from purple to colourless

Flame tests for metal ions

metal ion	flame colour
lithium (Li^+)	red
sodium (Na^+)	yellow
potassium (K^+)	lilac
copper(II) (Cu^{2+})	blue-green