Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

7059295991

CHEMISTRY **0620/52**

Paper 5 Practical Test **February/March 2018**

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 11 and 12.

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 **9** printed pages and **3** blank pages.

CAMBRIDGE International Examinations

[Turn over

1 You are going to investigate the reaction between dilute hydrochloric acid and an aqueous solution of sodium carbonate labelled solution **L**.

Read all the instructions carefully before starting the experiments.

Instructions
You are going to do three experiments.

(a) *Experiment 1*

- Use the measuring cylinder to pour 25 cm^3 of solution **L** into the conical flask.
- Add ten drops of thymolphthalein indicator to the conical flask.
- Fill the burette up to the 0.0 cm^3 mark with the dilute hydrochloric acid.
- Add dilute hydrochloric acid from the burette to the conical flask, 1.0 cm^3 at a time, while swirling the conical flask, until the solution just changes to colourless.
- Record the burette readings in the table and complete the table.

Keep your solution from Experiment 1 to use in Experiment 2.

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

[2]

(b) *Experiment 2*

- Now add ten drops of methyl orange indicator to the solution in the conical flask from Experiment 1.
- Record the initial burette reading in the table.
- Add dilute hydrochloric acid from the burette to the conical flask, 1.0 cm^3 at a time, while swirling the conical flask, until the solution just changes colour.
- Record the final burette reading in the table and complete the table.

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

[2]

(c) *Experiment 3*

- Empty the conical flask and rinse it with distilled water.
- Repeat Experiment 1, using methyl orange indicator instead of thymolphthalein indicator and adding dilute hydrochloric acid from the burette to the conical flask until the solution just changes colour.
- Record the burette readings in the table and complete the table.

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

[1]

(d) (i) What colour change was observed in the conical flask in Experiment 3?

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

(ii) Apart from the colour change, what was observed in the conical flask in Experiment 3?

..... [1]

(e) Complete the sentence.

Experiment ..... needed the largest volume of dilute hydrochloric acid to change the colour of the indicator. [1]

(f) Give the name of a more accurate piece of apparatus for measuring the volume of solution **L**.

..... [1]

(g) What would be the effect on the results if solution **L** were warmed before adding the dilute hydrochloric acid? Give a reason for your answer.

effect on the results .....

reason .....
[2]

[Turn over

(h) (i) Determine the simplest whole number ratio of volumes of dilute hydrochloric acid used in Experiments 1 and 3.

..... [1]

(ii) Suggest why the volumes of dilute hydrochloric acid used in Experiments 1 and 3 are different.

..... [1]

(i) Suggest why Universal Indicator **cannot** be used in these experiments.

.....

..... [1]

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

.....

..... [2]

[Total:16]

2 You are provided with two substances, solution **M** and solid **N**.
Do the following tests on the substances, recording all of your observations at each stage.

tests on solution M

Divide solution **M** into five approximately equal portions in five test-tubes.

(a) (i) Describe the appearance of solution **M**.

..... [1]

(ii) Test the pH of the first portion of solution **M**.

pH = ... [1]

(b) Add a few drops of dilute nitric acid and about 1 cm^3 of aqueous silver nitrate to the second portion of solution **M**.
Record your observations.

..... [1]

(c) Add a few drops of dilute nitric acid and about 1 cm^3 of aqueous barium nitrate to the third portion of solution **M**.
Record your observations.

..... [1]

(d) Add an excess of aqueous sodium hydroxide to the fourth portion of solution **M**.
Record your observations.

..... [2]

Keep the fifth portion of solution M for the test on solid N in (i).

(e) Identify solution **M**.

..... [3]

[Turn over

tests on solid N

Divide solid **N** into three approximately equal portions in one hard glass test-tube and two test-tubes.

(f) Describe the appearance of solid **N**.

..... [1]

(g) Heat the first portion of solid **N** in the hard glass test-tube. Heat gently and then more strongly.
Test the gas produced.
Record your observations.

.....

.....

.....

..... [4]

(h) Add about 1 cm^3 of dilute hydrochloric acid to the second portion of solid **N** in a test-tube.
Carry out a flame test on the mixture.
Record the colour of the flame.

..... [1]

(i) Add the fifth portion of solution **M** to the third portion of solid **N** in a test-tube. Leave the solution to stand for about 5 minutes.
Record your observations.

..... [1]

(j) What conclusions can you draw about solid **N**?

.....

..... [2]

[Total:18]

3 Magnesium reacts with dilute sulfuric acid at room temperature to form hydrogen gas.

Plan an experiment to find the rate of reaction between magnesium ribbon and dilute sulfuric acid.

In your answer:
- include a diagram
- indicate how you could use the results obtained to find the rate of reaction.

You are provided with common laboratory apparatus, magnesium ribbon and dilute sulfuric acid.

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.....

.....

..... [6]

[Total: 6]

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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