Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

Cambridge IGCSE

CANDIDATE NAME

CENTRE NUMBER | CANDIDATE NUMBER

4722898336

CHEMISTRY **0620/52**

Paper 5 Practical Test **February/March 2019**

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	
1	
2	
3	
Total	

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

This document consists of **8** printed pages.

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1 You are going to investigate the reaction between two different solutions, **A** and **B**, of aqueous potassium manganate(VII) and solution **C**.

Read all the instructions carefully before starting the experiments.

Instructions
You are going to do three experiments.

(a) *Experiment 1*

- Fill the burette up to the 0.0 cm^3 mark with solution **A**.
- Use the 25 cm^3 measuring cylinder to pour 25 cm^3 of solution **C** into the conical flask.
- Add about 1 cm^3 of solution **A** to the conical flask and swirl the conical flask.
- Continue to add solution **A** to the conical flask until the mixture just turns permanently pink.
- Record the burette readings in the table and complete the table.
- Pour about 2 cm^3 of the contents of the conical flask into a test-tube.
- Pour away the rest of the contents of the conical flask and rinse the conical flask with distilled water.

Keep the test-tube from Experiment 1 to use in Experiment 3.

	Experiment 1
final burette reading / cm^3	
initial burette reading / cm^3	
volume used / cm^3	

[2]

(b) *Experiment 2*

- Pour away the contents of the burette and rinse the burette with distilled water.
- Rinse the burette with solution **B**.
- Fill the burette up to the 0.0 cm^3 mark with solution **B**.
- Use the 25 cm^3 measuring cylinder to pour 25 cm^3 of solution **C** into the conical flask.
- Add about 1 cm^3 of solution **B** to the conical flask and swirl the conical flask.
- Continue to add solution **B** to the conical flask until the mixture just turns permanently pink.
- Record the burette readings in the table and complete the table.

	Experiment 2
final burette reading / cm^3	
initial burette reading / cm^3	
volume used / cm^3	

[2]

(c) *Experiment 3*

(i) Add aqueous sodium hydroxide to about 2 cm^3 of solution **C** in a test-tube.
Record your observations.

.... [1]

(ii) Add aqueous sodium hydroxide to the reaction mixture in the test-tube saved from Experiment 1.
Record your observations.

.... [1]

(d) (i) Which solution of potassium manganate(VII), solution **A** or solution **B**, is the more concentrated?
Explain your answer.

....

.... [2]

(ii) How many times more concentrated is this solution of potassium manganate(VII)?

.... [1]

(e) (i) Predict the volume of solution **B** that would be used if Experiment 2 were repeated using 50 cm^3 of solution **C**.
Explain your answer.

....

.... [2]

(ii) Suggest a practical problem that using 50 cm^3 of solution **C** could cause. How could this problem be solved?

....

.... [2]

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

advantage of using a measuring cylinder ....

....

disadvantage of using a measuring cylinder ....

....
[2]

(g) What conclusions can be drawn about solution **C** from Experiment 3?

....

.... [2]

[Total: 17]

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

tests on solution D

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

(a) Test the pH of the first portion of solution **D**.

pH = ... [1]

(b) Add a strip of magnesium ribbon to the second portion of solution **D**. Shake the mixture. Test the gas produced.
Record your observations.

....

....

.... [3]

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

.... [1]

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

.... [1]

Keep the fifth portion of solution D for the test in (g).

tests on solid E

(e) Describe the appearance of solid **E**.

.... [1]

(f) **(i)** Use a spatula to place half of solid **E** into a hard-glass test-tube. Heat the solid gently and then more strongly. Leave the hard-glass test-tube to stand for five minutes to cool.
Record your observations.

.... [1]

(ii) Now add about 2 cm^3 of distilled water to the residue in the hard-glass test-tube. Test the pH of the mixture.

pH = ... [1]

(g) Add the rest of solid **E** to the fifth portion of solution **D**. Test the gas produced.
Record your observations.

....

....

.... [3]

Keep the solution from the test in (g) for the test in (h).

(h) Add an approximately equal volume of distilled water to the solution from the test in **(g)** and shake the mixture.
Add an excess of aqueous sodium hydroxide to the mixture.
Record your observations.

.... [1]

(i) Identify solution **D**.

.... [2]

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

.... [2]

[Total: 17]

3 The rate of reaction between magnesium and dilute hydrochloric acid can be followed by measuring the volume of hydrogen produced.

Plan an experiment to investigate the effect of decreasing the temperature on the rate of this reaction by measuring the volume of hydrogen produced.

You are provided with magnesium ribbon, dilute hydrochloric acid and common laboratory apparatus.
You are advised to draw a labelled diagram of the apparatus you would use in the space provided.

....

....

....

....

....

....

....

....

....

....

.... [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 result
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