Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

CHEMISTRY **0620/52**

Paper 5 Practical Test **May/June 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.

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

Read all the instructions carefully before starting the experiments.

Instructions
You are going to carry out two experiments.

(a) *Experiment 1*

View solution

- Fill the burette with solution **A** to the 0.0 cm^3 mark.
- Use a measuring cylinder to pour 25 cm^3 of solution **B** into the conical flask.
- Add 1 cm^3 of solution **A** from the burette to the flask, while swirling the flask.
- Continue to add solution **A** to the flask until the mixture just turns permanently pink.
- Record the burette reading in the table and complete the table.
- Pour away the contents of the flask and rinse the flask with distilled water.

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

[2]

(b) *Experiment 2*

View solution

- Repeat Experiment 1 using 25 cm^3 of solution **C** instead of 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	

[2]

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(c) (i) How does the colour of solution **A** change when it is first added to the conical flask?

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

(ii) Why is an indicator **not** added to the conical flask?

View solution

..... [1]

(d) (i) Which solution of iron(II) sulfate, solution **B** or solution **C**, is the more concentrated? Explain your answer.

.....

..... [2]

(ii) How many times more concentrated is this solution of iron(II) sulfate?

View solution

..... [1]

(e) (i) If Experiment 2 were repeated using 50 cm^3 of solution **C**, what volume of solution **A** would be needed? Explain your answer.

.....

..... [2]

(ii) Suggest a practical problem that using 50 cm^3 of solution **C** in this investigation would cause. Suggest a possible solution to the problem.

problem .....

solution .....

View solution [2]

(f) Give **one** advantage and **one** disadvantage of using a measuring cylinder instead of a 25 cm^3 pipette for solution **B**.

advantage .....

disadvantage .....

[2]

[Total: 15]

View solution

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

tests on solid E

(a) Carry out a flame test on a sample of solid **E**.
Record your observations.

View solution

..... [1]

(b) Pour about 10 cm^3 of distilled water into a boiling tube. Measure the initial temperature of the water and record it in the table. Add the rest of solid **E** to the boiling tube and shake the boiling tube to dissolve solid **E**. Measure and record the temperature of the solution after 1 minute. Complete the table.

View solution

temperature of the solution after 1 minute / °C	
initial temperature of the water / °C	
temperature difference / °C	

[2]

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

(c) To the first portion of the solution, add about 2 cm^3 of dilute hydrochloric acid.
Test the gas given off with a small strip of filter paper that has been dipped into acidified aqueous potassium manganate(VII).
Record your observations.

View solution

.....

..... [3]

(d) To the second portion of the solution, add an excess of aqueous sodium hydroxide.
Record your observations.

View solution

..... [1]

(e) (i) Mix about 2 cm^3 of aqueous copper(II) sulfate and 2 cm^3 of aqueous potassium iodide. Add a small amount of starch solution to the mixture. Leave the solution to stand for 5 minutes.
Record your observations.

.....

..... [2]

(ii) Now add the third portion of the solution of **E** to the mixture in **(e)(i)**.
Record your observations.

View solution

.....

..... [2]

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

..... [2]

View solution

tests on solid F

(g) Carry out a flame test on a sample of solid **F**.
Record your observations.

View solution

..... [1]

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

(h) To the first portion of the solution, add about 1 cm^3 of dilute nitric acid and aqueous silver nitrate.
Record your observations.

..... [2]

(i) To the second portion of the solution, add excess aqueous sodium hydroxide.
Record your observations.

View solution

..... [1]

(j) Identify solid **F**.

View solution

..... [2]

[Total: 19]

3 Calcium carbonate and kaolinite are both white solids found in sedimentary rocks.

Calcium carbonate reacts with dilute hydrochloric acid to form aqueous calcium chloride. Kaolinite does **not** react with dilute acids.

You are provided with a mixture of calcium carbonate and kaolinite and access to dilute hydrochloric acid.

Plan an experiment to determine the percentage by mass of calcium carbonate in the mixture.

View solution

.....

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.....

.....

..... [6]

[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

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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

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