Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

2045765175

CHEMISTRY **0620/51**

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.

CAMBRIDGE International Examinations

1 You are going to investigate the reaction between aqueous sodium thiosulfate and two different aqueous solutions of potassium iodate labelled solution **C** and solution **D**.

Read all the instructions carefully before starting the experiments.

Instructions
You are going to carry out two experiments.

(a) *Experiment 1*

- Fill the burette provided up to the 0.0 cm^3 mark with the aqueous sodium thiosulfate.
- Use a measuring cylinder to pour 20 cm^3 of solution **C** into a conical flask.
- Add 10 cm^3 of dilute sulfuric acid into the flask and 1 g of potassium iodide. Swirl the flask to mix the contents.
- Add the aqueous sodium thiosulfate slowly from the burette to the flask, and swirl to mix thoroughly.
- When the contents of the flask are pale yellow, add 1 cm^3 of starch solution to the flask.
- Continue to add aqueous sodium thiosulfate slowly to the flask until the solution just turns colourless.
- Record the burette readings in the table.

(b) *Experiment 2*

- Empty the conical flask and rinse it with distilled water.
- Repeat Experiment 1, using solution **D** instead of solution **C**.
- 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) Describe the appearance of the solution in the conical flask before adding the aqueous sodium thiosulfate.

..... [1]

(d) Before the addition of the starch solution, describe the changes to the colour of the solution in the conical flask as the aqueous sodium thiosulfate is added.

..... [1]

(e) What colour change is observed in the conical flask when the starch solution is added?

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

(f) (i) Which solution of potassium iodate, solution **C** or solution **D**, is the more concentrated? Explain your answer.

.....

..... [2]

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

..... [1]

(g) Predict the volume of aqueous sodium thiosulfate which would be needed to react completely with 30 cm^3 of solution **D**.

.....

..... [2]

(h) (i) State **two** sources of error in the experiments.

1 .....

2 .....

[2]

(ii) Suggest **two** improvements to reduce the sources of error in **(h)(i)**.

1 .....

2 .....

[2]

[Total: 16]

[Turn over

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

tests on solid E

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

..... [1]

(b) Place a small amount of solid **E** in a hard glass test-tube. Heat the solid gently then strongly.
Record your observations.

.....

..... [2]

(c) (i) Place a small amount of solid **E** in a test-tube and add about 2 cm^3 of dilute sulfuric acid.
Test the gas given off.
Record your observations.

.....

.....

..... [3]

(ii) Now gradually add an excess of aqueous ammonia to the mixture in the test-tube.
Record your observations.

.....

.....

..... [3]

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

..... [1]

(e) Identify solid **E**.

..... [2]

tests on solid F

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

..... [1]

Add about 4 cm^3 of distilled water to about half of solid **F** in a test-tube and shake the test-tube to dissolve solid **F**.

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

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

..... [1]

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

..... [1]

(h) Carry out a flame test on solid **F**.
Record your observations.

..... [1]

(i) Identify solid **F**.

..... [2]

[Total: 18]

[Turn over

3 A sample of furniture cleaner contains aqueous sodium chloride, aqueous ammonia and sand.

(a) Give a test to show the presence of ammonia in the mixture.

..... [1]

(b) Plan experiments to obtain a sample of

(i) pure water from the mixture, ...

.....

.....

..... [2]

(ii) pure sand from the mixture. .....

.....

.....

.....

..... [3]

[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