Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

8578699418

CHEMISTRY **0620/53**

Paper 5 Practical Test **October/November 2014**

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.
Practical notes are provided on page 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 **7** printed pages and **1** blank page.

CAMBRIDGE International Examinations

[Turn over

1 You are going to investigate the addition of four different solids, **H**, **J**, **K** and **L**, to water.
The same mass of solid, 4 g, will be used in each experiment.

Read all the instructions below carefully before starting the experiments.

Instructions
You are going to carry out five experiments.

(a) *Experiment 1*

Use a measuring cylinder to pour 25 cm^3 of distilled water into the polystyrene cup provided. Support the polystyrene cup in the 250 cm^3 beaker. Measure the initial temperature of the water and record it in the table below.
Add all of solid **H** to the water in the cup and stir the mixture with the thermometer.
Measure the temperature of the liquid mixture after 90 seconds. Record your result in the table.
Remove the thermometer and rinse the thermometer and the cup with water.

(b) *Experiment 2*

Repeat Experiment 1, using solid **J** instead of solid **H**.
Measure and record the initial and final temperatures in the table below.
Keep some of this solution in a test-tube for Experiment 5.

(c) *Experiment 3*

Repeat Experiment 1, using solid **K**. Record the temperatures in the table.

(d) *Experiment 4*

Repeat Experiment 1 using solid **L**. Record the temperatures in the table and complete the table. **Keep** this solution for Experiment 5.

experiment	solid	initial temperature / °C	final temperature / °C	temperature difference / °C
1	**H**			
2	**J**			
3	**K**			
4	**L**			

[4]

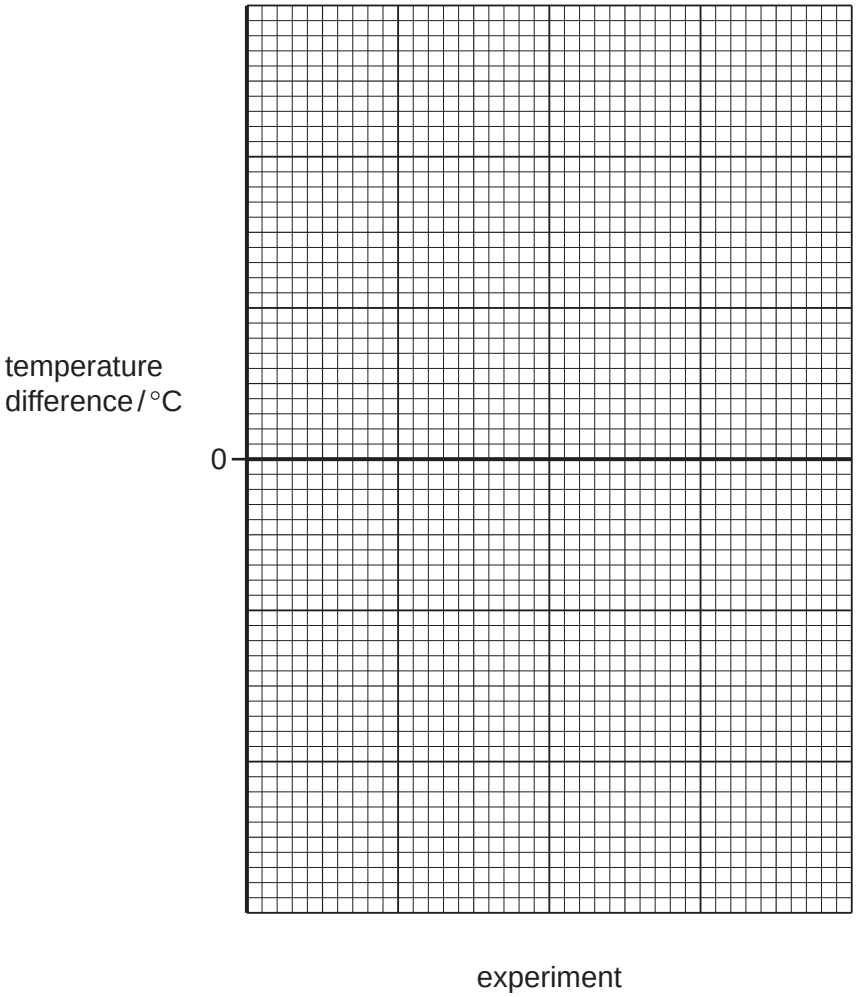
(e) *Experiment 5*

Pour about 3 cm^3 of the solution from Experiment 2 into a test-tube. Use a teat pipette to add about 3 cm^3 of the solution from Experiment 4 to the test-tube. Record your observations.

.....

..... [2]

(f) Draw a labelled bar chart of the results for Experiments 1, 2, 3 and 4 on the grid below.



[4]

Use your results and observations to answer the following questions.

(g) (i) Which experiment produced the smallest temperature change?

..... [1]

(ii) Which solids dissolve in water to produce an endothermic change? Explain your choice.

.....

..... [2]

(h) Suggest the temperature change that would occur if

(i) Experiment 3 was repeated using 50 cm^3 of distilled water,

.....

..... [1]

(ii) 2 g of solid **L** were used in Experiment 4.

..... [1]

(iii) Explain your answer to **(h)(ii)**.

..... [1]

(i) Predict the temperature of the solution in Experiment 2 after one hour. Explain your answer.

.....

..... [2]

(j) Suggest an explanation for the observations in Experiment 5.

.....

.....

..... [2]

[Total: 20]

2 You are provided with two aqueous solutions, **M** and **N**.
Carry out the following tests on **M** and **N**, recording all of your observations in the table.
Conclusions must **not** be written in the table.

tests	observations
<u>tests on solution **M**</u> Divide solution **M** into four equal portions in separate test-tubes. **(a)** Describe the appearance of solution **M**. Test the pH of the first portion of **M**.	.... [1]
(b) Add a spatula measure of calcium carbonate to the second portion of **M**. Test the gas given off with a splint.	.... [2]
(c) To the third portion of **M**, add magnesium ribbon. Test the gas given off with a splint.	.... [3]
(d) To the fourth portion of **M**, add a few drops of dilute nitric acid and about 1 cm^3 of aqueous silver nitrate.	.... [2]

[Turn over

tests	observations
<u>tests on solution **N**</u> Divide solution **N** into three equal portions in separate test-tubes. **(e)** Describe the appearance of solution **N**. Test the pH of the first portion of solution **N**.	..... [1] ..... [1]
(f) Use a teat pipette to add three to four drops of aqueous zinc sulfate to the second portion of **N**. Shake the mixture. Now add excess aqueous zinc sulfate to the mixture and shake.	.... [3]
(g) To the third portion of **N**, add a spatula measure of ammonium chloride. Warm the mixture and test the gas given off with damp litmus paper.	.... [2]

(h) (i) Identify the gas given off in test **(c)**.

..... [1]

(ii) Identify the gas given off in test **(g)**.

..... [1]

(i) Identify solution **M**.

..... [2]

(j) What conclusion can you draw about solution **N**?

..... [1]

[Total: 20]

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NOTES FOR USE IN QUALITATIVE ANALYSIS

Test 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.
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 with dilute nitric acid, then aqueous barium nitrate	white ppt.

Test 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.
copper (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

Test 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