Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

7887217677

CHEMISTRY **0620/53**

Paper 5 Practical Test **May/June 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.

IB14 06_0620_53/3RP

CAMBRIDGE International Examinations

1 You are going to investigate what happens when two different solids, **M** and **N**, dissolve in water.

Read all the instructions below carefully before starting the experiments.

Instructions
You are going to carry out three experiments.

(a) *Experiment 1*

Use a measuring cylinder to pour 25 cm^3 of distilled water into the polystyrene cup. Support the cup by putting it into the 250 cm^3 beaker. Measure the temperature of the water and record it in the table below.

Add all of solid **M** to the water, start the timer and stir the solution with the thermometer.

Measure the temperature of the solution every 30 seconds for three minutes. Record your results in the table. At the end of the experiment, pour about 4 cm^3 of the solution into a test-tube for Experiment 3.

time / s	0	30	60	90	120	150	180
temperature of solution / °C							

[2]

(b) *Experiment 2*

Empty the polystyrene cup and rinse it with water.

Use a measuring cylinder to pour 25 cm^3 of distilled water into the polystyrene cup.
Measure the temperature of the water and record it in the table below.

Add all of solid **N** to the water, start the timer and stir the solution with the thermometer.

Measure the temperature of the solution every 30 seconds for three minutes. Record your results in the table.

time / s	0	30	60	90	120	150	180
temperature of solution / °C							

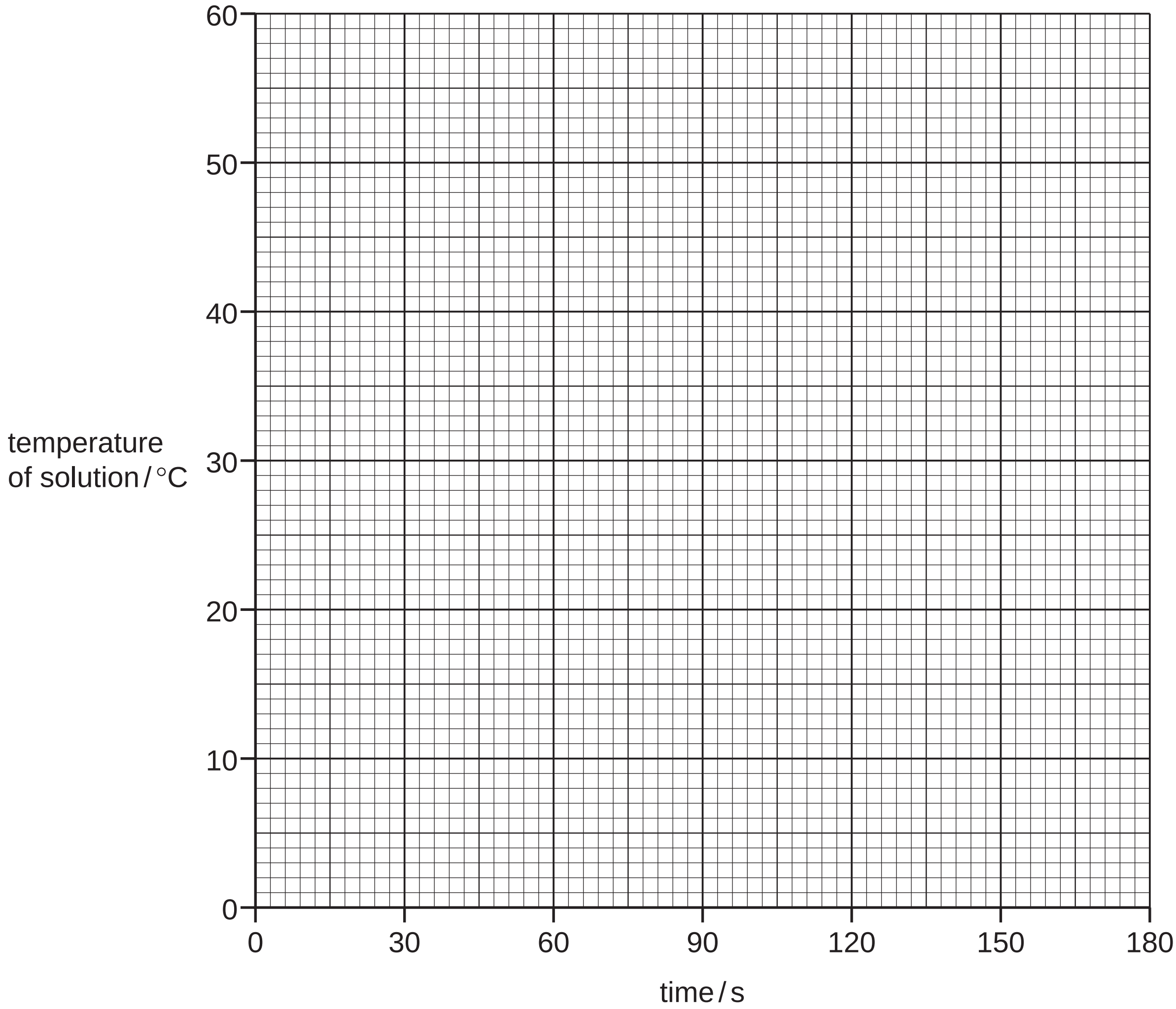
[2]

(c) *Experiment 3*

To about 4 cm^3 of the solution from Experiment 1, add about 1 cm^3 of dilute sulfuric acid.
Record your observation.

.... [1]

(d) Plot the results for Experiments 1 and 2 on the grid and draw two smooth line graphs. Clearly label your graphs.



[6]

(e) (i) **From your graph**, deduce the temperature of the solution in Experiment 1 after 45 seconds.
Show clearly **on the graph** how you worked out your answer.

.... °C [2]

(ii) **From your graph**, deduce how long it takes for the initial temperature of the solution in Experiment 2 to change by 2 °C.
Show clearly **on the graph** how you worked out your answer.

.... s [2]

(f) From your results in Experiment 2, what type of chemical process occurs when substance **N** dissolves in water?

.... [1]

(g) What conclusion can you draw from Experiment 3?

.... [1]

(h) Suggest the effect on the results if Experiment 1 was repeated using 50 cm^3 of distilled water.

....

.... [2]

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

....

.... [2]

(j) When carrying out the experiments, what would be the advantage of taking the temperature readings every 10 seconds?

....

.... [1]

[Total: 22]

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

tests	**observations**
<u>tests on solid **P**</u> Use a spatula to divide solid **P** into two separate boiling tubes. **(a)** Describe the appearance of solid **P**.	....
(b) (i) Add about 3 cm^3 of dilute sulfuric acid to the first boiling tube of **P** and warm the mixture for two minutes. Allow the mixture to settle. Decant the solution into two equal portions in separate test-tubes. Add an equal volume of distilled water to each test-tube. Carry out the following tests. **(ii)** Add several drops of aqueous sodium hydroxide to the first portion of the solution and shake the test-tube. Now add excess sodium hydroxide to the test-tube. **(iii)** Add aqueous potassium iodide to the second portion of the solution, shake and leave to stand for ten minutes.	.... [1] .... [2] .... [2]
(c) To the second boiling tube of **P** add about 2 cm^3 of dilute hydrochloric acid and warm the mixture for two minutes. Allow the mixture to settle. Decant off 1 cm^3 of the liquid into a test-tube. Add aqueous ammonia to the solution until no further change is seen.	.... [1] .... [3]

tests	observations
<u>tests on solid **Q**</u> **(d)** Describe the appearance of solid **Q**.	.... [1]
(e) **(i)** Add about 3 cm^3 of dilute sulfuric acid to solid **Q** in the boiling tube and warm the mixture for two minutes. Allow the mixture to settle. Decant the solution into two equal portions in separate test-tubes.	.... [2]
(ii) Add aqueous sodium hydroxide to the first portion until there is no further change.	.... [1]
(iii) Add aqueous ammonia to the second portion until there is no further change.	.... [2]

(f) Identify solid **P**.

.... [2]

(g) Draw a conclusion about **Q**.

.... [1]

[Total: 18]

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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