Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

7312444178

CHEMISTRY **0620/52**

Paper 5 Practical Test **February/March 2015**

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.

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CAMBRIDGE International Examinations

[Turn over

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1 You are going to investigate the solubility of salt **D** in water at various temperatures.

Read all the instructions below carefully before starting the experiments.

Instructions
You are going to carry out four experiments.

(a) *Experiment 1*

You are provided with a clean boiling tube containing 4 g of salt **D**.
Fill the burette provided with distilled water and add 10.0 cm^3 of water to the boiling tube. Heat the mixture of salt **D** and water **carefully** until all of the solid has dissolved.

Remove the boiling tube from the heat and allow the solution to cool. Stir the solution gently with the thermometer.

Note the temperature at which crystals **first appear** and record the temperature in the table at the top of **page 4**.

Keep the boiling tube and its contents for the remaining three experiments in this question.

(b) *Experiment 2*

From the burette, add a further 2.0 cm^3 of water to the boiling tube and contents from Experiment 1.

Heat the mixture to dissolve the crystals as before. Find the temperature at which crystals first appear.
It will help if the boiling tube is dipped for **short** periods of time in a beaker of cold water to speed up the rate of cooling.
Record, in the table, the total volume of water in the boiling tube and the temperature at which crystals first appear.

(c) *Experiment 3*

From the burette, add a further 2.0 cm^3 of water to the boiling tube and contents from Experiment 2. Repeat the experiment exactly as before.
Record, in the table, the total volume of water in the boiling tube and the temperature at which crystals first appear.

(d) *Experiment 4*

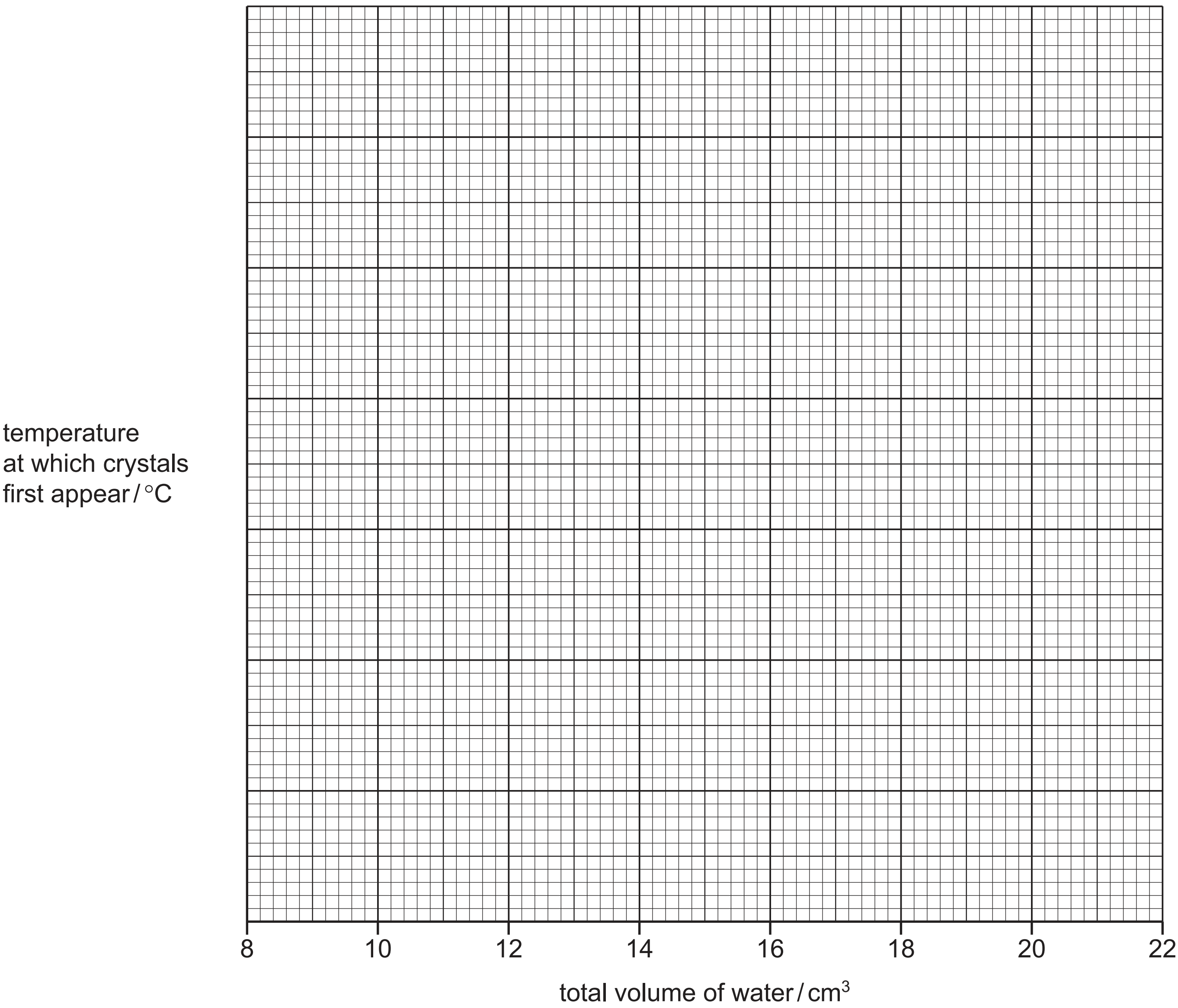
From the burette, add a further 4.0 cm^3 of water to the boiling tube and contents from Experiment 3. Repeat the experiment exactly as before.
Note all the results in the table.

At the end of Experiment 4, the total volume of water in the boiling tube will be 18.0 cm^3.

Experiment number	total volume of water / cm^3	temperature at which crystals first appear / °C
1	10.0	
2		
3		
4		

[5]

(e) Plot the results on the grid below and draw a smooth line graph.



[5]

(f) **From your graph**, find the temperature at which crystals of **D** would first appear if the total volume of water in the solution was 20.0 cm^3.
Show clearly **on the grid** how you worked out your answer.

.............................°C [2]

(g) How did you know when salt **D** was completely dissolved in the water?

.... [1]

(h) The solubility of salt **D** at 100 °C is 57 g in 100 cm^3 of water.

Suggest, with a reason, the effect of using 8 g of salt **D** instead of 4 g in these experiments.

....

.... [2]

(i) Salt **C** is less soluble in water than salt **D**.

Sketch on the grid the graph you would expect for salt **C**. Label this graph. [2]

(j) Describe and explain **one** improvement that could be made to the experimental method to obtain more reliable results in this investigation.

improvement ....

explanation ....

....

.... [2]

[Total: 19]

Before moving on to Question 2, carefully place your solution of salt **D**, boiling tube, stopper and thermometer into the container labelled **waste for Question 1**.

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

tests	**observations**
tests on solution **E** **(a)** Describe the appearance of solution **E**.	.... [1]
Divide the solution into three equal portions in separate test-tubes. **(b)** To the first portion of the solution, add a few drops of dilute nitric acid and about 1 cm^3 of aqueous barium nitrate.	.... [2]
(c) To the second portion of the solution, add excess aqueous sodium hydroxide and shake the mixture. Filter the mixture. Gently warm the filtrate and test the gas given off. Note how the residue on the filter paper changes after five minutes.	.... [1] .... [2] .... [1]
(d) To the third portion of the solution, add about 1 cm^3 of aqueous potassium manganate(VII). Now add aqueous sodium hydroxide to the mixture.	.... [1] .... [2]
tests on solution **F** **(e)** **(i)** Describe the appearance of solution **F**. **(ii)** Test the pH of solution **F**.	.... [1] .... [1]
(f) Add a few zinc granules to the solution **F** provided in the boiling tube. Shake the tube every minute. Note how the colour of the solution changes over the next five minutes.	.... [3]

(g) What conclusions can you draw about solution **E**?

....

.... [4]

(h) What conclusions can you draw about solution **F**?

....

.... [2]

[Total: 21]

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