Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

CHEMISTRY

0620/53

Paper 5 Practical Test

May/June 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

1 You are going to investigate what happens when four different solids, **D**, **E**, **F** and **G**, react with excess dilute hydrochloric acid. The solids are all calcium compounds.

Read all the instructions below carefully before starting the experiments.

Instructions
You are going to carry out four experiments.

(a) *Experiment 1*

Use a measuring cylinder to pour 30 cm^3 of hydrochloric acid into the polystyrene cup supported in the beaker provided. Measure the temperature of the hydrochloric acid and record it in the table below.
Add all of solid **D** to the hydrochloric acid and stir the mixture with the thermometer.

Measure the temperature reached by the liquid mixture. Record your result in the table. Record any observations.

observations .....

..... [1]

Empty the polystyrene cup and rinse it with water.

(b) *Experiment 2*

Repeat Experiment 1 using solid **E**.
Record your results in the table.

(c) *Experiment 3*

Repeat Experiment 1 using solid **F**.
Record your results in the table.

(d) *Experiment 4*

Repeat Experiment 1 using solid **G** but add 3-4 drops of Universal Indicator solution to the hydrochloric acid before adding the solid. Record your results in the table and note any observations below.

observations .....

..... [2]

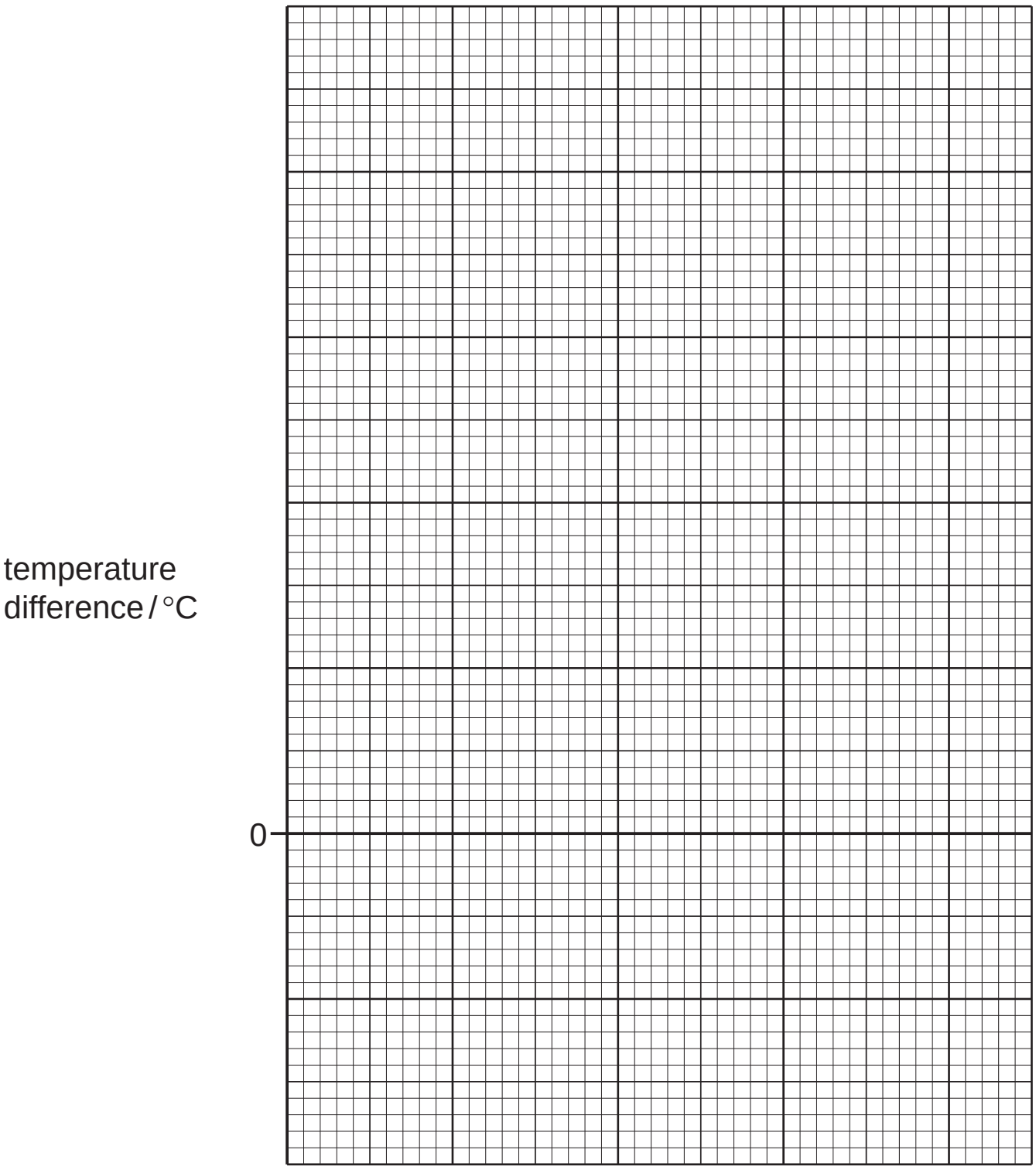
(e) Complete the final column in the table.

Experiment	solid added	initial temperature of acid / °C	temperature reached / °C	temperature difference / °C
1	**D**			
2	**E**			
3	**F**			
4	**G**			

[4]

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



[4]

Use the results and observations to answer the following questions.

(g) (i) What type of chemical process occurs when solid **D** reacts with hydrochloric acid?

..... [1]

(ii) What conclusion can you draw about solid **D** from your observations in Experiment 1?

..... [1]

(h) Which experiment produced the largest temperature difference?

..... [1]

(i) Explain your observations in Experiment 4.

.....

..... [2]

(j) Predict the temperature of the solution in Experiment 2 after 1 hour. Explain your prediction.

.....

..... [2]

(k) Suggest and explain the effect on the results if Experiment 2 was repeated using 60 cm^3 of hydrochloric acid.

.....

..... [2]

[Total: 20]

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2 You are provided with solid **H**. Solid **H** is a salt containing two cations and one anion.
Carry out the following tests on solid **H**, recording all of your observations in the table.
Conclusions must **not** be written in the table.

tests	observations
<u>tests on solid **H**</u> **(a)** Describe the appearance of solid **H**.	..... [1]
(b) Use a spatula to put half of solid **H** into a hard-glass test-tube. Heat the solid gently and then strongly. Test any gases given off with damp pH indicator paper.	.... [3]
<u>tests on a solution of **H**</u> **(c)** Add about 10 cm^3 of distilled water to the rest of solid **H**, stopper and shake to dissolve. Describe the appearance of the solution.	..... [1]
Divide the solution into four equal portions in four test-tubes. Carry out the following tests. **(d)** To the first portion of the solution, add aqueous sodium hydroxide using a teat pipette and shake the test-tube. Now add excess sodium hydroxide to the test-tube. Heat the mixture gently and test any gases given off.	..... [2] ..... [1] .... [2]
(e) To the second portion of the solution, add excess aqueous ammonia solution.	..... [1]

tests	observations
(f) To the third portion of the solution, add a few drops of dilute nitric acid and about 1 cm^3 of aqueous silver nitrate.	..... [1]
(g) To the fourth portion of the solution, add a few drops of dilute nitric acid followed by about 1 cm^3 of barium nitrate solution.	.... [2]

(h) What does test **(b)** tell you about the nature of solid **H**?

.....

..... [2]

(i) What does test **(f)** tell you about the nature of solid **H**?

..... [1]

(j) What conclusions can you draw about the identity of solid **H**?

.....

..... [3]

[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

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