UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME		
CENTRE NUMBER		CANDIDATE NUMBER

8601854076

CHEMISTRY **0620/51**

Paper 5 Practical Test **May/June 2013**

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 a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, 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	

This document consists of **7** printed pages and **1** blank page.

For Examiner's Use

1 You are going to investigate what happens when two different solids, **C** and **D**, react with excess dilute hydrochloric acid.

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 30 cm^3 of dilute hydrochloric acid into the polystyrene cup supported in the beaker provided. Measure the temperature of the dilute hydrochloric acid and record it in the table below. Add 1 g of solid **C** to the dilute hydrochloric acid and stir the mixture with the thermometer.
Measure the maximum temperature reached by the liquid mixture. Record your result in the table.

(b) *Experiment 2*

Empty the polystyrene cup and rinse it with water.
Repeat Experiment 1 using 2 g of solid **C**.
Record your results in the table.

(c) *Experiments 3 and 4*

Repeat Experiment 2 using 3 g and then 5 g of solid **C**.
Record your results in the table.

Complete the final column in the table.

Experiment	mass of solid **C** / g	initial temperature of acid / °C	maximum temperature reached / °C	temperature change / °C
1				
2				
3				
4				

[4]

(d) *Experiment 5*

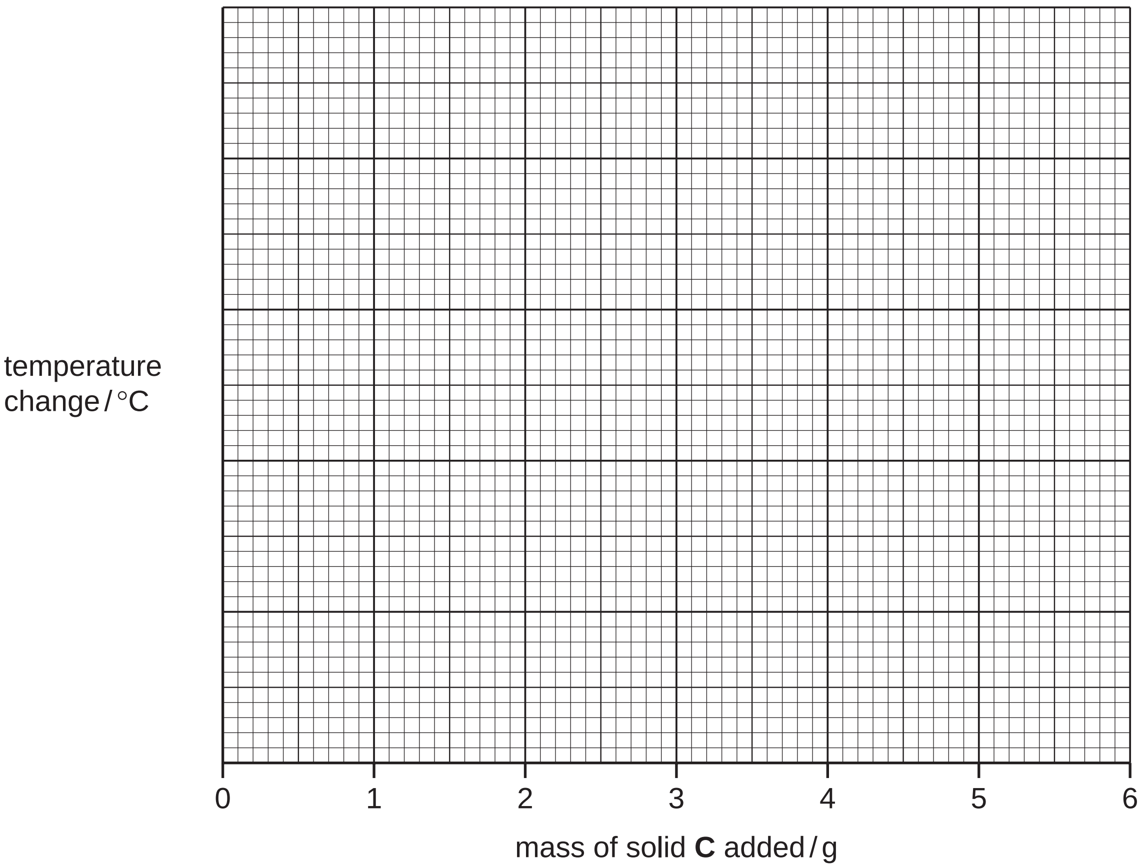
Repeat Experiment 1 using all of the solid **D** provided. Measure the minimum temperature reached by the liquid mixture. Record your results in the spaces below.

Initial temperature of dilute hydrochloric acid = ...°C

Final temperature of liquid mixture = ...°C

Temperature change = ...°C [2]

(e) Plot the results for Experiments 1, 2, 3 and 4 on the grid and draw a straight line graph.



[4]

(f) **(i)** **From your graph**, deduce the temperature change of the solution when 6 g of solid **C** is added to 30 cm^3 of dilute hydrochloric acid.
Show clearly **on the grid** how you worked out your answer.

.... °C [2]

(ii) **From your graph**, deduce the mass of solid **C** that would give a temperature rise of 9 °C when added to 30 cm^3 of dilute hydrochloric acid.
Show clearly **on the grid** how you worked out your answer.

....

.... [2]

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

.... [1]

(h) Suggest the effect on the results if Experiment 3 was repeated using 60 cm^3 of dilute hydrochloric acid.

....

.... [2]

(i) Predict the temperature of the solution in Experiment 4 after 1 hour. Explain your answer.

....

.... [2]

(j) When carrying out the experiments, what would be **one** advantage and **one** disadvantage of taking the temperature readings after exactly one minute?

advantage ....

....

disadvantage ....

.... [2]

[Total: 21]

2 You are provided with two different liquids, **A** and **B**.
A is an aqueous solution and **B** is a pure liquid.
Carry out the following tests on **A** and **B**, recording all of your observations in the table.
Conclusions must not be written in the table.

tests	**observations**
<u>tests on liquid **A**</u> Divide liquid **A** into four equal portions in separate test-tubes. **(a)** Describe the colour and smell of liquid **A**. Using a teat pipette, add a few drops of the liquid to Universal Indicator paper. Describe the colour and state the pH.	.... [1] .... [2]
(b) To the second portion of liquid **A**, add a piece of magnesium ribbon. After two minutes, test the gas given off with a splint.	.... [3]
(c) To the third portion of liquid **A**, add a marble chip.	.... [2]
(d) To the fourth portion of liquid **A**, add a spatula measure of copper oxide. Heat the solution gently and leave to settle.	.... [1]

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tests	observations
<u>tests on liquid **B**</u>	
(e) **(i)** To about 1 cm^3 of liquid **B**, add a few drops of dilute sulfuric acid followed by aqueous potassium dichromate(VI). Heat the mixture to boiling.	.... [2]
(ii) Repeat **(e)(i)** using aqueous potassium manganate(VII) instead of potassium dichromate(VI).	.... [2]
(f) Place a few drops of liquid **B** on a dry watch glass. Touch the surface of the liquid with a lighted splint.	.... [2]

(g) Identify liquid **A**.

.... [2]

(h) What conclusions can you draw about liquid **B**?

.... [2]

[Total: 19]

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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