UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

2536379922

CHEMISTRY **0620/52**

Paper 5 Practical Test **October/November 2010**

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.
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	
1	
2	
Total	

This document consists of **8** printed pages.

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UNIVERSITY *of* CAMBRIDGE
International Examinations

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

Read all instructions below carefully before starting the experiments.

Instructions
You are going to carry out two sets of experiments.

(a) *Experiment 1*

Using a measuring cylinder, pour 20 cm^3 of distilled water into the polystyrene cup provided. Put the cup into a 250 cm^3 beaker for support. Measure the temperature of the water and record it in the table below.

Add 2 g of solid **A** provided to the cup and stir the mixture with a thermometer. Measure and record the temperature of the solution after one minute. Pour the solution away and rinse the polystyrene cup.

Repeat the experiment using 3 g of the solid **A** provided. Record your results in the table.
Repeat the experiment using 4 g of the solid **A** provided. Record your results in the table.
Repeat the experiment using 6 g of the solid **A** provided. Record your results in the table.

mass of solid **A** / g	initial temperature / °C	final temperature / °C
2		
3		
4		
6		

[3]

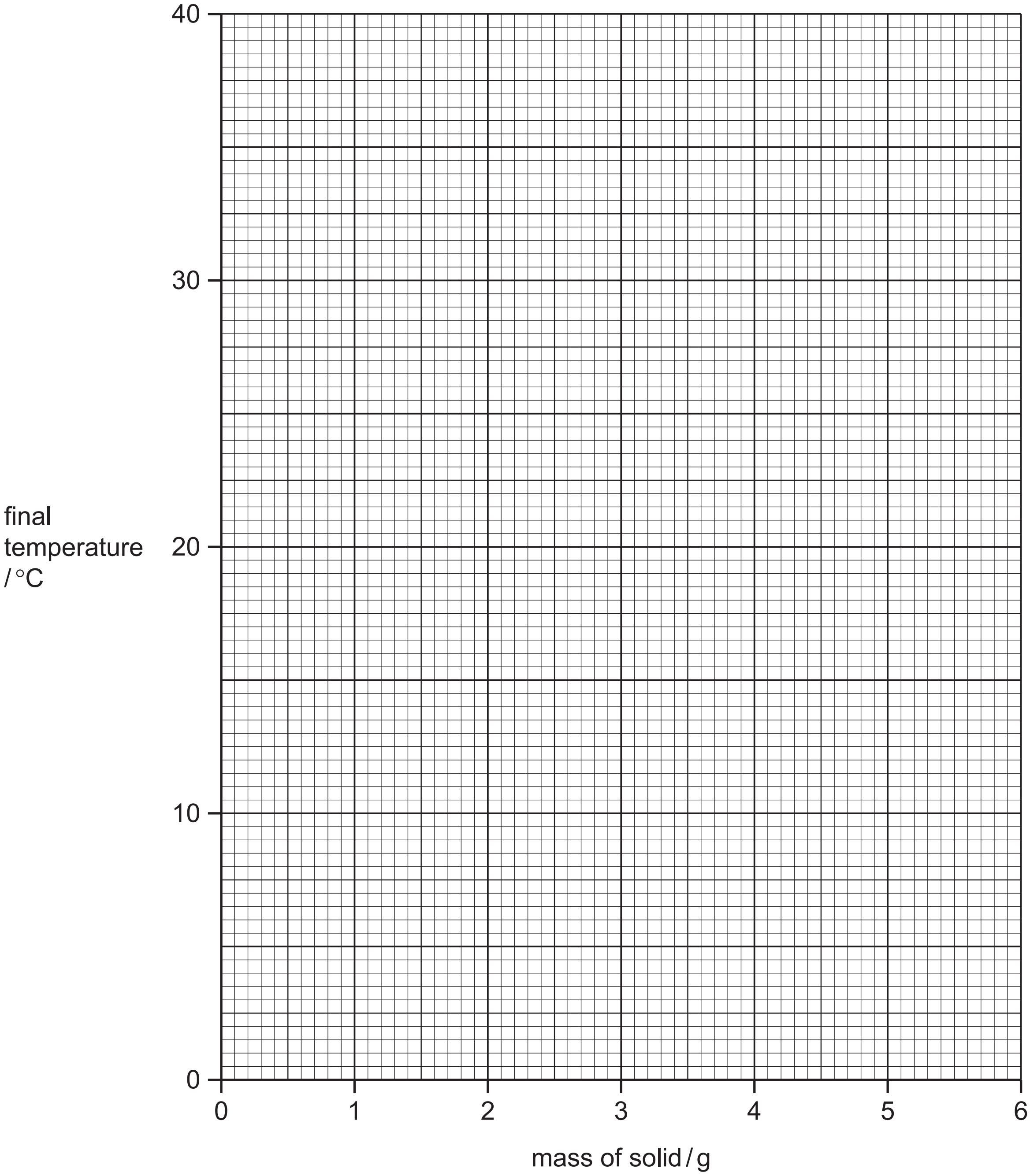
(b) *Experiment 2*

Repeat experiment 1 using 2 g, 3 g and 4 g of solid **B** respectively.
Record your results in the table below.

mass of solid **B** / g	initial temperature / °C	final temperature / °C
2		
3		
4		

[2]

(c) Plot the results of the experiments on the grid below. Draw two best-fit straight line graphs.
Clearly label your graphs.



[6]

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(d) **(i)** **Use your graph** to estimate the temperature of the reaction mixture if 6 g of solid **B** was added to 20 cm^3 of water.
Show clearly **on the grid** how you worked out your answer.

.... [2]

(ii) **From your graph**, work out the temperature of the reaction mixture if 5 g of solid **A** was added to 20 cm^3 of water.
Show clearly **on the graph** how you worked out your answer.

.... [2]

(e) What type of chemical reaction occurs when solid **A** dissolves in water?

.... [1]

(f) Explain how the temperature changes would differ in the experiments if 40 cm^3 of water was used.

....

....

.... [2]

(g) Predict the effect of using lumps of solid **B** in Experiment 2. Explain your answer.

....

.... [2]

(h) Suggest **one** change you could make to the **apparatus** used in the experiments to obtain more accurate results.

....

.... [1]

[Total: 21]

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2 You are provided with a mixture of two solids, **C** and **D**. Solid **C** is water-soluble and **D** is insoluble. Carry out the following tests on **C** and **D**, recording all of your observations in the table.
Conclusions must **not** be written in the table.

tests	observations
Add 15 cm^3 of distilled water to the mixture in the boiling tube. Stopper and shake the boiling tube for two minutes. Filter the contents of the tube, keeping the filtrate and the residue for the following tests.	
test on the filtrate **(a)** To about 1 cm^3 of the solution, add a few drops of dilute nitric acid and about 1 cm^3 of aqueous potassium iodide.	.... [2]
(b) To about 1 cm^3 of the solution add about 1 cm^3 of dilute hydrochloric acid.	.... [1]
(c) To about 1 cm^3 of the solution add an equal volume of aqueous sodium hydroxide. Now add a small spatula measure of aluminium powder and warm the mixture **carefully**. Test any gases given off.	.... [2]

tests	observations
<u>tests on the residue</u> Wash the residue in the filter paper with a little distilled water. Using a spatula, transfer some of the solid residue from the filter paper into two test-tubes. **(d)** Heat the solid in the first test-tube gently and then strongly. Leave the test-tube to cool.	.... [2]
(e) Add about 2 cm^3 of dilute hydrochloric acid to the second test-tube. Test the gas given off with limewater.	.... [2]
(f) After 2 minutes, add an equal volume of distilled water and shake the test-tube. Decant off the liquid and divide into two approximately equal portions. **(i)** To the first portion add aqueous sodium hydroxide a little at a time until in excess.	.... [2]
(ii) To the second portion add aqueous ammonia a little at a time until in excess.	.... [2]

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

.... [1]

(h) Identify solid **C**.

.... [2]

(i) What conclusions can you draw about solid **D**?

....

....

.... [3]

[Total: 19]

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