UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

4263914068

CHEMISTRY **0620/51**

Paper 5 Practical Test **May/June 2012**

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	
Total	

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

UNIVERSITY of CAMBRIDGE International Examinations

For Examiner's Use

1 You are going to investigate the reaction between aqueous lead nitrate and aqueous potassium chloride.

Read all the instructions below carefully before starting the experiment.

Instructions
You are going to carry out one experiment.

(a) *Experiment*

Using the measuring cylinder, pour 3 cm^3 of the aqueous lead nitrate provided into each of the six test-tubes in the test-tube rack. Label the test-tubes 1, 2, 3, 4, 5 and 6 respectively.

Fill the burette with the aqueous potassium chloride provided to the 0.0 cm^3 mark.

From the burette add 1.0 cm^3 of aqueous potassium chloride to test-tube 1.

Add 2.0 cm^3 of aqueous potassium chloride to test-tube 2.

Add 4.0 cm^3, 5.0 cm^3, 6.0 cm^3 and 7.0 cm^3 of aqueous potassium chloride to test-tubes 3, 4, 5 and 6 respectively.

Using a glass rod carefully stir the contents of each of the test-tubes. Leave the contents of the test-tubes to stand for 10 minutes.

You should start question 2 while waiting for the solid in the test-tubes to settle.

After 10 minutes, use a ruler to measure the height of the solid in each test-tube. Record your results in the table.

test-tube number	volume of aqueous potassium chloride / cm^3	height of solid / mm
1		
2		
3		
4		
5		
6		

[4]

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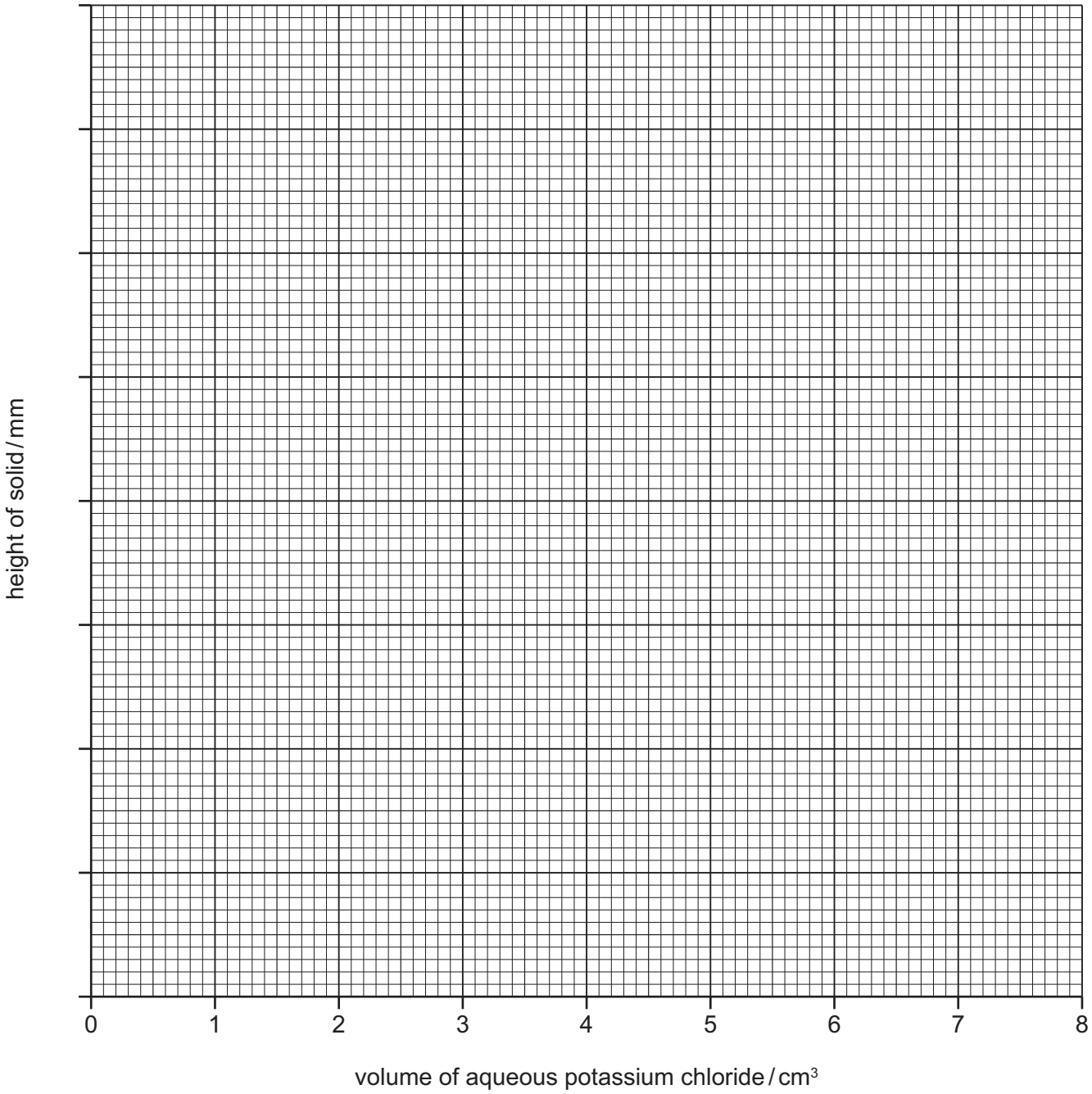
(b) Plot your results on the grid below. Draw a line graph.



[4]

(c) **From your graph**, find the height of the solid formed when 3.5 cm^3 of aqueous potassium chloride is added to 3 cm^3 of aqueous lead nitrate.
Show clearly **on the graph** how you obtained your answer.

..... [3]

(d) What type of chemical reaction occurs when aqueous potassium chloride reacts with aqueous lead nitrate?

..... [1]

(e) Describe the trend in the heights of the solids in test-tubes 1 to 6.

.....

.....

..... [2]

(f) Predict what would happen if the experiment were continued using three further test-tubes with 8 cm^3, 9 cm^3 and 10 cm^3 of aqueous potassium chloride. Explain your answer.

.....

.....

..... [2]

(g) What difference would be observed if the experiment was repeated using aqueous silver nitrate and aqueous potassium iodide?

.....

..... [1]

(h) Explain **one** improvement you could make to the experiment to obtain more accurate results.

improvement .....

explanation .....

..... [2]

[Total: 19]

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2 You are provided with solid **W**.
Carry out the following tests on **W**, recording all of your observations in the table.
Conclusions must **not** be written in the table.

tests	observations
<u>tests on solid **W**</u> **(a)** Describe the appearance of solid **W**.	..... [1]
Use a spatula to place about one spatula measure of **W** into each of four test-tubes to carry out the tests in **(b)**. **(b) (i)** Heat solid **W** gently and then strongly.	.....
	..... [2]
Leave the mixture to cool for five minutes. Add about 2 cm^3 of dilute hydrochloric acid. Test the gas given off with a lighted splint.	.....
	..... [2]
(ii) Add about 2 cm^3 of dilute hydrochloric acid to solid **W**. Test the gas given off.	.....
	..... [3]
(iii) To solid **W**, add about 5 cm^3 of aqueous copper sulfate.	.....
Heat the mixture gently.	..... [2]
(iv) To solid **W**, add one spatula measure of ammonium chloride and shake the test-tube. Heat the mixture gently. Test the gas given off with damp pH indicator paper.	.....
	..... [2]
<u>tests on aqueous **W**</u> **(c)** Pour 10 cm^3 of distilled water into a boiling tube. Measure and record the temperature of the water.	..... [2]
Add the rest of solid **W** to the water and stir with the thermometer. Measure and record the temperature of the solution after one minute.	..... [1]
Use pH indicator paper to record the pH of the solution.	..... [1]

(d) Identify the gas given off in test **(b)(ii)**.

..... [1]

(e) Identify the gas given off in test **(b)(iv)**.

..... [1]

(f) What type of change occurs when solid **W** dissolves in water in test **(c)**?

..... [1]

(g) What conclusions can you draw about solid **W**?

.....

..... [2]

[Total: 21]

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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