UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

9962014292

CHEMISTRY **0620/63**

Paper 6 Alternative to Practical **May/June 2013**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

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.

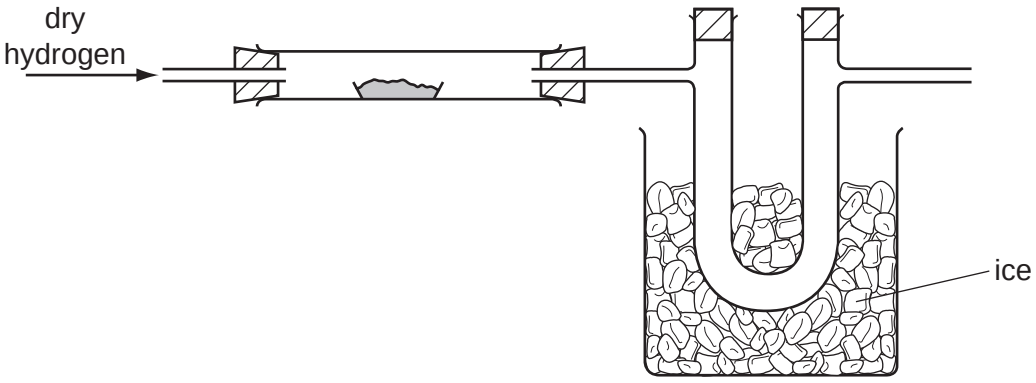
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **11** printed pages and **1** blank page.

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1 A student passed dry hydrogen gas over heated copper(II) oxide using the apparatus below. He wanted to collect and measure the water formed in the reaction.



(a) Use labelled arrows to indicate where

(i) the heat is applied,

(ii) the water collects. [2]

(b) The colour of the copper(II) oxide changes from black to ..... [1]

(c) Suggest why the hydrogen gas that was used had to be dry.

..... [1]

(d) Describe a chemical test for water.

test .....

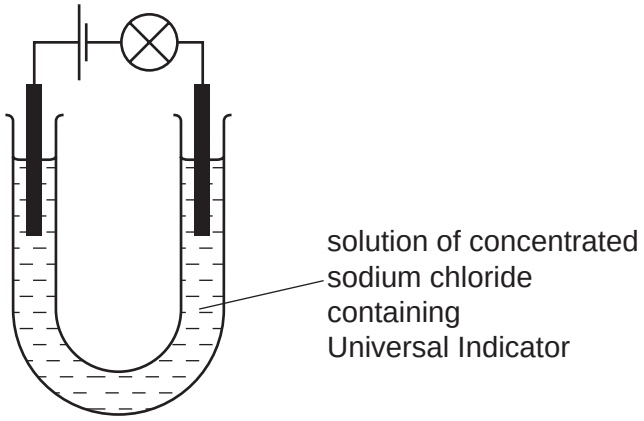
result ..... [2]

[Total: 6]

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2 Electricity was passed through a solution of concentrated sodium chloride containing Universal Indicator using the apparatus shown.



The bulb lit up. The solution near the negative electrode changed colour from green to purple.

(a) Give **one** other expected observation.

..... [1]

(b) Name a suitable non-metallic element for the electrodes.

..... [1]

(c) Name the process which uses electricity to break down solutions.

..... [1]

(d) **(i)** Explain why the Universal Indicator changed colour.

.....

..... [2]

(ii) Predict the colour of the indicator near the positive electrode. Explain your prediction.

colour .....

explanation ..... [2]

[Total: 7]

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3 A student investigated the reaction between potassium hydrogen carbonate, $KHCO_3$, and two aqueous solutions of dilute hydrochloric acid of different concentrations, labelled **F** and **G**.

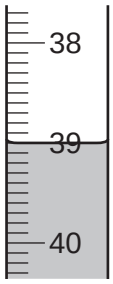
Two experiments were carried out.

(a) *Experiment 1*

Using a measuring cylinder, 20 cm^3 of distilled water was poured into a conical flask. A 0.3 g sample of potassium hydrogen carbonate was added to the flask and shaken to dissolve the solid.
Methyl orange indicator was added to the alkaline solution in the conical flask.

A burette was filled up to the 0.0 cm^3 mark with the solution **F** of dilute hydrochloric acid. Acid **F** was added from the burette until the solution in the flask just changed colour.

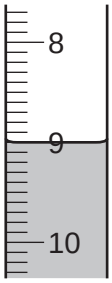
Use the burette diagram to record the final reading in the table below and complete the table for this experiment.



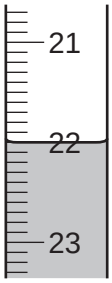
final reading

(b) *Experiment 2*

The conical flask was emptied and rinsed with distilled water.
The contents of the burette were poured away and the burette rinsed with distilled water and then the solution **G** of dilute hydrochloric acid. Experiment 1 was repeated using solution **G** instead of solution **F**.
Use the burette diagrams to record the readings in the table below and complete the table.



initial reading



final reading

	burette readings / cm^3	
	Experiment 1	Experiment 2
final reading		
initial reading		
difference		

[4]

(c) What colour change was observed in the contents of the flask after the hydrochloric acid was added to the flask?

from ..... to ..... [2]

(d) What type of chemical reaction occurred when hydrochloric acid reacted with potassium hydrogen carbonate?

..... [1]

(e) Complete the sentence below.

Experiment ..... needed the smallest volume of hydrochloric acid to change the colour of the methyl orange. [1]

(f) **(i)** Compare the volumes of hydrochloric acid used in Experiments 1 and 2.

..... [1]

(ii) The most concentrated solution of hydrochloric acid was solution ..... . [1]

(g) If Experiment 2 was repeated using 0.6 g of potassium hydrogen carbonate, what volume of hydrochloric acid would be needed?

..... [2]

(h) What would be a more accurate method of measuring the volume of the distilled water?

..... [1]

(i) Why was the burette rinsed with distilled water and then the solution **G** of dilute hydrochloric acid before starting Experiment 2?

.....

..... [2]

(j) What would be the effect on the results if the solutions of potassium hydrogen carbonate were warmed before adding the hydrochloric acid? Give a reason for your answer.

effect on results .....

reason ..... [2]

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(k) Describe a **different** method of finding out which of the solutions of hydrochloric acid, **F** or **G**, is the more concentrated.

.....

.....

.....

.....

..... [3]

[Total: 20]

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4 Two solids, **H** and **I**, were analysed. **H** was the salt copper ethanoate, $(CH_3COO)_2Cu$. The tests on the solids and some of the observations are in the following table. Complete the observations in the table.

tests	observations
<u>tests on solid **H**</u> Solid **H** was added to distilled water in a test-tube and shaken to dissolve. The solution was divided into three equal portions in test-tubes, and the following tests carried out.	
(a) Appearance of the solution.	..... [1]
(b) Aqueous sodium hydroxide was added to the second portion of the solution.	..... [2]
(c) Drops of aqueous ammonia were added to the third portion of the solution. Excess aqueous ammonia was then added to the mixture.	..... [2] .... [2]
<u>tests on solid **I**</u> **(d) (i)** Solid **I** was heated in a dry test-tube. The gas given off was tested with a lighted splint. The test-tube was left to cool. Dilute hydrochloric acid was then added to the test-tube. The gas given off was tested. **(ii)** Solid **I** was added to dilute nitric acid in a test-tube. The solution was warmed and the mixture smelled.	solid turned black and charred the gas ignited effervescence limewater turned milky smell of vinegar

(e) What conclusions can you draw about solid **I**?

.....

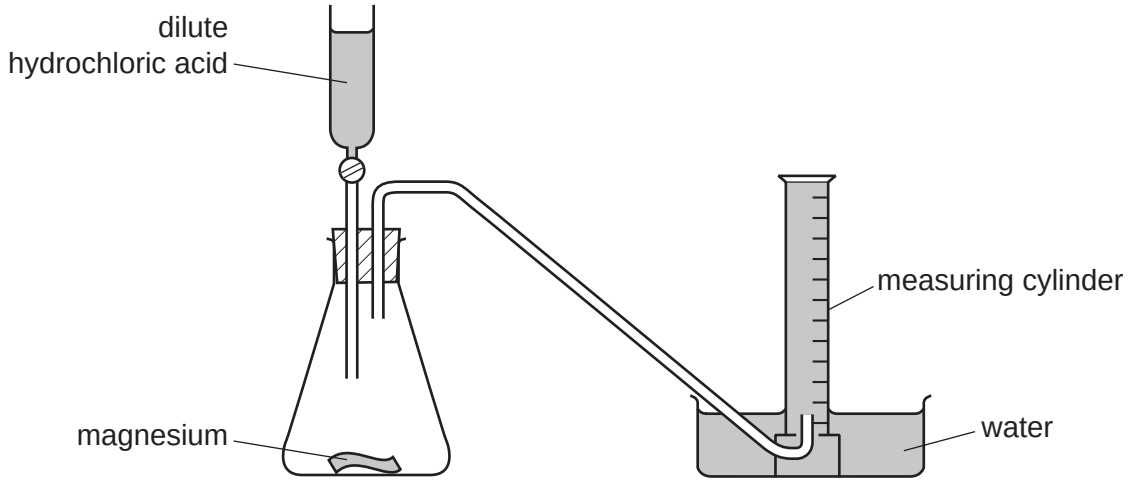
..... [2]

[Total: 9]

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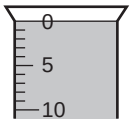
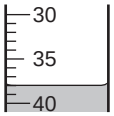
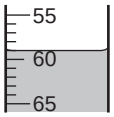
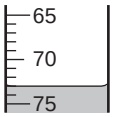
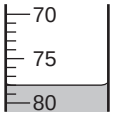
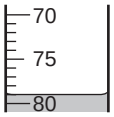
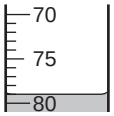
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5 A student investigated the rate of reaction between magnesium and excess dilute hydrochloric acid at room temperature. The apparatus was set up as shown in the diagram.



Using a tap funnel, 20 cm^3 of hydrochloric acid was added to 4 cm of magnesium ribbon. The volume of hydrogen produced was measured every minute for six minutes.

(a) Use the measuring cylinder diagrams to record the volumes of gas collected in the table of results.

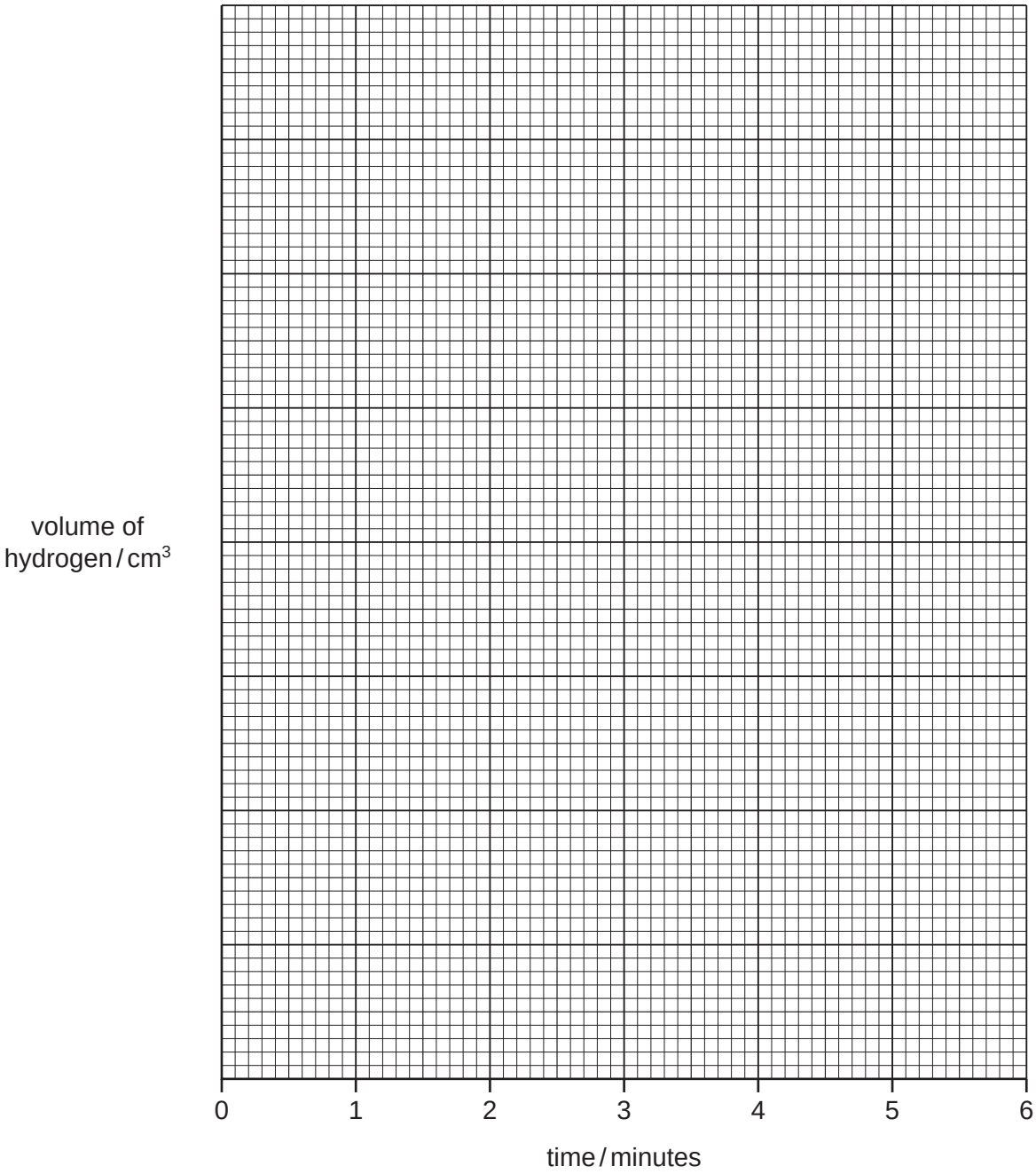
time / min	measuring cylinder diagram	total volume of gas collected / cm^3
0		
1		
2		
3		
4		
5		
6		

[2]

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(b) Plot the points on the grid and draw a smooth line graph.



[4]

(c) **From your graph**, find the time at which 50 cm^3 of gas was produced. Show clearly **on the graph** how you obtained your answer.

..... [2]

(d) Sketch **on the grid** the graph you would expect if the experiment was repeated using 2 cm of magnesium ribbon. [2]

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(e) Explain why the rate of reaction would be lower if the hydrochloric acid was cooled to 5 °C before the reaction.

.....

.....

..... [2]

[Total: 12]

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6 The table gives information about the solubility of three different solids, **W**, **X** and **Y**, in two different solvents.

substance	solubility in cold water	solubility in hot water	solubility in cyclohexane
W	insoluble	insoluble	very soluble
X	insoluble	very soluble	insoluble
Y	very soluble	very soluble	insoluble

You are provided with a mixture of the three substances, **W**, **X** and **Y**. Plan a method which could be used to separate pure dry samples of **W**, **X** and **Y** from the mixture.

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 6]

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