UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

5673438807

CHEMISTRY **0620/61**

Paper 6 Alternative to Practical **October/November 2012**

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.

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.

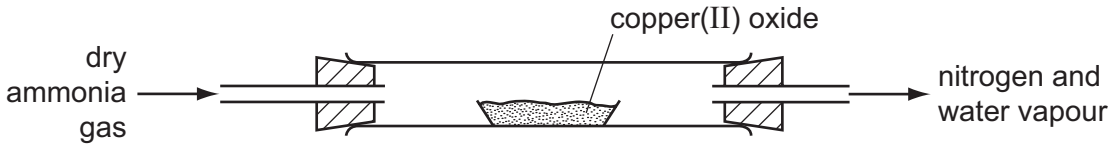
For Examiner's Use	
1	
2	
3	
4	
5	
6	
Total	

This document consists of **13** printed pages and **3** blank pages.

UNIVERSITY of CAMBRIDGE International Examinations

1 A student reacted dry ammonia gas with hot copper(II) oxide.
The apparatus used is shown below.
The equation for the reaction is

$$2NH_3 + 3CuO \rightarrow 3Cu + N_2 + 3H_2O$$



(a) Indicate with an arrow where the heat is applied. [1]

(b) The colour of the copper(II) oxide would change

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

(c) Draw a labelled diagram to show how liquid water could be obtained from the water vapour produced.

[2]

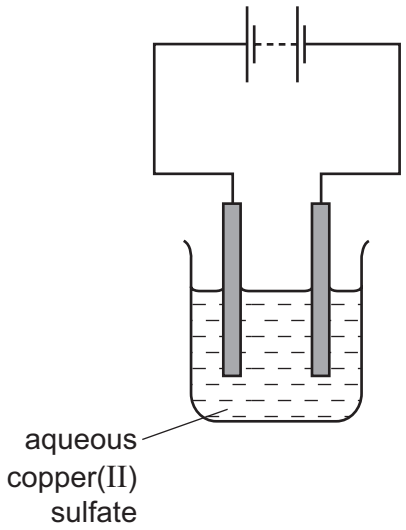
(d) Suggest the effect of nitrogen on a lighted splint.

..... [1]

[Total: 6]

For Examiner's Use

2 Electricity was passed through aqueous copper(II) sulfate using inert electrodes as shown in the diagram below.
Copper was deposited at one of the electrodes.



(a) Name a suitable material for the electrodes.

..... [1]

(b) At which electrode was copper deposited?

..... [1]

(c) Give **one** other observation seen during the electrolysis.

..... [1]

The electrode at which copper was deposited was removed at intervals, washed, dried and weighed.
The results are shown in the table on page 4.

(d) (i) Suggest how the electrode was washed?

..... [1]

(ii) How could the electrode be dried quickly?

..... [1]

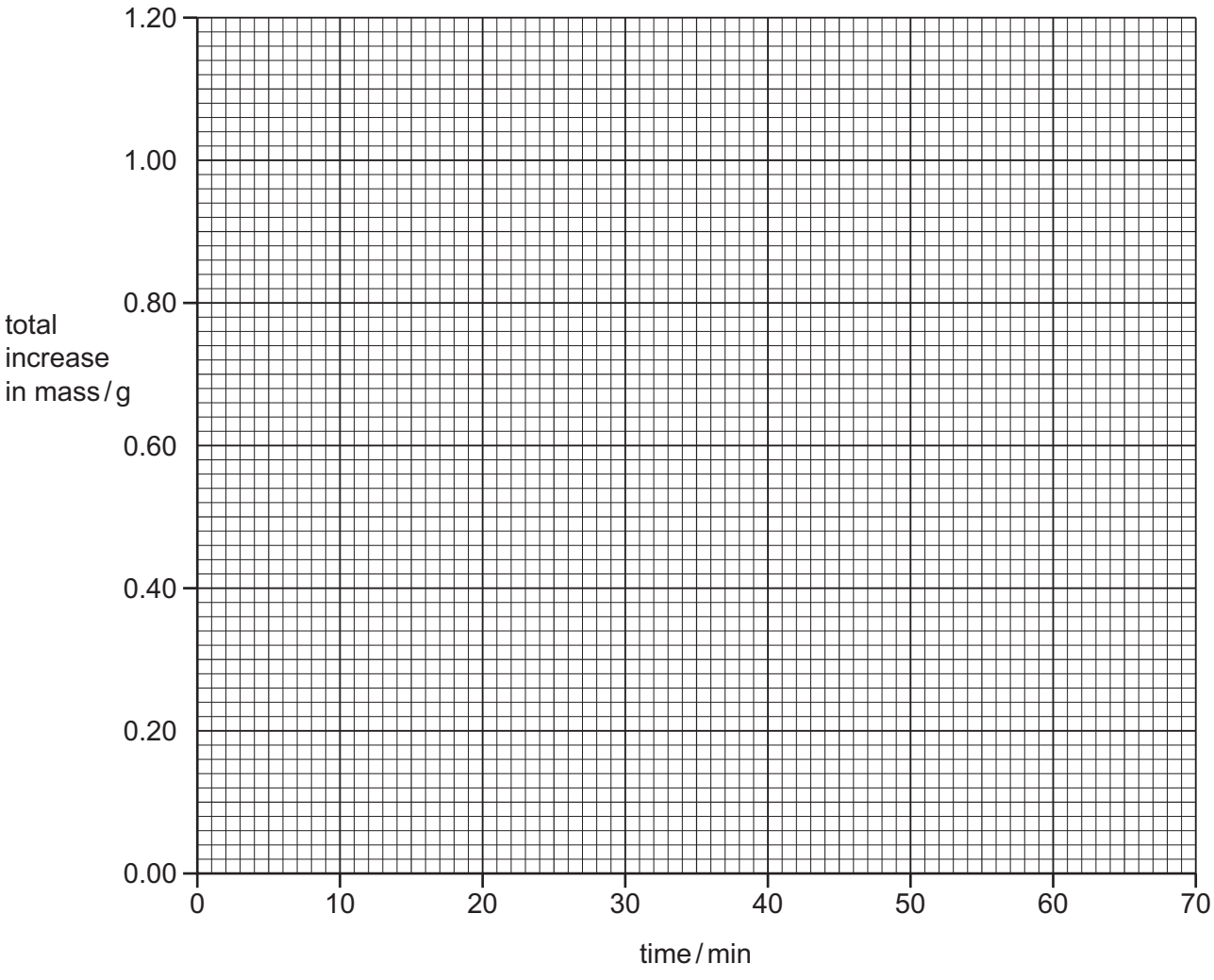
[Turn over

Table of results

time / min	mass of electrode / g	total increase in mass / g
0	3.75	0.00
10	4.00	0.25
20	4.25	0.50
30	4.50	
40	4.75	
50	4.90	
60	4.90	
70	4.90	

(e) Complete the table by calculating the total increase in mass for the remaining time intervals. [1]

(f) Plot the points on the grid below. Draw a graph with two intersecting straight lines.



[3]

For Examiner's Use

(g) Suggest why the last three readings were the same.

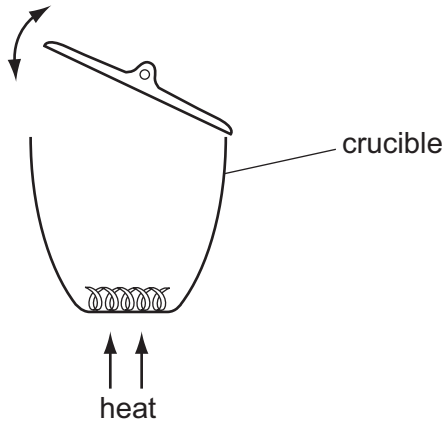
.....

..... [1]

[Total: 10]

For Examiner's Use

3 A student carried out an experiment to find the mass of magnesium oxide formed when magnesium burns in air.
A strip of magnesium ribbon was loosely coiled and placed in a weighed crucible, which was then reweighed.
The crucible was heated strongly for several minutes. During the heating, the crucible lid was lifted and replaced several times as in the diagram below.



The magnesium was converted into magnesium oxide. After cooling, the crucible and contents were reweighed.

(a) Describe the appearance of the

(i) magnesium ..... [1]

(ii) magnesium oxide. ..... [1]

(b) Name the element that reacted with the magnesium.

..... [1]

(c) Why was the lid lifted during heating?

..... [1]

(d) Suggest why the mass of the magnesium oxide was found to be **lower** than expected.

.....

..... [2]

[Total: 6]

For Examiner's Use

4 A student investigated the speed of reaction when iodine was produced by the reaction of solution **L** with potassium iodide at different temperatures.

Five experiments were carried out.

Experiment 1

A burette was filled with the aqueous solution **L** to the 0.0 cm^3 mark.
10.0 cm^3 of solution **L** was added from the burette into a boiling tube and the initial temperature of the solution was measured.

Using a measuring cylinder, 5 cm^3 of aqueous potassium iodide and 3 cm^3 of aqueous sodium thiosulfate were poured into a second boiling tube. Starch solution was added to this boiling tube and the mixture shaken.

The mixture in the second boiling tube was added to the solution **L**, shaken and the clock started. These chemicals reacted to form iodine which reacted with the starch. When a blue colour appeared, the clock was stopped and the time measured and recorded in the table. The final temperature of the mixture was measured.

Experiment 2

Experiment 1 was repeated but solution **L** was heated to about 40 °C. The temperature of the solution was measured before adding the mixture in the second boiling tube.
When a blue colour appeared, the clock was stopped and the time measured and recorded in the table. The final temperature of the mixture was measured.

Experiment 3

Experiment 2 was repeated, heating solution **L** to about 50 °C.

Experiment 4

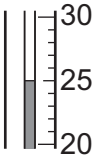
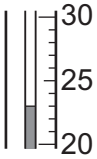
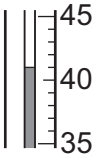
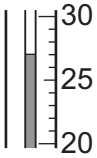
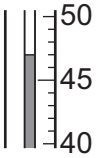
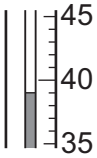
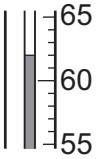
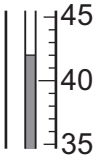
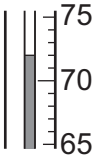
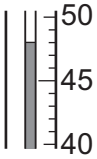
Experiment 2 was repeated, heating solution **L** to about 60 °C.

Experiment 5

Experiment 2 was repeated, heating solution **L** to about 70 °C.

[Turn over

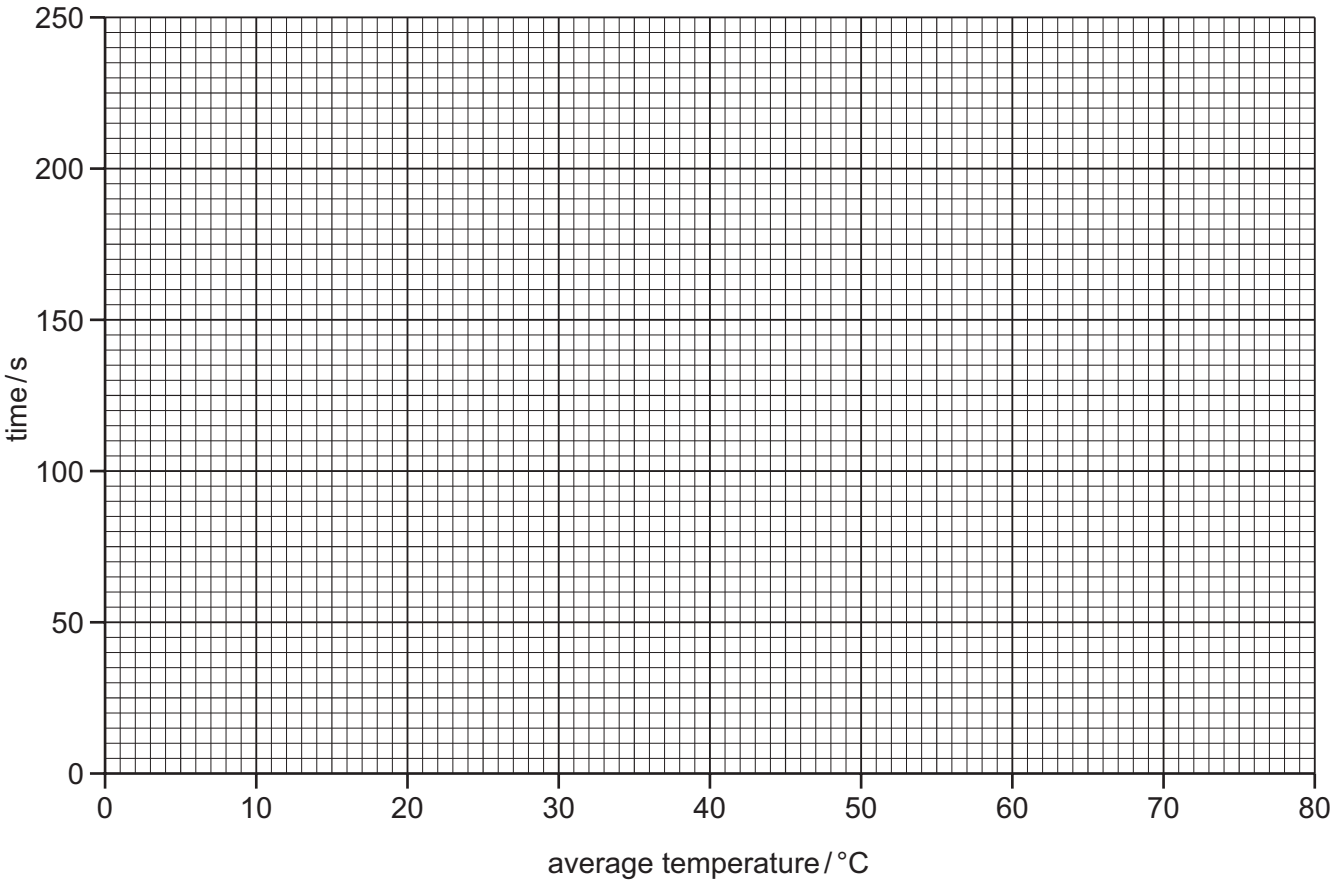
(a) Use the thermometer diagrams in the table to record the temperatures and complete the table.

experiment	thermometer diagram	initial temperature / °C	thermometer diagram	final temperature / °C	average temperature / °C	time / s
1						215
2						105
3						60
4						40
5						35

[5]

For Examiner's Use

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



[5]

(c) **From your graph**, work out the time taken for the blue colour to appear if solution **L** was heated to 80 °C. The final temperature of the reaction mixture was 64 °C.
Show clearly **on the grid** how you obtained your answer.

..... [2]

(d) Suggest the purpose of the starch solution in the experiments.

..... [1]

(e) **(i)** In which experiment was the reaction speed fastest?

..... [1]

(ii) Explain, using ideas about particles, why this experiment was the fastest.

.....

..... [2]

[Turn over

(f) Predict the effect on the time and speed of the reaction in Experiment 5 if it was repeated using a less concentrated solution of **L**.

time .....

speed ..... [2]

(g) Why was a burette used to measure solution **L** instead of a measuring cylinder?

.....

..... [1]

[Total: 19]

5 A mixture of two solids, **M** and **N**, was analysed.
Solid **M** was zinc sulfate which is water-soluble and solid **N** was insoluble.
The tests on the mixture, and some of the observations, are in the table.
Complete the observations in the table.

tests	observations
Distilled water was added to the mixture in a boiling tube and shaken. The contents of the tube were filtered and the filtrate and residue kept for the following tests.	
<u>tests on the filtrate</u> The filtrate was divided into four portions.	
(a) (i) Drops of aqueous sodium hydroxide were added to the first portion of the filtrate. Excess aqueous sodium hydroxide was then added. **(ii)** Drops of aqueous ammonia were added to the second portion of the filtrate. Excess aqueous ammonia was then added.	.... [3] .... [2]
(b) About 1 cm^3 of dilute nitric acid followed by silver nitrate solution was added to the third portion of the filtrate.	..... [1]
(c) About 1 cm^3 of dilute nitric acid followed by barium nitrate solution was added to the fourth portion of the filtrate.	..... [2]

tests	observations
<u>tests on the residue</u> **(d)** Appearance of the residue.	black solid
(e) Dilute hydrochloric acid was added to a little of the residue. The mixture was heated and the gas given off was tested with damp blue litmus paper.	effervescence pungent gas, bleached litmus paper
(f) Aqueous hydrogen peroxide was added to a little of the residue. The gas given off was tested.	effervescence glowing splint relit

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

..... [1]

(h) Identify the gas given off in test **(f)**.

..... [1]

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

.....

..... [2]

[Total: 12]

6

Which is the more pure - limestone or marble?

Calcium carbonate is found in limestone and in marble. All carbonates react with hydrochloric acid to form chlorides. Calcium carbonate is insoluble in water but calcium chloride is water soluble.
Most impurities in limestone and marble are insoluble.
Plan an experiment to find out which of limestone and marble contain most insoluble impurities.
You are provided with common laboratory apparatus.

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.....

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.....

.....

..... [7]

[Total: 7]

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