UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

2908924238

CHEMISTRY **0620/63**

Paper 6 Alternative to Practical **October/November 2010**

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.

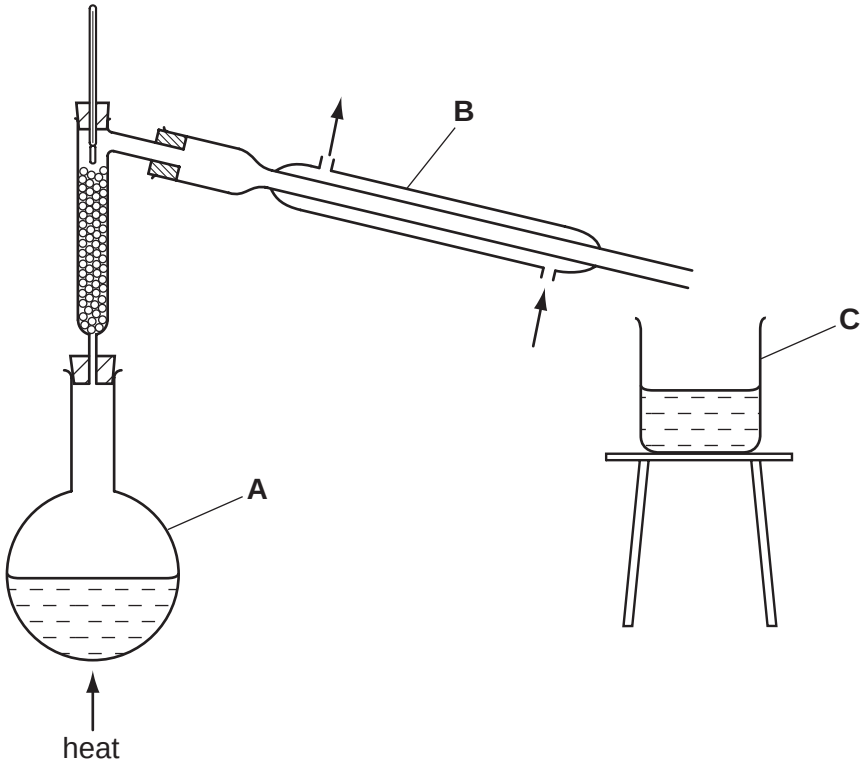
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
Total	

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

For Examiner's Use

1 A student separated a mixture of two alkanes, decane (b.p. 174 °C) and octane (b.p. 126 °C) using the apparatus shown below.



(a) (i) Name this method of separation.

..... [1]

(ii) Name the pieces of apparatus labelled

A .....

B ..... [2]

(b) Why would an electric heater be used rather than a flame for heating this mixture?

..... [1]

(c) Which of the two alkanes would be collected first at **C**?

..... [1]

(d) How would the student know when the second alkane began to be collected?

..... [1]

[Total: 6]

For Examiner's Use

2 The notes below show the steps taken by a student to prepare crystals of hydrated nickel nitrate, $Ni(NO_3)_2.6H_2O$.

Step 1 Place 25 cm^3 of dilute nitric acid in a beaker.

Step 2 Add nickel carbonate powder to the beaker until it is in excess.

Step 3 Separate the solution of nickel nitrate from the mixture.

Step 4 Heat the solution to obtain crystals of hydrated nickel nitrate.

(a) (i) Name the piece of apparatus used to measure the nitric acid in **Step 1**.

..... [1]

(ii) Why is it **not** necessary to heat the dilute nitric acid before adding the nickel carbonate?

..... [1]

(b) How would the student know when excess nickel carbonate was present in **Step 2**?

..... [1]

(c) Draw a diagram to show the separation method used in **Step 3**.

[2]

(d) How could the student make sure a good sample of crystals was obtained when carrying out **Step 4**? Explain your answer.

.....

.....

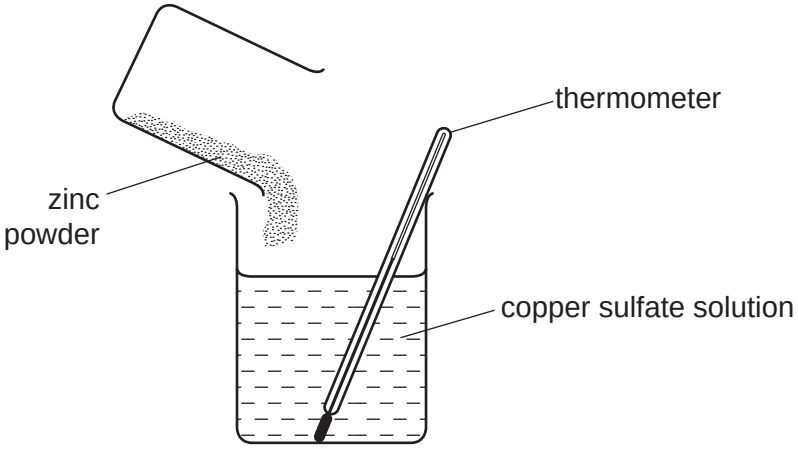
..... [2]

[Total: 7]

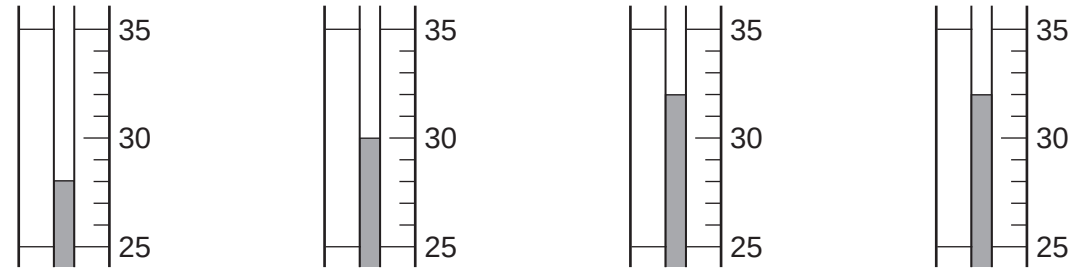
For Examiner's Use

3 Peter investigated the temperature change when 0.5 g of zinc powder was added to 50 cm^3 of copper sulfate solution in a beaker.

The experiment was repeated three times using different masses of zinc powder. The initial temperature of the copper sulfate solution was the same in each experiment.



The thermometer diagrams show the highest temperature reached.



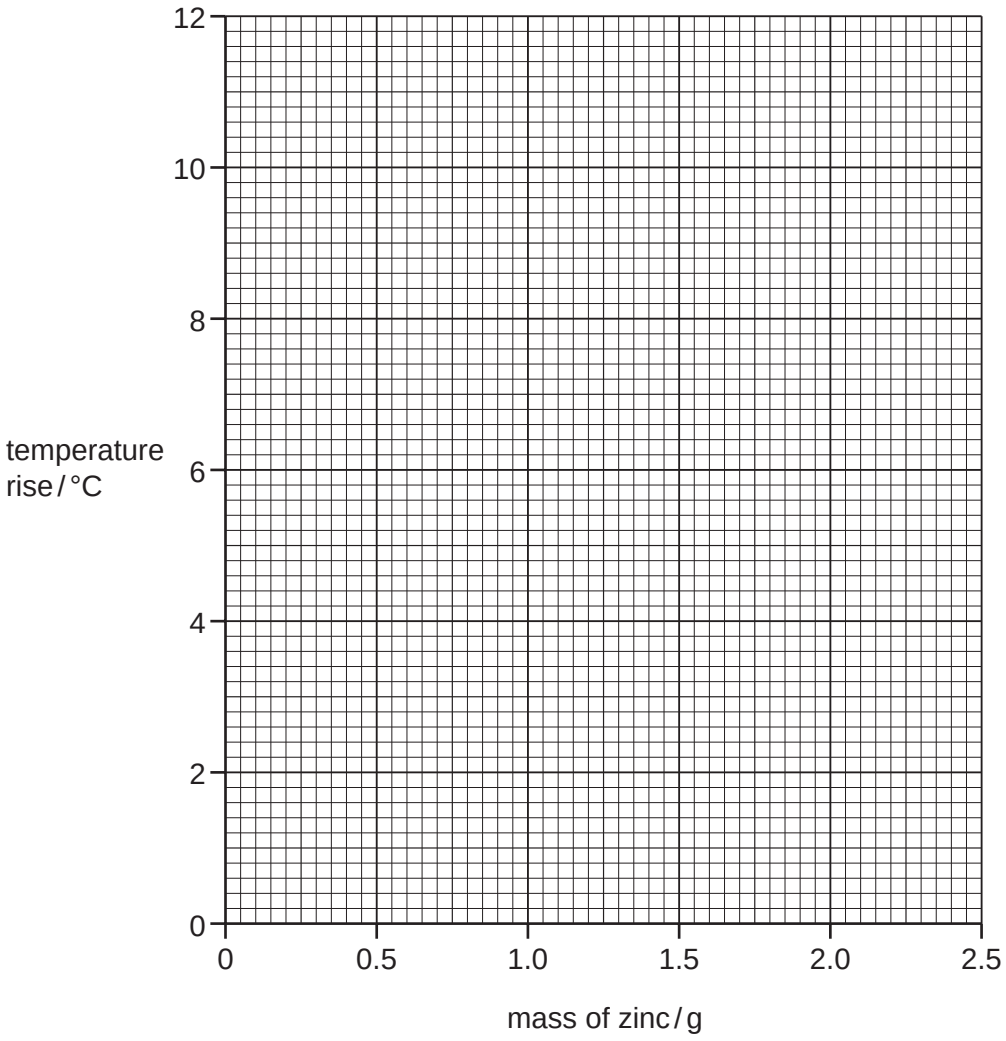
(a) Use the thermometer diagrams to complete the table of results.

Table of results

mass of zinc / g	initial temperature / °C	highest temperature / °C	temperature rise / °C
0.5	21		
1.0	21		
1.5	21		
2.0	21		

[2]

(b) Plot the results on the grid below and connect the points with straight lines.



[3]

(c) (i) **Use your graph** to find the mass of zinc required to produce a temperature rise of 6.0 °C. Show clearly **on the grid** how you obtained your answer.

..... [2]

(ii) Suggest why the temperature rise was the same in the last two experiments.

..... [1]

(d) Sketch on the grid the graph you would expect if the experiments were repeated using the same masses of magnesium powder. [2]

[Total: 10]

For Examiner's Use

4 **(a)** A student investigated the reaction between dilute hydrochloric acid and two different alkaline solutions, **F** and **G**.

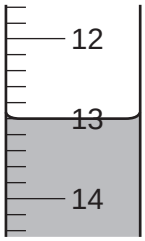
Two experiments were carried out.

Experiment 1

A burette was filled up to the 0.0 cm^3 mark with dilute hydrochloric acid.

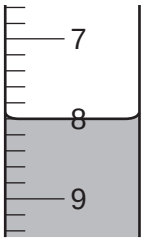
Using a measuring cylinder, 25 cm^3 of solution **F** was placed into a conical flask with a few drops of phenolphthalein indicator.

The hydrochloric acid was added to the flask until the colour of the phenolphthalein changed. Use the burette diagram to record the final volume in the table of results.

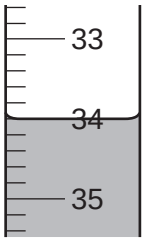


Experiment 2

Experiment 1 was repeated using solution **G**.
Use the burette diagrams to record the volumes and complete the table of results.



initial



final

Table of results

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

[4]

For Examiner's Use

(b) Which ion is present in all alkaline solutions?

..... [1]

(c) (i) In which Experiment was the greatest volume of hydrochloric acid used?

..... [1]

(ii) Compare the volumes of hydrochloric acid used in Experiments 1 and 2.

..... [1]

(iii) Suggest explanations for the difference in volumes.

.....

.....

..... [2]

(d) Predict the volume of hydrochloric acid which would be needed to react completely with 12.5 cm^3 of solution **G**. Explain your answer.

.....

..... [3]

(e) (i) State **two** sources of error in the experimental procedure.

1. .....

2. ..... [2]

(ii) Suggest **two** improvements to reduce the sources of error in the experimental procedure.

1. .....

2. ..... [2]

[Total: 16]

For Examiner's Use

5 Two salts, **W** and **X**, were analysed. **X** was iron(II) chloride.
The tests on each salt, and some of their observations, are in the following table.
Complete the observations in the table.

tests	observations
tests on salt **W**	
(a) A little of **W** was heated in a test-tube. Any gas given off was tested with damp pH indicator paper.	a white solid formed at the top of the test-tube pungent gas evolved, pH 8-10
(b) **W** was dissolved in distilled water in a test-tube. The solution was divided into three portions in test-tubes and the following tests carried out.	
(i) To the first portion, dilute hydrochloric acid was added and then aqueous barium chloride.	white precipitate
(ii) To the second portion, dilute nitric acid was added and then aqueous silver nitrate.	no visible reaction
(iii) To the third portion, aqueous sodium hydroxide was added. The mixture was heated and any gases given off were tested with damp pH indicator paper.	pungent gas evolved, pH 8-10
tests on salt **X**	
(c) Appearance of salt **X**.	..... [1]
(d) Salt **X** was dissolved in distilled water in a test-tube. The solution was divided into two portions.	
(i) To the first portion, excess aqueous sodium hydroxide was added.	.... [2]
(ii) To the second portion, a few drops of nitric acid was added followed by aqueous silver nitrate.	.... [2]

For Examiner's Use

(e) Identify the gas given off in tests **(a)** and **(b)(iii)**.

..... [1]

(f) What conclusions can you draw about salt **W**?

.....

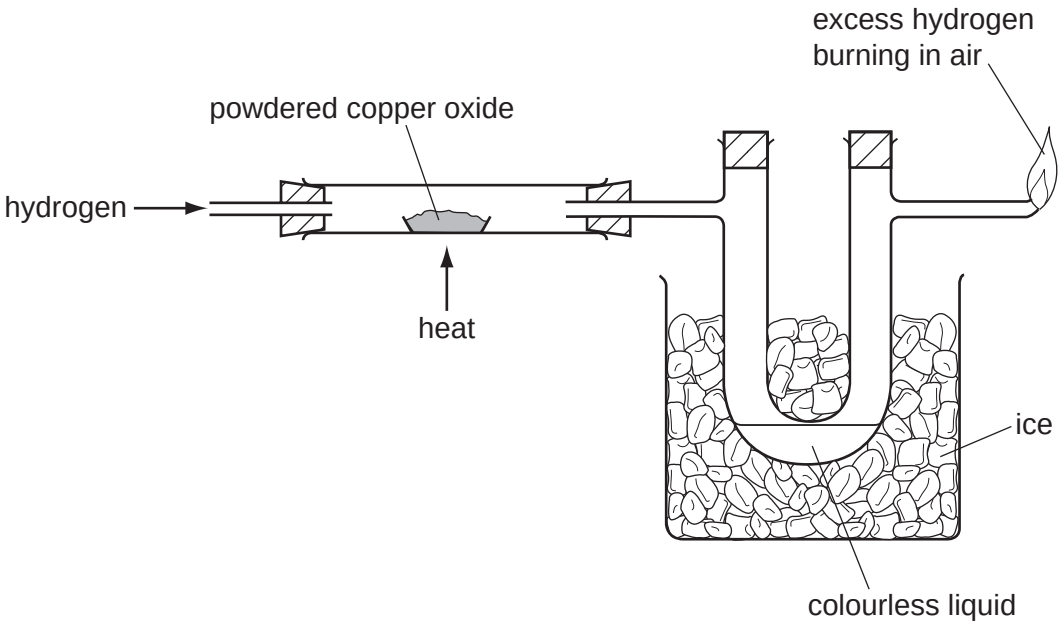
.....

..... [3]

[Total: 9]

For Examiner's Use

6 A student passed hydrogen over hot copper oxide using the apparatus below. Copper was formed.



(a) Explain why powdered copper oxide was used and not lumps of copper oxide.

.....

..... [2]

(b) The copper oxide changed colour from black to ..... [1]

(c) What caused the colourless liquid to form in the U-tube?

..... [1]

(d) Give a chemical test that could be carried out on the colourless liquid to show the presence of water.

test .....

result ..... [2]

[Total: 6]

For Examiner's Use

7 The label shows the substances present in a bottle of orange fruit drink.

ORANGE FRUIT DRINK

Contains: orange juice, malic acid, citric acid and natural colours (carotenes)

NO ARTIFICIAL COLOURS (E NUMBERS)

(a) A piece of pH indicator paper was dipped in the drink.

(i) Predict the pH value obtained.

..... [1]

(ii) Why does the pH indicator paper give a more reliable result than adding Universal Indicator solution to the drink?

.....

..... [1]

(b) Describe an experiment you could carry out to show that only natural colours were present in the drink.

A space has been left if you want to draw a diagram to help you answer the question.

.....

.....

.....

.....

..... [4]

[Total: 6]

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