UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

4045280680

CHEMISTRY **0620/62**

Paper 6 Alternative to Practical **October/November 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.

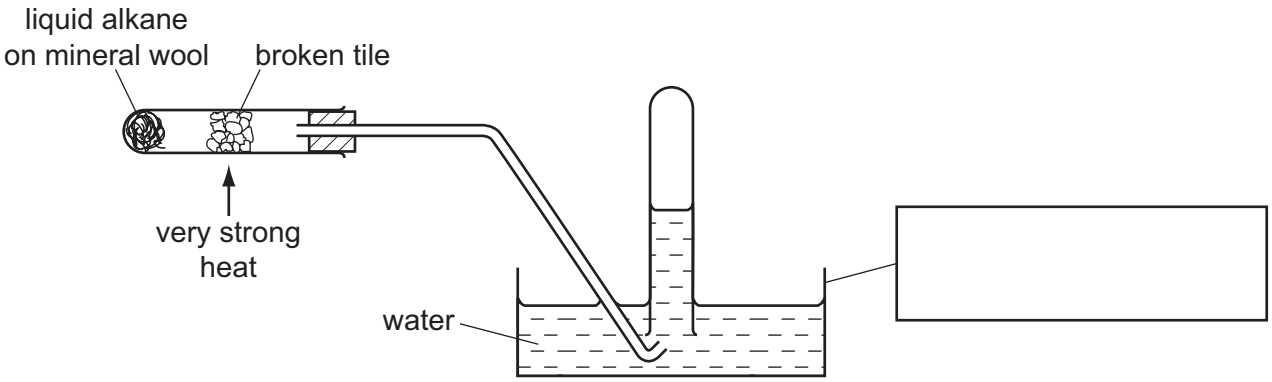
Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

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 **12** printed pages.

For Examiner's Use

1 Alkenes can be made by cracking long chain alkanes. A student used the apparatus below to demonstrate cracking.



(a) Complete the box to show the apparatus used. [1]

(b) Indicate with an arrow where the alkenes are collected. [1]

(c) Suggest the purpose of the mineral wool.

..... [1]

(d) Why are **small** pieces of broken tile used?

.....

..... [1]

(e) Describe a test to show that alkenes have been made.

test .....

result ..... [2]

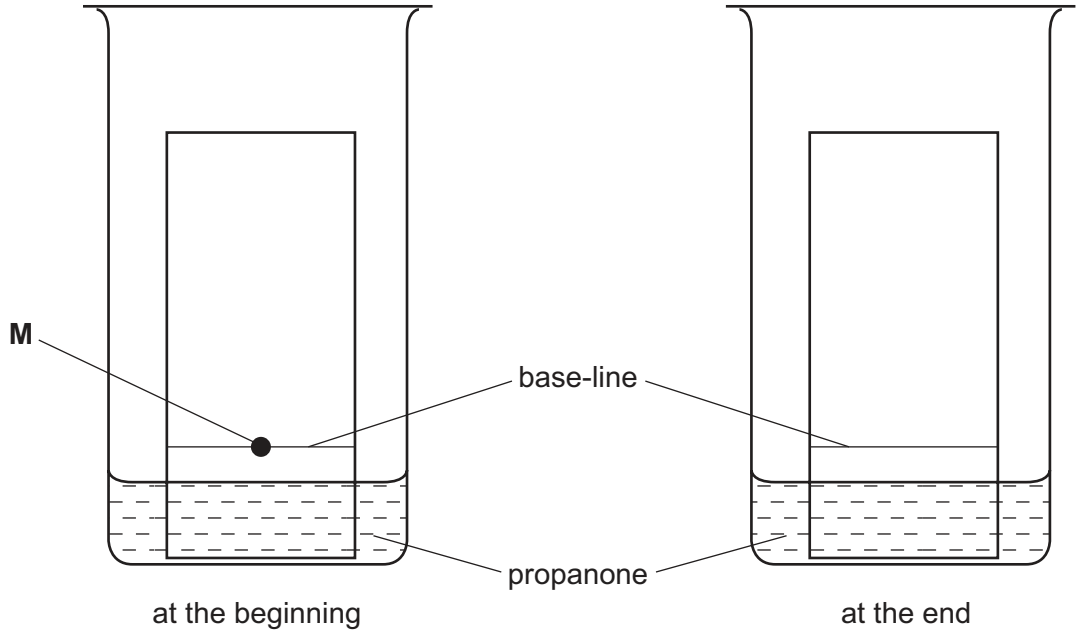
[Total: 6]

2 Substance **M** is a mixture of four dyes. Three of the dyes have different solubilities in propanone. The fourth dye is insoluble in propanone.

(a) Name the process that could be used to separate these dyes.

..... [1]

(b) Sketch on the right hand diagram the results you would expect if **M** was analysed as shown.



[2]

(c) Why is the base-line not drawn in ink?

.....

..... [1]

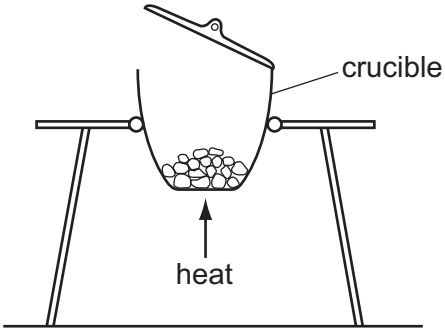
(d) Why must the level of the propanone be below the base-line?

..... [1]

[Total: 5]

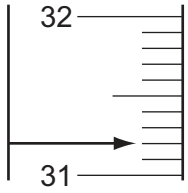
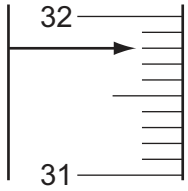
For Examiner's Use

3 A student investigated the formation of calcium oxide by heating calcium in air, using the apparatus shown.



She weighed an empty crucible and its lid. She then added some calcium to the crucible and reweighed it.

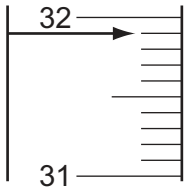
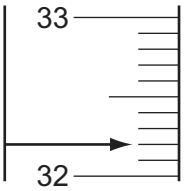
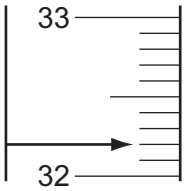
(a) Use the balance diagrams to record the masses in the table.

	balance diagram	mass / g
mass of crucible and lid		
mass of crucible, lid and calcium		

[1]

The student then heated the calcium in the crucible for ten minutes. The lid was raised occasionally using a pair of tongs. After ten minutes, the crucible was allowed to cool and reweighed. This procedure was repeated twice.

(b) Use the balance diagrams to complete the table of results.

time / min	10	20	30
balance diagram			
mass of crucible, lid and calcium oxide / g			

[2]

For Examiner's Use

(c) Why was the lid of the crucible raised occasionally?

..... [1]

(d) Explain why the crucible was heated three times.

.....

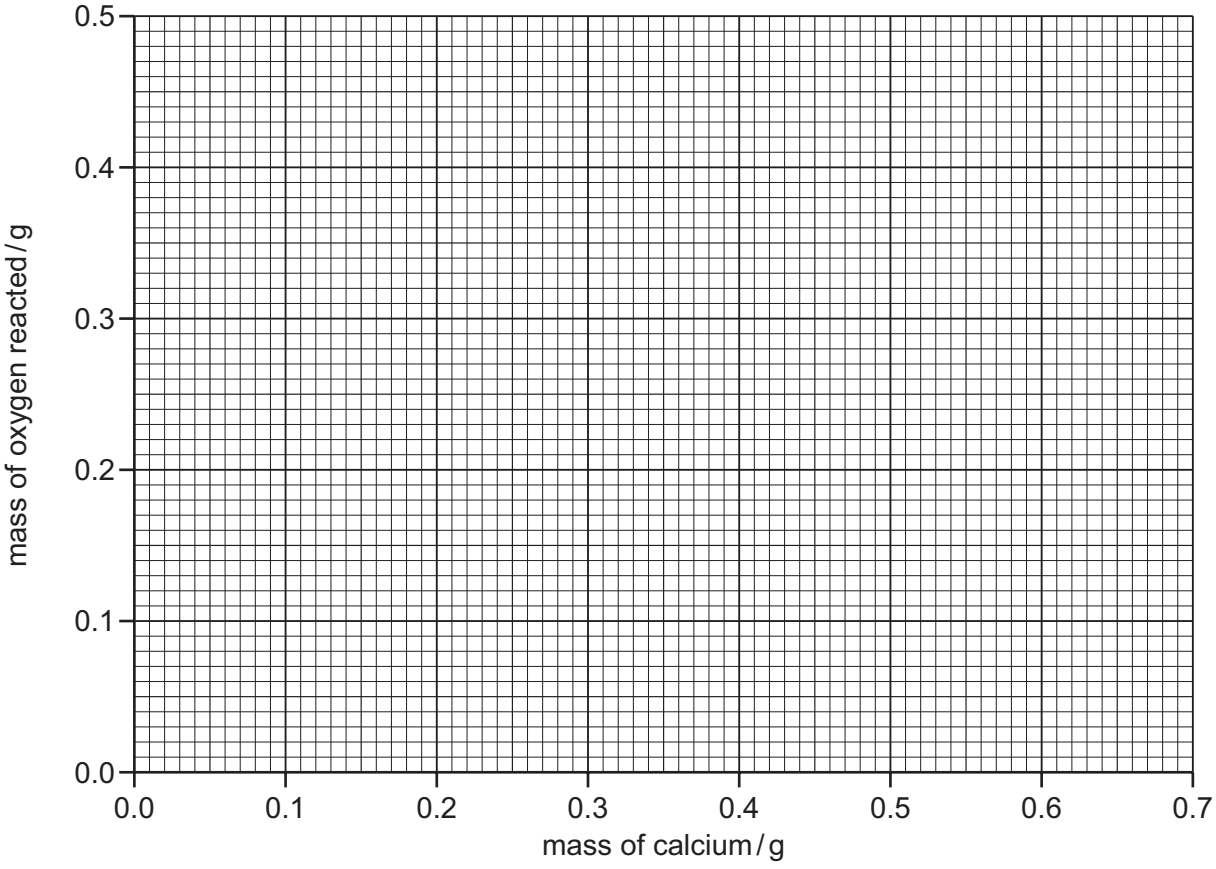
..... [2]

The table shows the results of experiments using different masses of calcium.

experiment	mass of calcium / g	mass of calcium oxide / g	mass of oxygen reacted / g
1	0.12	0.20	0.08
2	0.20	0.32	0.12
3	0.30	0.49	0.19
4	0.40	0.61	
5	0.44	0.72	
6	0.48	0.79	
7	0.56	0.92	

(e) Complete the table of results. [1]

(f) Plot the results on the grid and draw a straight line graph.



[5]

(g) Which result is inaccurate?

..... [1]

(h) **Use your graph** to work out the mass of calcium oxide formed when 0.7 g of calcium is heated in air. Show clearly on the grid how you used your graph.

[3]

[Total: 16]

For Examiner's Use

4 A student investigated what happened when dilute hydrochloric acid and aqueous copper(II) sulfate solution reacted with different metals.

Five experiments were carried out.

(a) *Experiment 1*

Using a measuring cylinder 10 cm^3 of dilute hydrochloric acid was poured into a boiling tube. The temperature of the solution was measured.
1 g of zinc powder was added to the boiling tube and the mixture stirred with the thermometer. The maximum temperature of the mixture was measured.

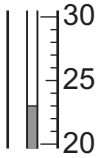
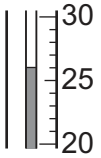
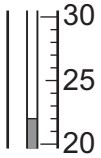
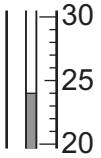
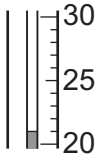
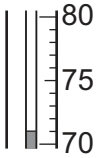
(b) *Experiment 2*

Experiment 1 was repeated using 1 g of iron powder instead of zinc. The initial and maximum temperatures were measured.

(c) *Experiment 3*

Experiment 1 was repeated using 1 g of magnesium powder instead of zinc. The initial and maximum temperatures were measured.

Use the thermometer diagrams to record the temperatures in the table. Complete the table.

experiment	thermometer diagram	initial temperature / °C	thermometer diagram	maximum temperature / °C	temperature rise / °C
1					
2					
3					

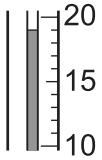
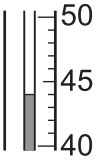
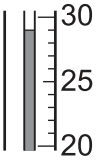
[3]

(d) *Experiment 4*

Using a measuring cylinder, 10 cm^3 of aqueous copper sulfate was poured into a boiling tube. The temperature of the solution was measured.
1 g of magnesium powder was added to the boiling tube and the mixture stirred with the thermometer.
The gas was tested with a lighted splint and a loud pop was observed. The maximum temperature of the mixture was measured.

(e) *Experiment 5*

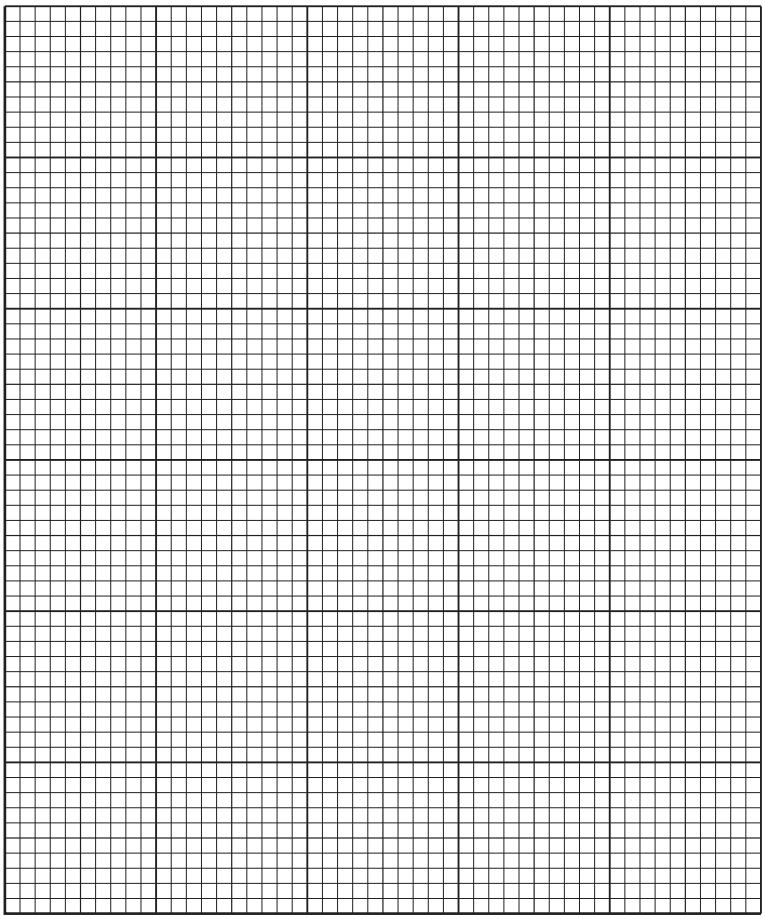
Experiment 4 was repeated using 1 g of iron powder instead of magnesium. A red-brown solid was formed.
Use the thermometer diagrams to record the temperatures in the table. Complete the table.

experiment	thermometer diagram	initial temperature / °C	thermometer diagram	maximum temperature / °C	temperature rise / °C
4					
5					

[3]

(f) Draw a labelled bar chart for the results of Experiments 1, 2, 3, 4 and 5 on the grid below.

temperature rise / °C



[5]

Use the results and observations to answer the following questions.

(g) (i) Which Experiment produced the largest temperature rise?

..... [1]

(ii) Suggest why this Experiment produced the largest temperature rise.

..... [1]

(h) Name the gas given off in Experiment 4.

..... [1]

(i) (i) Identify the red-brown solid formed in Experiment 5.

..... [1]

(ii) What type of chemical reaction occurs when iron reacts with aqueous copper(II) sulfate in Experiment 5?

..... [1]

(j) Predict the effect on the temperature change if 1 g of magnesium ribbon was used in Experiment 3. Explain your answer.

effect .....

explanation .....

..... [2]

(k) Suggest why potassium was not used as one of the metals in these experiments.

.....

..... [1]

[Total: 19]

For Examiner's Use

5 Two different liquids, **A** and **B**, were analysed.
A was an aqueous solution of ethanoic acid and **B** was a pure liquid.
The tests on the liquids and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
<u>tests on liquid **A**</u> Liquid **A** was divided into three equal portions in separate test-tubes.	
(a) Colour and smell of liquid **A**.	..... [1]
The liquid was added to Universal Indicator.	colour changed from green to ..... pH ..... [2]
(b) A piece of magnesium ribbon was added to the second portion of liquid **A**. The gas given off was tested with a splint.	.... [3]
(c) Calcium carbonate was added to the third portion of liquid **A**.	..... [1]

tests	observations
<u>tests on liquid **B**</u> **(d)** Dilute sulfuric acid was added to liquid **B** followed by aqueous potassium manganate(VII). The mixture was heated.	changed colour from purple to colourless
(e) Liquid **B** was poured onto a dry watch glass. The surface of the liquid was touched with a lighted splint.	liquid burned with a yellow / blue flame

(f) What conclusions can you draw about liquid **B**?

.....

..... [2]

[Total: 9]

6

For Examiner's Use

Hair bleach

A solution of hydrogen peroxide can be used to bleach hair. Hairdressers buy '20 volume' hydrogen peroxide. One volume of this solution breaks down to form 20 volumes of oxygen. For example 10 cm^3 of 20 volume hydrogen peroxide will break down to produce 200 cm^3 of oxygen.

Old solutions of hydrogen peroxide will produce less oxygen than expected.

Plan an experiment to find out which of two solutions of hydrogen peroxide, **H** and **J**, is new and which is old. You are provided with common laboratory apparatus and the catalyst manganese(IV) oxide which speeds up the break down of hydrogen peroxide.

.....

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.....

.....

.....

.....

.....

.....

..... [5]

[Total: 5]