Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

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CHEMISTRY **0620/63**

Paper 6 Alternative to Practical **May/June 2015**

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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, 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.

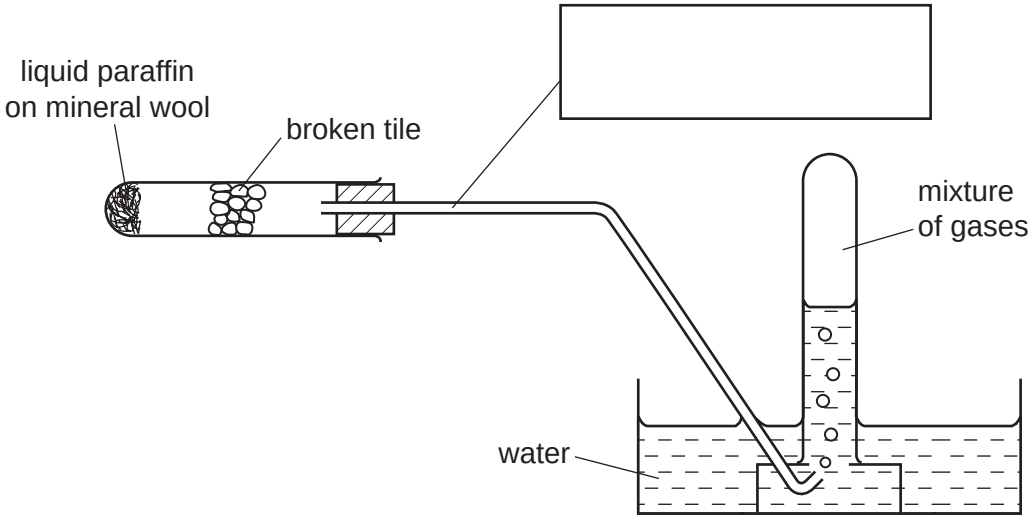
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

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1 Liquid paraffin oil was heated using the apparatus shown. The vapour was broken down by being passed over very hot small pieces of broken tile. The gas collected was a mixture of alkenes and hydrogen.



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

(b) Indicate with **two** arrows where heat was applied. [2]

(c) **(i)** Why were **small** pieces of broken tile used?

..... [1]

(ii) What was the purpose of the mineral wool?

..... [1]

(d) Name the process where long-chain hydrocarbons are broken down by heat.

..... [1]

(e) Suggest the effect of passing the mixture of hydrogen and alkenes through bromine water.

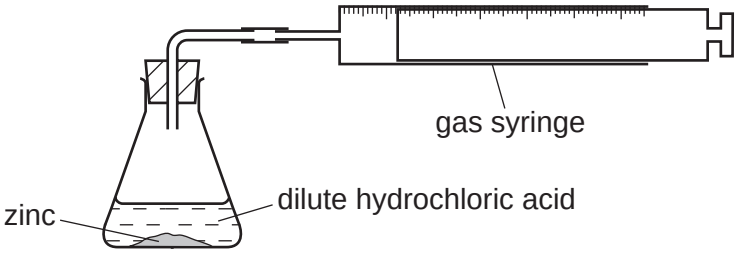
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..... [1]

[Total: 7]

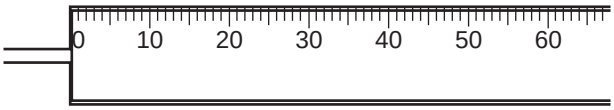
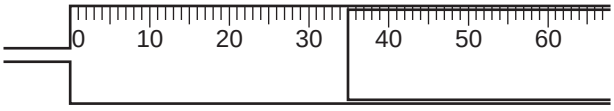
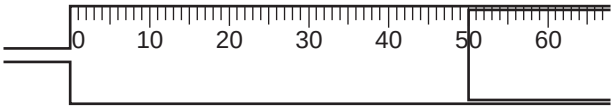
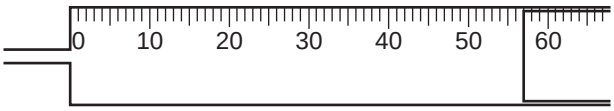
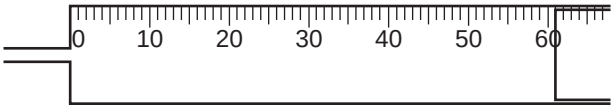
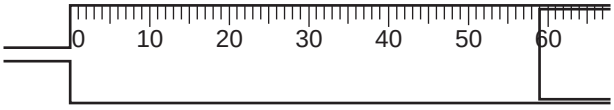
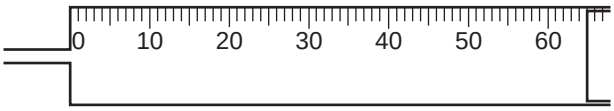
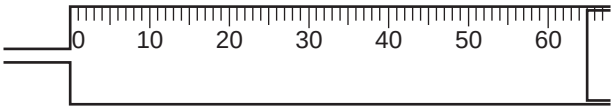
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2 A student investigated the rate of reaction between zinc and excess hydrochloric acid, at 20 °C. 2 g of zinc powder was added to 50 cm^3 of dilute hydrochloric acid.



The volume of hydrogen released was measured every 30 seconds.

(a) Use the gas syringe diagrams to record the volumes in the table.

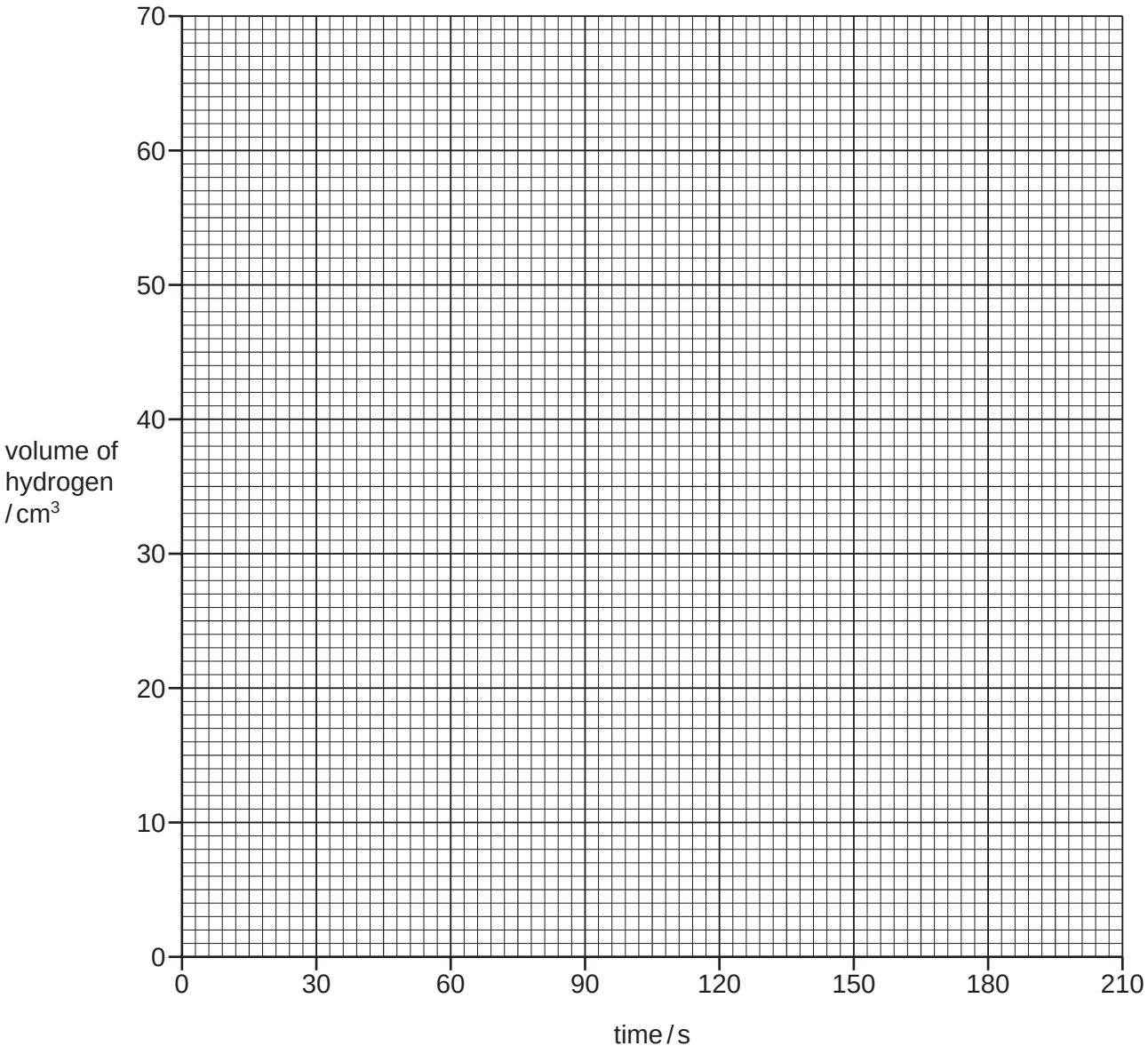
time / s	gas syringe diagram	volume of hydrogen / cm^3
0		
30		
60		
90		
120		
150		
180		
210		

[3]

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[Turn over

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



[4]

(c) (i) At which time interval does the point appear to be inaccurate?

..... [1]

(ii) **Use your graph** to find the volume of gas that would be expected at this time.

..... [2]

(d) The experiment was repeated but the hydrochloric acid was cooled to 5 °C before adding the zinc.

(i) How could the hydrochloric acid be cooled?

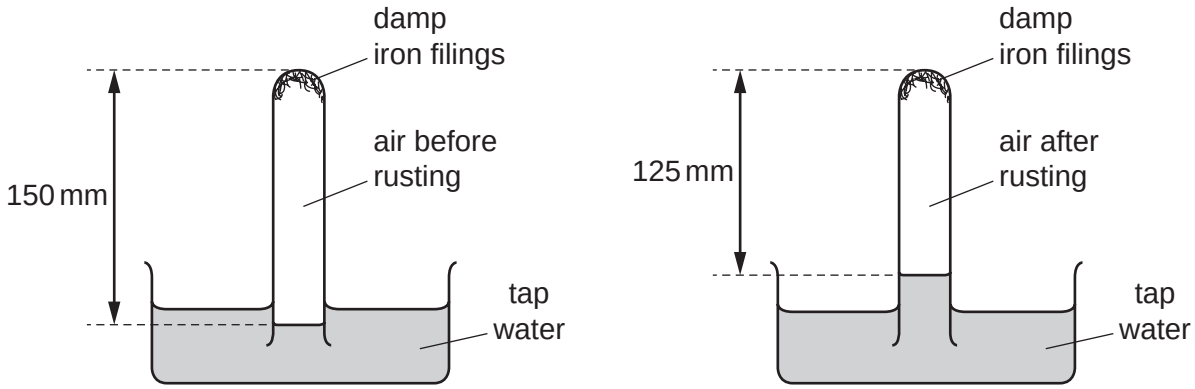
..... [1]

(ii) Sketch **on the grid** the graph you would expect for the results at 5 °C. Label your graph 'lower temperature'. [2]

[Total: 13]

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3 An investigation into the rusting of iron filings was carried out using damp iron filings in an inverted boiling tube.



(a) After one week the colour of the iron filings changed from grey to ..... [1]

(b) **(i)** Why did the water rise up the boiling tube?

..... [1]

(ii) Use the information on the diagram to work out the percentage decrease in the volume of the air in the boiling tube after one week.

.....

..... [2]

(c) What would be the effect if this experiment were repeated using boiled distilled water instead of tap water?

..... [1]

[Total: 5]

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[Turn over

4 A student investigated the temperature changes when four different solids, **D**, **E**, **F** and **G**, reacted with excess dilute hydrochloric acid. The solids were all calcium compounds.

Four experiments were carried out.

(a) *Experiment 1*

Using a measuring cylinder, 30 cm^3 of hydrochloric acid was poured into a polystyrene cup. The temperature of the hydrochloric acid was measured.
2 g of solid **D** was added to the hydrochloric acid and the mixture stirred with a thermometer.
The temperature reached by the liquid mixture was measured.
Observations were recorded.

Observation: Rapid effervescence.

The polystyrene cup was emptied and rinsed with distilled water.

(b) *Experiment 2*

Experiment 1 was repeated using solid **E**.

(c) *Experiment 3*

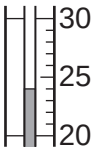
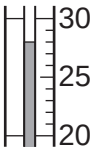
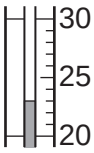
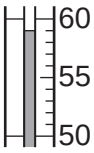
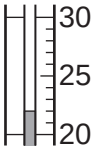
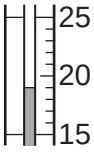
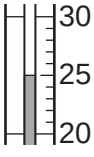
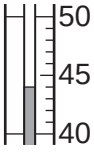
Experiment 1 was repeated using solid **F**.

(d) *Experiment 4*

Experiment 1 was repeated using solid **G** but Universal Indicator solution was added to the hydrochloric acid before adding the solid. Observations were recorded.

Observation: The red colour of the liquid, pH 1, changed colour to orange then yellow, pH 6.

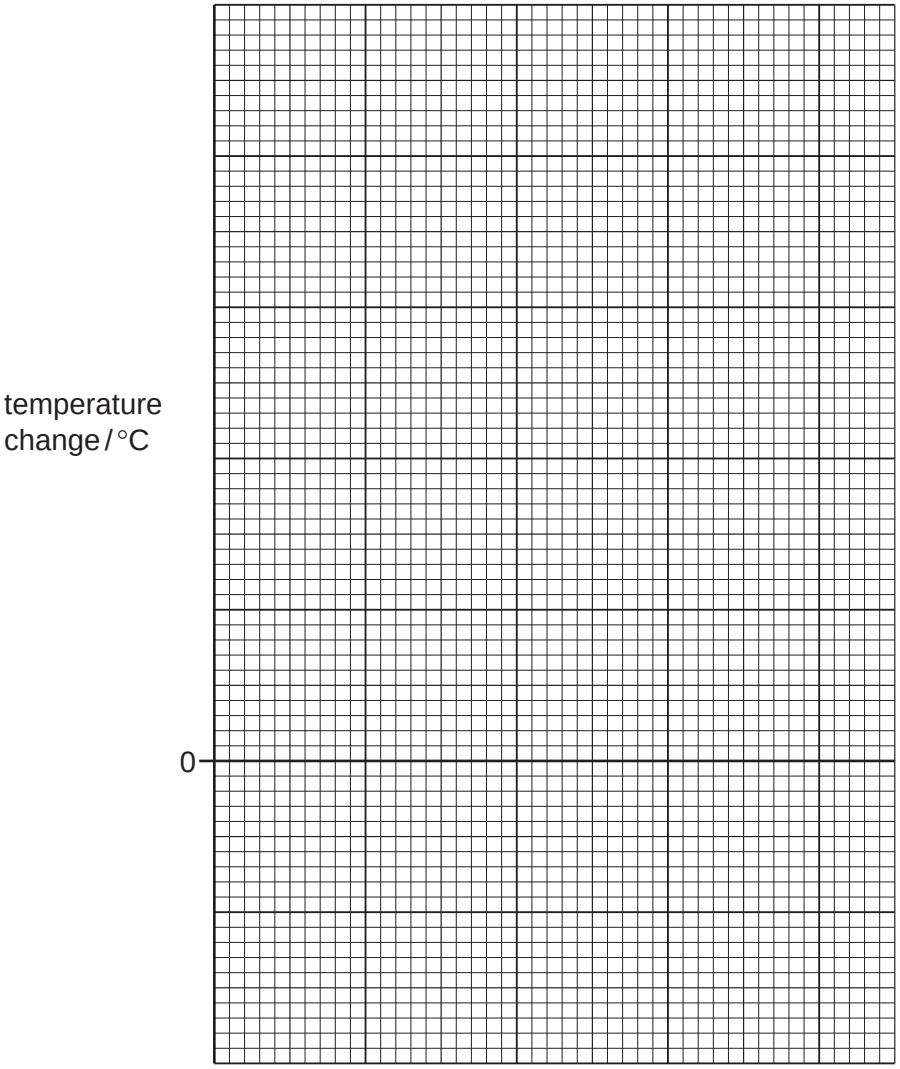
(e) Use the thermometer diagrams to record all of the temperatures in the table. Complete the final column in the table.

Experiment	thermometer diagram	initial temperature of acid / °C	thermometer diagram	temperature reached / °C	temperature change / °C
1					
2					
3					
4					

[3]

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(f) Draw a labelled bar chart to show the results of the Experiments 1, 2, 3 and 4.



[4]

(g) Use the results and observations to answer the following questions.

(i) What type of chemical process occurred when solid **D** reacted with hydrochloric acid?

..... [1]

(ii) What conclusion can you draw about solid **D** from the observations in Experiment 1?

..... [1]

(h) Which experiment produced the largest temperature change?

..... [1]

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[Turn over

(i) Explain the observations in Experiment 4.

.....

..... [2]

(j) Predict the temperature of the solution in Experiment 2 after 1 hour. Explain your prediction.

.....

..... [2]

(k) Suggest and explain the effect on the results if Experiment 2 was repeated using 60 cm^3 of hydrochloric acid.

.....

..... [2]

(l) Suggest a possible source of error in this experiment. Identify a change in apparatus which would reduce this error.

source of error .....

change to apparatus .....
[2]

[Total: 18]

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5 Solid **H** was analysed. Solid **H** was a salt containing iron(III) ions, sulfate ions and one other cation (positive ion).
The tests on solid **H**, and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
<u>tests on solid **H**</u> **(a)** Appearance of solid **H**.	pale yellow solid
(b) Solid **H** was heated gently and then strongly. The gas given off was tested with pH indicator paper.	condensation formed at the top of the test-tube pungent gas pH paper turned blue-green, pH 10
<u>tests on a solution of **H**</u> Water was added to solid **H** to produce an aqueous solution, solution **H**. **(c)** Drops of aqueous sodium hydroxide were added to 1 cm^3 of solution **H** and the test-tube shaken. Excess sodium hydroxide was then added to the test-tube. The mixture was heated gently and the gas given off was tested.	..... [2] ..... [1] pungent gas, red litmus paper turned blue
(d) Excess aqueous ammonia solution was added to solution **H**.	..... [1]
(e) Dilute nitric acid and aqueous silver nitrate were added to solution **H**.	..... [1]
(f) Dilute nitric acid and barium nitrate solution were added to solution **H**.	..... [2]

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[Turn over

(g) What does the formation of condensation in test **(b)** tell you about the nature of solid **H**?

.....

..... [1]

(h) What does test **(e)** tell you about the nature of solid **H**?

..... [1]

(i) **(i)** Name the gas given off in test **(c)**.

..... [1]

(ii) What conclusions can you draw about the identity of the other cation in solid **H**?

..... [1]

[Total: 11]

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6 **Burnable Ice (Methane Hydrate)**

Methane hydrate is ice which contains trapped methane gas. Methane is released when the ice melts and is a useful fuel.
Plan an investigation to find the volume of methane gas trapped in 1 kg of this ice.
You are provided with a lump of the ice weighing between 100 g and 200 g and common laboratory apparatus.
You may include a diagram in your answer.

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 6]

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