Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

7046780444

CHEMISTRY **0620/61**

Paper 6 Alternative to Practical **October/November 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.

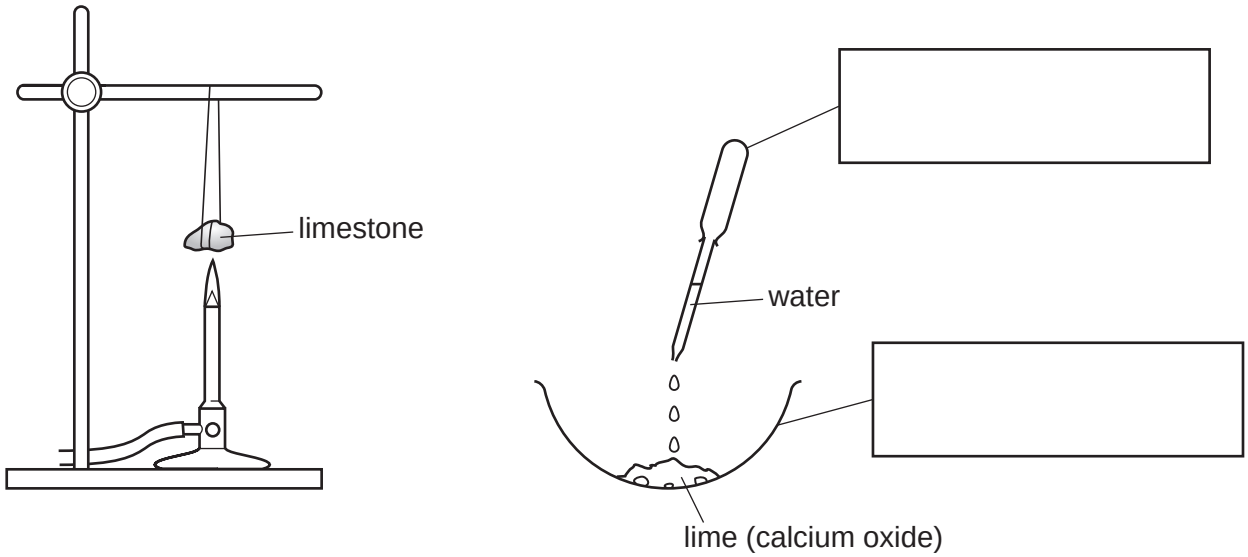
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

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 **12** printed pages and **4** blank pages.

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1 A piece of limestone was heated strongly for ten minutes. The solid was then left to cool. Cold water was added to the solid. The solid reacted with the water to form a solution, **A**.



(a) Complete the boxes to label the pieces of apparatus. [2]

(b) **(i)** Suggest what could be used to hang the piece of limestone from the stand over the heat. Explain your answer.

.....

.....

..... [2]

(ii) In what position should the air hole of the Bunsen burner be?

..... [1]

(c) Predict the effect of

(i) solution **A** on pH indicator paper,

..... [1]

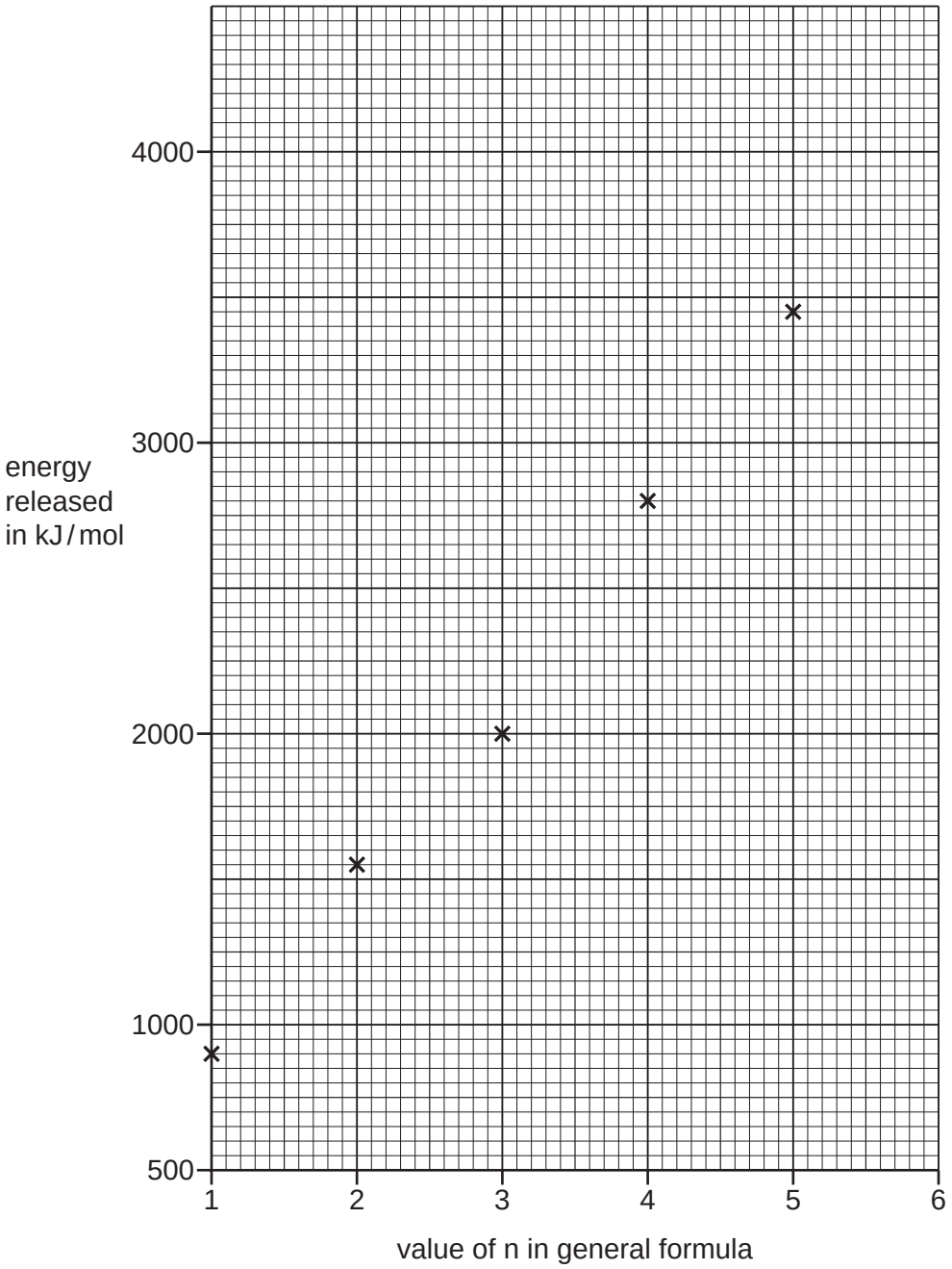
(ii) carbon dioxide on solution **A**.

..... [1]

[Total: 7]

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2 The alkanes are a homologous series of hydrocarbons which are used as fuels. Their general formula is C_nH_{2n+2}.
The energy released when equal amounts of the first five alkanes were burned was measured. The results are shown plotted on the grid below.



(a) Draw a line of best fit on the grid. [1]

(b) Suggest **two** reasons why not all of the points lie on the line of best fit.

1 .....

2 .....
[2]

(c) **Use your graph** to work out the amount of energy released when the same amount of hexane, C_6H_{14}, is burned. Show clearly how you worked out your answer.

..... [2]

(d) A student predicted that the energy released by burning butane would be two times the energy produced by burning ethane.

Suggest why she made this prediction and compare the values obtained for these two alkanes.

.....

.....

.....

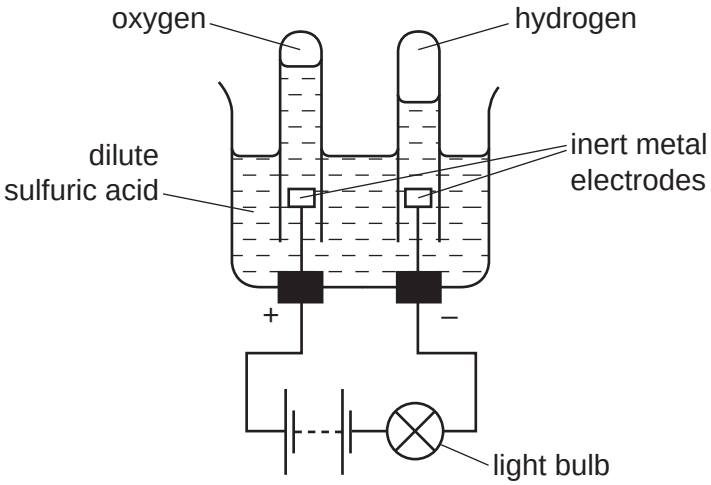
.....

..... [3]

[Total: 8]

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3 Electricity was used to break down dilute sulfuric acid using the apparatus shown.



(a) What name is given to this process?

..... [1]

(b) Give **one** observation which could be made during this experiment.

..... [1]

(c) Suggest a suitable metal for the inert metal electrodes.

..... [1]

(d) Give a test for oxygen gas.

test .....

result .....
[2]

(e) Why does hydrogen form at the negative electrode?

..... [1]

(f) The experiment was repeated using concentrated hydrochloric acid.

Explain why this experiment was carried out in a fume cupboard.

.....

..... [2]

[Total: 8]

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4 A student investigated the rate of reaction between magnesium ribbon and four different solutions of dilute sulfuric acid, **A**, **B**, **C** and **D**. The sulfuric acid was in excess in all experiments.

Four experiments were carried out.

(a) *Experiment 1*

Using a measuring cylinder, 30 cm^3 of aqueous sulfuric acid **A** was poured into a beaker. The stop clock was started and a 4 cm length of magnesium was added to the sulfuric acid in the beaker. The mixture was stirred constantly. The time taken for all of the magnesium to react and disappear was measured.
The beaker was rinsed out with distilled water.

(b) *Experiment 2*

Experiment 1 was repeated using the solution **B** of sulfuric acid.

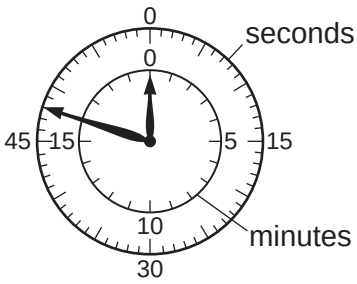
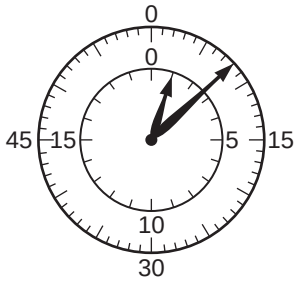
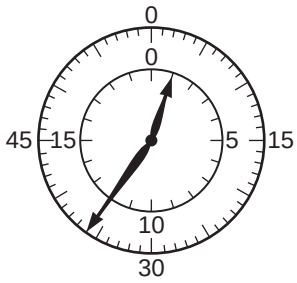
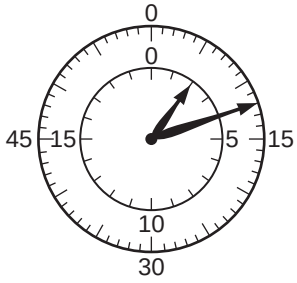
(c) *Experiments 3 and 4*

Experiment 1 was repeated, using the solutions **C** and **D** of sulfuric acid.

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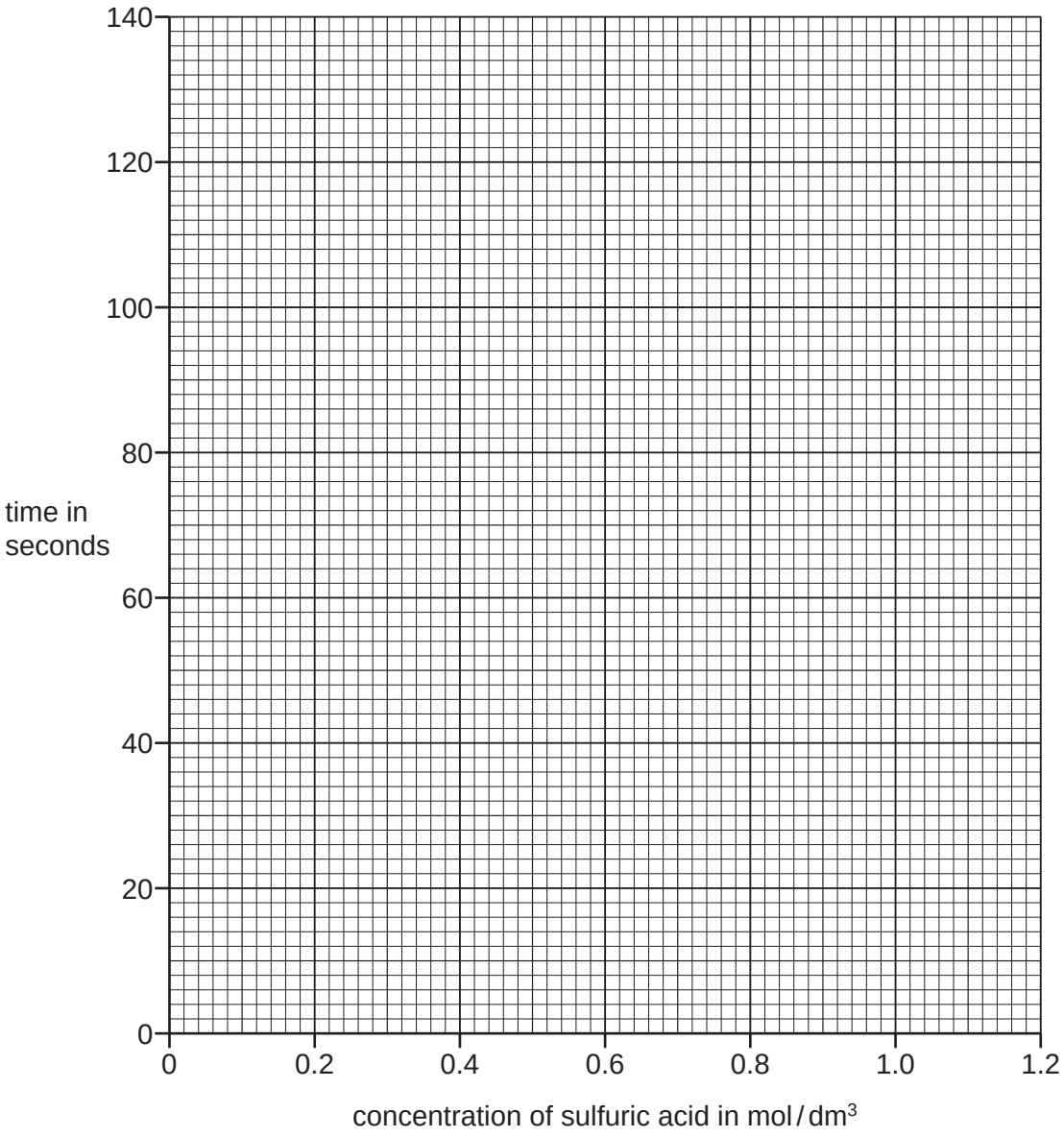
(d) Use the stop clock diagrams to record the times in the table.

Experiment number	concentration of sulfuric acid in mol / dm^3	stop clock diagram	time for magnesium to completely disappear in seconds
1	1.0		
2	0.8		
3	0.6		
4	0.5		

[4]

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(e) Plot the results for Experiments 1, 2, 3 and 4 on the grid and draw a smooth line graph.



[3]

(f) (i) **From your graph**, deduce the concentration of the sulfuric acid if the time for the reaction was 80 s.
Show clearly **on the graph** how you worked out your answer.

..... mol / dm^3 [2]

(ii) **From your graph**, deduce how long the reaction would take if a solution of sulfuric acid of concentration 1.2 mol / dm^3 was used.
Show clearly **on the graph** how you worked out your answer.

..... s [2]

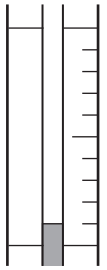
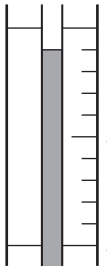
(g) Why was the same amount of magnesium used in Experiments 1, 2, 3 and 4?

..... [1]

(h) Another experiment was carried out.
A 4 cm length of magnesium ribbon was added to dilute sulfuric acid. The temperature of the solution was measured before and after the reaction. The observations were recorded and the gas given off tested.

Observations: Rapid effervescence and the tube felt hot. A lighted splint popped.

Use the thermometer diagrams to record the temperatures.

before addition of magnesium	temperature / °C	after addition of magnesium	temperature / °C
			

[2]

(i) **(i)** What type of chemical reaction occurred when magnesium reacted with sulfuric acid?

..... [1]

(ii) Identify the gas given off.

..... [1]

(iii) Suggest the effect on the temperature change if this experiment was repeated using 2 cm of magnesium ribbon.

.....

..... [2]

(j) Suggest a different method which could be used to investigate the rate of the reaction between magnesium and sulfuric acid. State the difference in the apparatus used and measurements to be taken.

apparatus .....

measurements .....

.....

..... [3]

[Total: 21]

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5 Two metal salt solutions, **X** and **Y**, were analysed. Solution **X** was iron(II) chloride.
The tests on **X** and **Y**, and some of the observations, are given in the following tables.
Complete the observations in the table.

tests	observations
tests on solution **X** **(a)** Appearance of solution **X**.	..... [1]
The solution was divided into four equal portions. **(b)** Dilute nitric acid and aqueous silver nitrate were added to the first portion of solution.	..... [1]
(c) Aqueous sodium hydroxide was added to the second portion of solution and the mixture shaken.	..... [2]
(d) Excess aqueous ammonia was added to the third portion of solution.	..... [1]
(e) An oxidising agent was added to the fourth portion of the solution. Aqueous sodium hydroxide was then added to the mixture.	..... [2]

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[Turn over

tests	observations
<u>tests on solution **Y**</u> The solution was divided into three equal portions. **(f)** Dilute hydrochloric acid was added to the first portion of the solution.	white precipitate formed
(g) Aqueous sodium hydroxide was added to the second portion of the solution and the mixture shaken. Aluminium powder was added to the mixture and it was warmed gently. The gas given off was tested with damp red litmus paper.	effervescence pungent gas evolved, litmus paper turned blue
(h) Aqueous potassium iodide was added to the third portion of the solution.	pale yellow precipitate

(i) What conclusions can you draw about solution **Y**?

.....

..... [2]

[Total: 9]

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6 Toothbright



Toothbright toothpaste contains three compounds, sodium fluoride, calcium carbonate and water. Calcium carbonate is insoluble in water and sodium fluoride is soluble in water.

Plan an investigation to find out the percentage of calcium carbonate present in this toothpaste. You are provided with common laboratory apparatus.

.....

.....

.....

.....

.....

.....

.....

..... [7]

[Total: 7]

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