UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

1741889902

CHEMISTRY **0620/63**

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 **12** printed pages.

UNIVERSITY of CAMBRIDGE International Examinations

For
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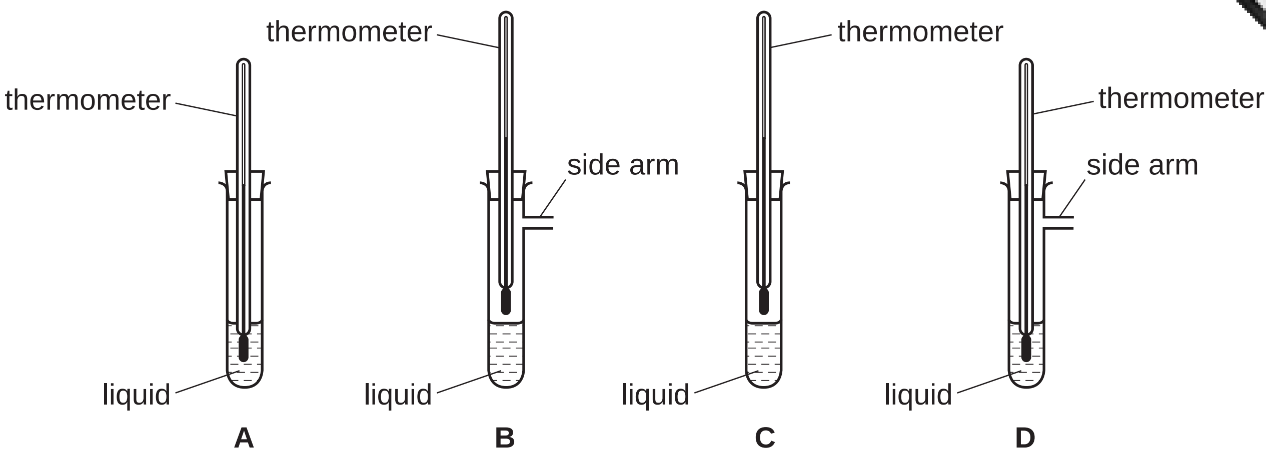
...e

1 The diagrams show four sets of apparatus, **A**, **B**, **C** and **D**.



(a) **(i)** Which set of apparatus would be most suitable to determine the boiling point of a liquid?

.... [1]

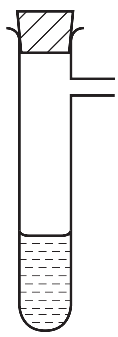
(ii) Indicate with an arrow on this diagram where heat should be applied. [1]

(b) What would be the effect if the liquid in **A** was heated strongly? Explain your answer.

effect ....

explanation .... [2]

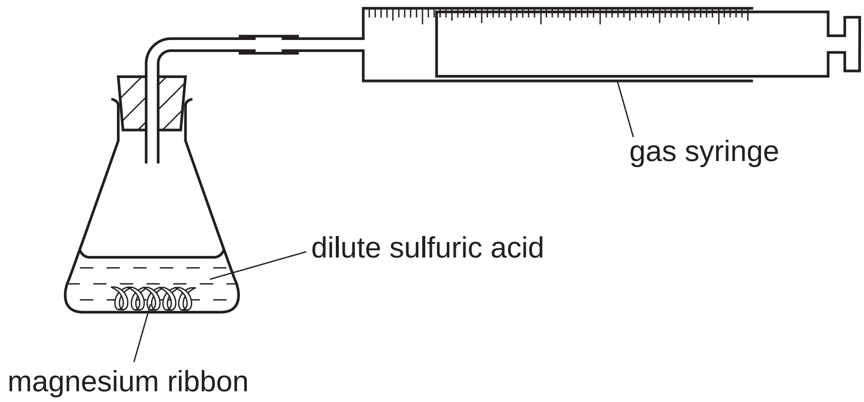
(c) The apparatus below can be used to prepare and collect a gas which is insoluble in water. Complete the diagram to show how this gas could be collected over water. Label the diagram.



[2]

[Total: 6]

2 A student carried out two experiments to investigate the speed of reaction between magnesium and excess dilute sulfuric acid.
The apparatus shown below was used to measure the volume of gas produced.



(a) Name the gas produced during the reaction.

.... [1]

Two experiments were carried out.

Experiment 1

Dilute sulfuric acid was added to magnesium ribbon and the volume of gas produced was measured every minute for seven minutes.

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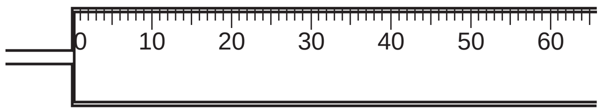
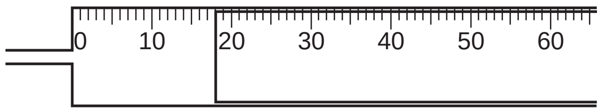
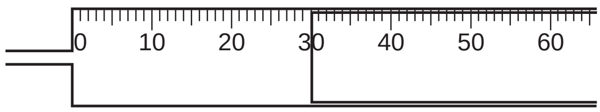
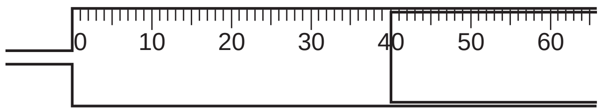
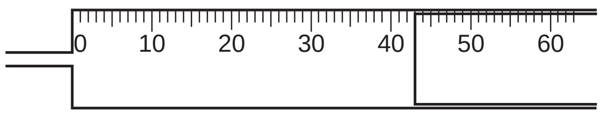
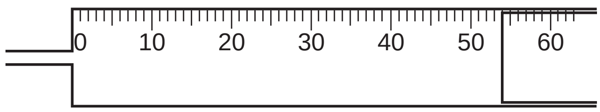
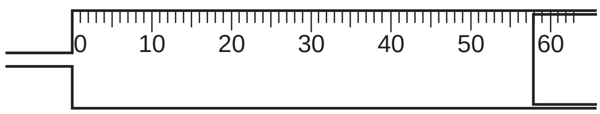
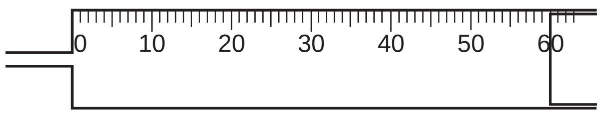
(b) Use the gas syringe diagrams to complete the table of results.

time / min	gas syringe diagram	volume of gas produced / cm
0		
1		
2		
3		
4		
5		
6		
7		

[3]

Experiment 2

The results for Experiment 2 have been plotted on the grid opposite and a graph drawn.

(c) Plot the results for Experiment 1 on the grid. Draw a smooth line graph. [4]

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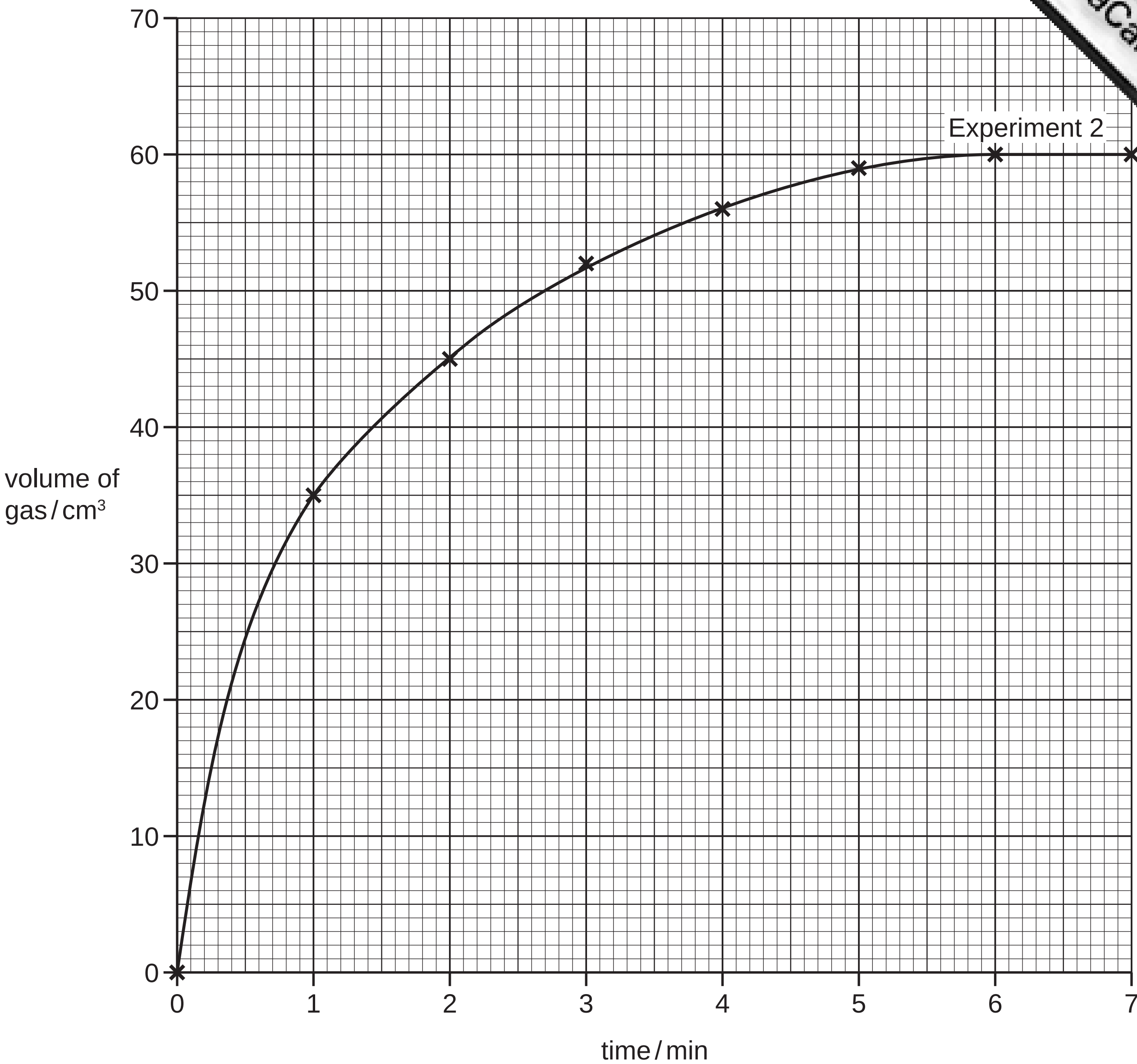


(d) **(i)** At which time interval does the volume reading appear to be inaccurate? Explain the reason for your choice.

....

.... [2]

(ii) What was the total volume of gas that should have been produced at that time? Indicate **on the grid** how you arrived at your answer.

.... [2]

(e) Suggest and explain how the conditions had changed in Experiment 2 compared to Experiment 1.

....

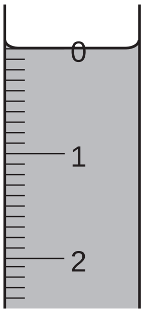
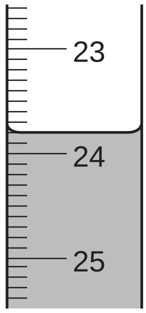
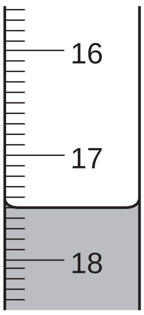
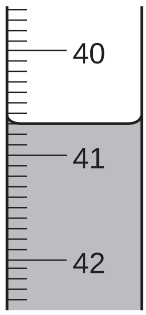
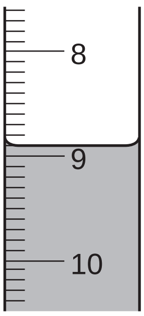
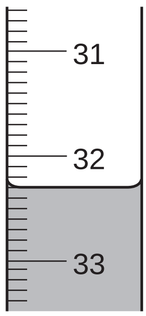
.... [2]

[Total: 14]

3 The formula of any acid can be written as H_yA.
A student investigated an acid, **S**, by titrating its aqueous solution with aqueous so
hydroxide.
A burette was filled with a solution of acid **S** up to the 0.0 cm^3 mark. A 25.0 cm^3 portion of aqueous sodium hydroxide was added to a conical flask. A few drops of litmus indicator were added to the flask. The acid was added from the burette until the colour of the indicator changed. Three titrations were carried out.

The burette diagrams in the table below show the initial and final readings in the three titrations.

(a) Use the burette diagrams to record the volumes in the table. Complete the table.

titration	burette diagram	initial reading / cm^3	burette diagram	final reading / cm^3	difference / cm^3
1					
2					
3					

[3]

(b) Which of these are the best **two** titration results? Use these results to work out the average volume of solution **S** added.

best results ....

average volume = ...cm^3 [2]

(c) Which piece of apparatus was used to measure the sodium hydroxide solution?

.... [1]

(d) The litmus indicator changed colour

from .... to .... [1]

The experiment was repeated using hydrochloric acid of the same concentration as acid **S**. 46.6 cm^3 of hydrochloric acid was needed to neutralise 25.0 cm^3 of the aqueous sodium hydroxide.

(e) **(i)** Compare the volume of acid **S** used to neutralise 25.0 cm^3 of the aqueous sodium hydroxide with the volume of hydrochloric acid used.

.... [1]

(ii) Suggest the value of y in the formula H_yA for acid **S**.

.... [1]

[Total: 9]

4 A mixture of solids, **Y** and **Z**, was analysed. **Y** was calcium chloride, which is water-soluble and **Z** is an insoluble salt.
The tests on the mixture, and some of the observations, are in the following table.
Complete the observations in the table.

tests	observations
Distilled water was added to the mixture in a boiling tube. The mixture was shaken and filtered. The residue was saved and tests carried out on the filtrate.	
tests on the filtrate **(a)** The solution was divided into three test-tubes and the following tests were carried out. **(i)** To the first test-tube of solution, drops of aqueous sodium hydroxide were added. Excess aqueous sodium hydroxide was then added to the test-tube.	.... [3]
(ii) Test **(i)** was repeated using aqueous ammonia instead of aqueous sodium hydroxide.	.... [1]
(iii) To the third test-tube of the solution, dilute nitric acid was added followed by silver nitrate solution.	.... [2]
tests on the residue **(b)** Dilute nitric acid was added to the residue. The gas given off was tested with limewater.	rapid effervescence limewater turned milky
Distilled water was added to the solution followed by aqueous potassium iodide.	yellow precipitate formed

(c) Identify the gas given off in test **(b)**.

.... [1]

(d) What conclusions can you draw about solid **Z**?

.... [2]

[Total: 9]

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5 A student investigated the temperature changes when zinc and magnesium react with aqueous iron(II) sulfate solution.

Two experiments were carried out.

Experiment 1

Using a measuring cylinder, 40 cm^3 of aqueous iron(II) sulfate was poured into a beaker and the initial temperature of the solution was measured. The initial temperature of the solution was 25 °C in each experiment.
0.2 g of zinc powder was added to the beaker and the maximum temperature of the mixture measured and recorded.

The experiment was repeated using increasing masses of zinc powder. The results are in the table below.

mass of zinc added / g	maximum temperature / °C	temperature rise / °C
0.0	25.0	0.0
0.2	30.0	5.0
0.4	34.5	9.5
0.6	39.0	14.0
0.8	44.0	19.0
1.0	44.0	19.0
1.2	44.0	19.0

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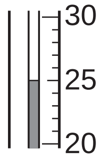
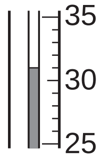
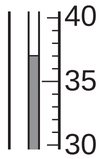
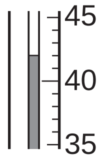
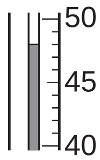
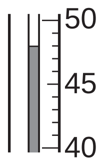
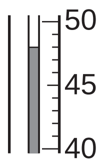
Experiment 2

Experiment 1 was repeated using magnesium powder.

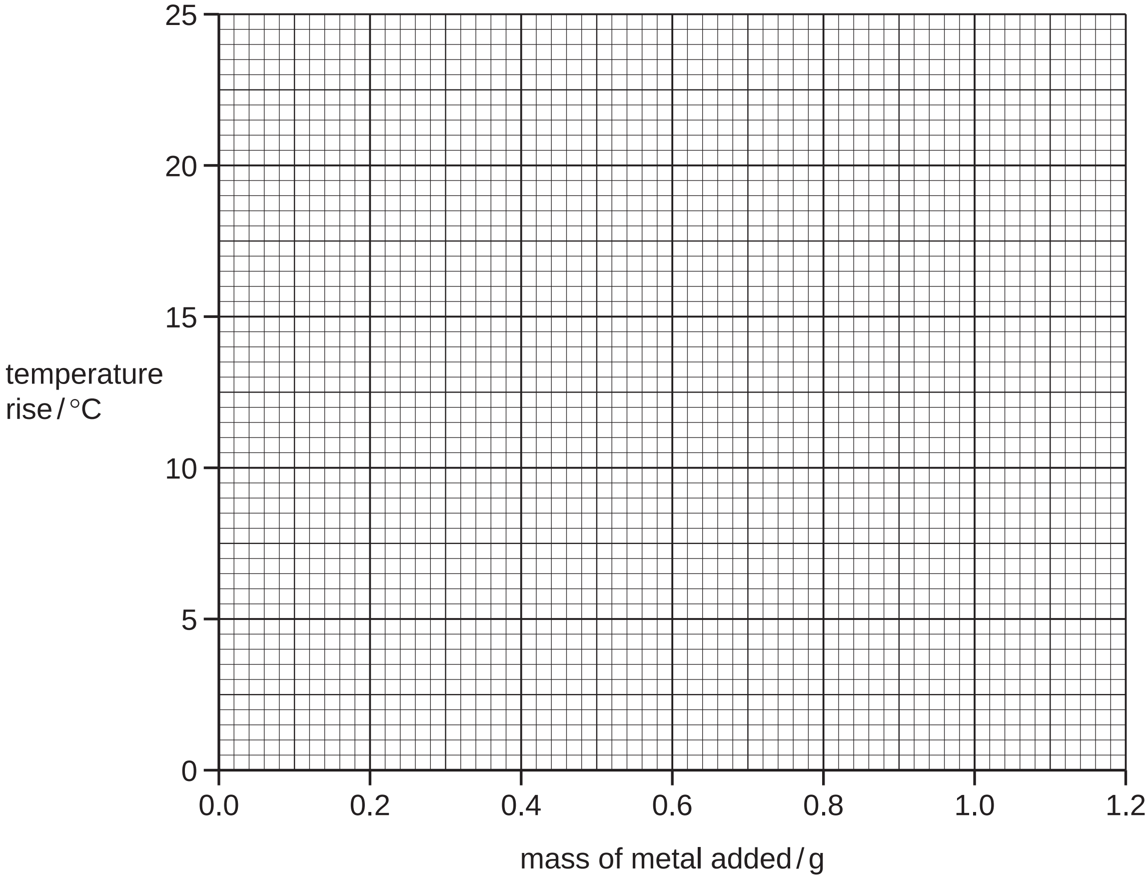
(a) Use the thermometer diagrams in the table to record the maximum temperatures reached and complete the table.

mass of magnesium added / g	thermometer diagram	maximum temperature reached / °C	temperature rise / °C
0.0			
0.2			
0.4			
0.6			
0.8			
1.0			
1.2			

[3]

For miner's

(b) Plot the results for both experiments on the grid below. For each experiment graph with two intersecting straight lines. Label the graphs.



[5]

(c) **Use your graphs** to find

(i) the mass of zinc required to produce a temperature rise of 12 °C.

.... [1]

(ii) the temperature rise produced by 0.3 g of magnesium.

.... [1]

(d) What is the minimum mass of magnesium required to produce the maximum temperature?

.... [1]

(e) Which reagent is in excess in Experiment 1? Explain your answer.

....

.... [2]

(f) Experiment 2 was repeated using copper powder. Suggest how the results of this experiment would compare with those using zinc and magnesium.

....

.... [2]

[Total: 15]

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6

Fats and oils

Unsaturated fats and oils contain at least one carbon to carbon double bond.
These double bonds react with bromine water which changes colour from orange to colourless.

Plan an experiment that could be carried out to compare samples of sunflower oil, olive oil and butter to find out which of these contains the largest number of carbon to carbon double bonds.

You are provided with common laboratory apparatus and an organic solvent to dissolve the fats and oils.

....

....

....

....

....

....

....

....

.... [7]

[Total: 7]