Centre No.						Paper Reference (complete below)							Surname	Initial(s)
Candidate No.										/			Signature	

Paper Reference(s)

4335/03 4437/08

London Examinations IGCSE

Chemistry – 4335

Paper 3

Science (Double Award) – 4437

Paper 8

Foundation and Higher Tiers

Wednesday 12 November 2008 – Afternoon

Time: 1 hour 15 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
Total	

Materials required for examination
Rule, pencil and calculator

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s), the paper reference and your signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions. Write your answers in the spaces provided in this question paper.
Show all the steps in any calculations and state the units.
Calculators may be used.

Information for Candidates

The total mark for this paper is 50. The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 4 questions in this question paper.
There are 16 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

Write your answers neatly and in good English.

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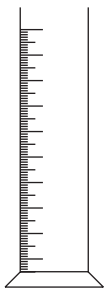
1. The diagrams show some pieces of apparatus used in an experiment to measure the temperature change when a solid dissolves in water.

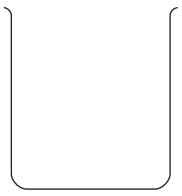
In this experiment:

- some water is added from a measuring cylinder to a polystyrene cup
- the temperature of the water is measured
- the solid is added to the water and the mixture stirred
- the temperature of the solution is measured.

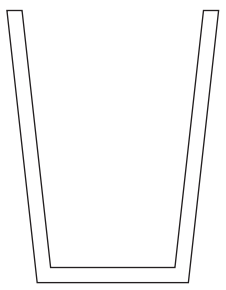
A



B

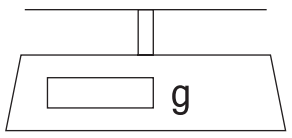


C



D

E



F

(a) Choose from the letters **A**, **B**, **C**, **D**, **E** and **F** to identify the apparatus in the table below.

Name of apparatus	Letter
Balance	
Measuring cylinder	
Polystyrene cup	
Thermometer	

(4)

Leave blank

(b) (i) Why is it better to dissolve the solid in the water in a polystyrene cup rather than in a beaker?

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(1)

(ii) One disadvantage of using a polystyrene cup instead of a beaker is that it is more easily knocked over. Suggest one way to prevent this.

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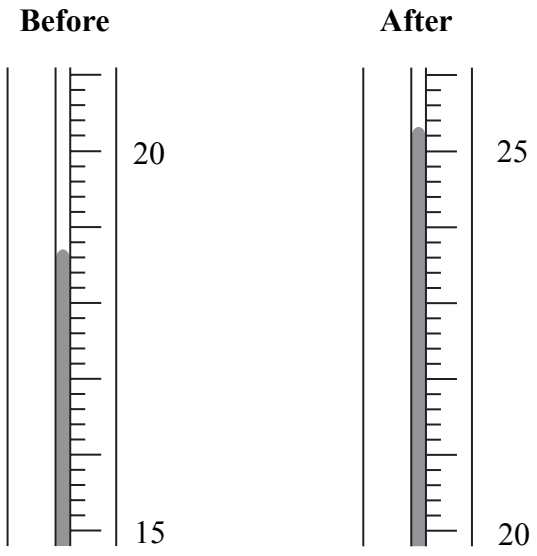
(1)

(c) The diagrams show the readings on the thermometer before and after a student added the solid to the water.



Write down the thermometer readings and work out the temperature change.

Temperature before ..... °C

Temperature after ..... °C

Temperature change ..... °C

(3)

(d) How can the student check the reliability of the result?

.....

.....

(1)

Q1

(Total 10 marks)

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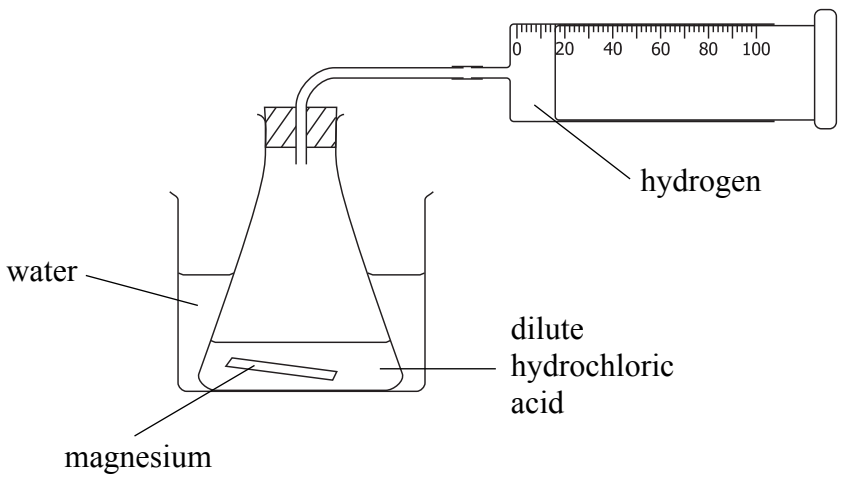
2. The equation for the reaction between magnesium and dilute hydrochloric acid is

$$Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$$

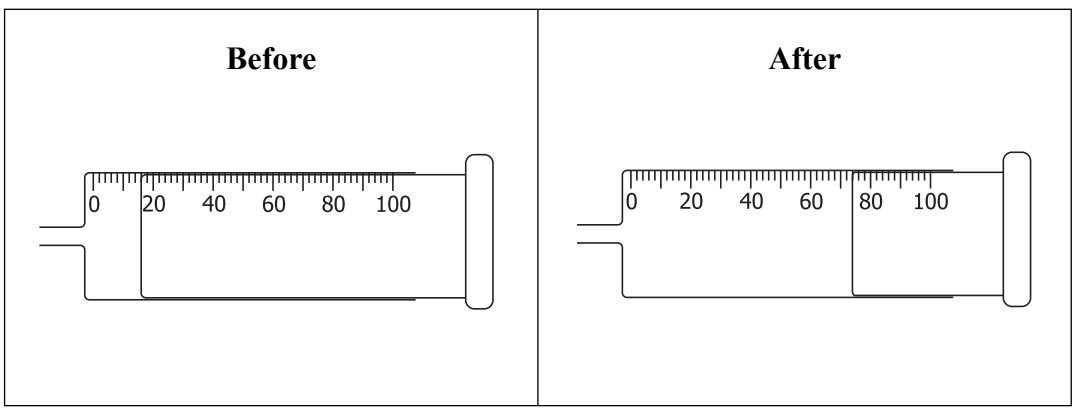
To investigate this reaction a student

- pours a measured volume of dilute hydrochloric acid into a conical flask
- adds a piece of magnesium ribbon to the flask
- connects a gas syringe
- measures the volume of gas collected.

Here is the apparatus she uses.



(a) The diagrams show the syringe before and after the gas is collected in one experiment.



Write down the volume readings and work out the volume of gas collected.

Volume before ..... cm^3

Volume after ..... cm^3

Volume collected ..... cm^3

(3)

Leave blank

(b) Seven students use the apparatus to investigate the effect of changing the concentration of the acid on the rate of reaction.

They all agree to use the following method in each experiment:

- use the same length of magnesium ribbon
- use the same total volume of acid solution
- alter the concentration by using less acid but more water
- measure the time to collect 80 cm^3 of gas

The table shows the results obtained.

Student	Acid solution used		Time (s)
	Volume of HCl(aq) (cm^3)	Volume of water (cm^3)	
K	50	0	11.0
L	45	5	13.5
M	40	10	12.0
N	30	20	16.5
O	25	20	14.5
P	20	30	26.0
Q	15	35	38.5

(i) In what way did student O fail to follow the agreed method?

.....

(1)

(ii) Why did this make the student's result invalid?

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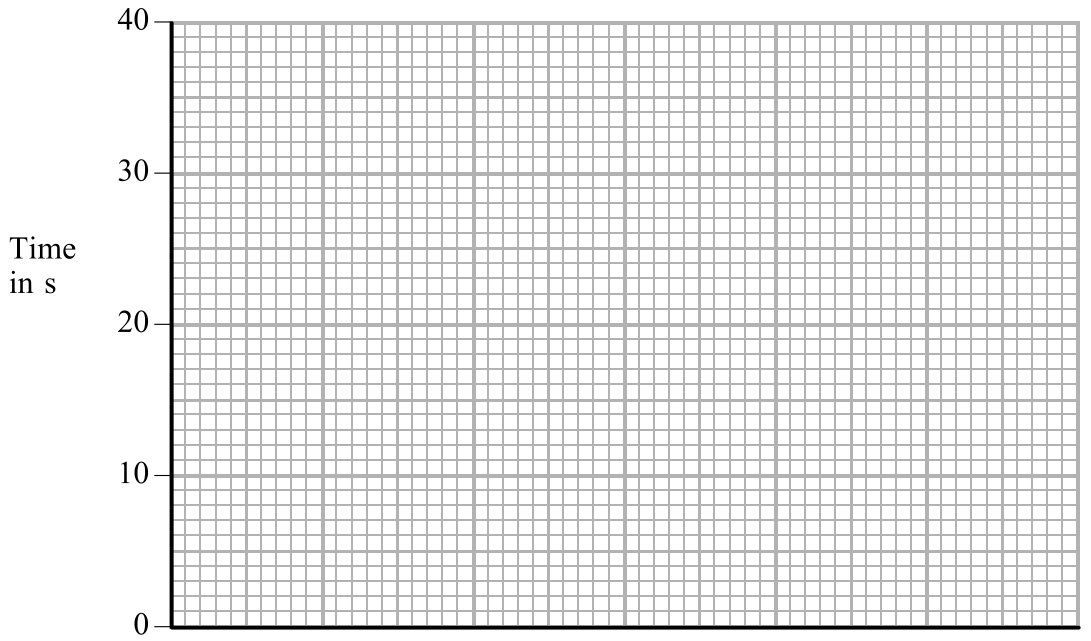
(1)

Leave blank

(iii) The results can be shown on a graph.

Choose a suitable label and scale for the horizontal axis.

Plot the results of the other six students (not including student O) on the grid below and draw a line of best fit.



(5)

(iv) Estimate the time taken to collect 80 cm^3 of gas in an experiment using equal volumes of acid and water to make the acid solution. Show on your graph how you obtained your answer.

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(2)

(v) Circle on the graph one result that is anomalous.

(1)

(c) Describe the relationship shown by the graph.

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(1)

Leave blank

(d) The diagram of the apparatus shows a beaker of water surrounding the conical flask. Suggest a reason for this.

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(1)

(e) A second group of students do the experiments using magnesium powder instead of magnesium ribbon. All other conditions remain the same as those used by the first group of students.

(i) How should they make sure that the experiments are a fair test?

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(1)

(ii) Use scientific knowledge to explain why the rate of reaction is faster using magnesium powder than using magnesium ribbon.

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(3)

Q2

(Total 19 marks)

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3. Calcium fluoride is insoluble in water. It forms as a precipitate when solutions of calcium iodide and potassium fluoride are mixed together.

$$CaI_2(aq) + 2KF(aq) \rightarrow CaF_2(s) + 2KI(aq)$$

A series of experiments is carried out to find the quantity of precipitate formed when different volumes of the two solutions are mixed.

This is the method:

- Use a burette to add some calcium iodide solution to a boiling tube
- Use a different burette to add some potassium fluoride solution to the boiling tube
- Let the precipitate settle and measure its height
- Repeat the experiment using different volumes of the two solutions

(a) Why is a burette more suitable than a pipette for measuring the volumes of the solutions?

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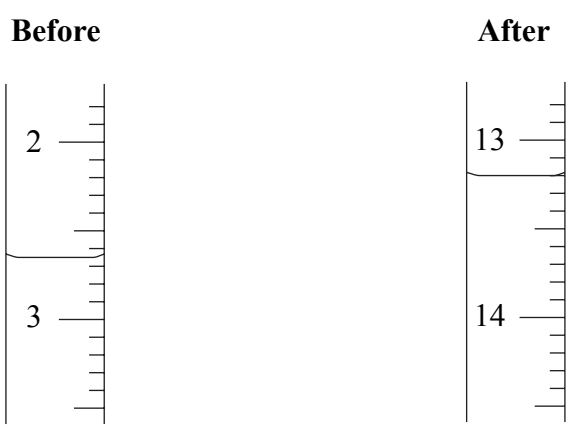
(1)

(b) The diagram shows the burette readings in one experiment.



Write down the volume readings and work out the volume of solution added.

Volume at end ..... cm^3

Volume at start ..... cm^3

Volume added ..... cm^3

(3)

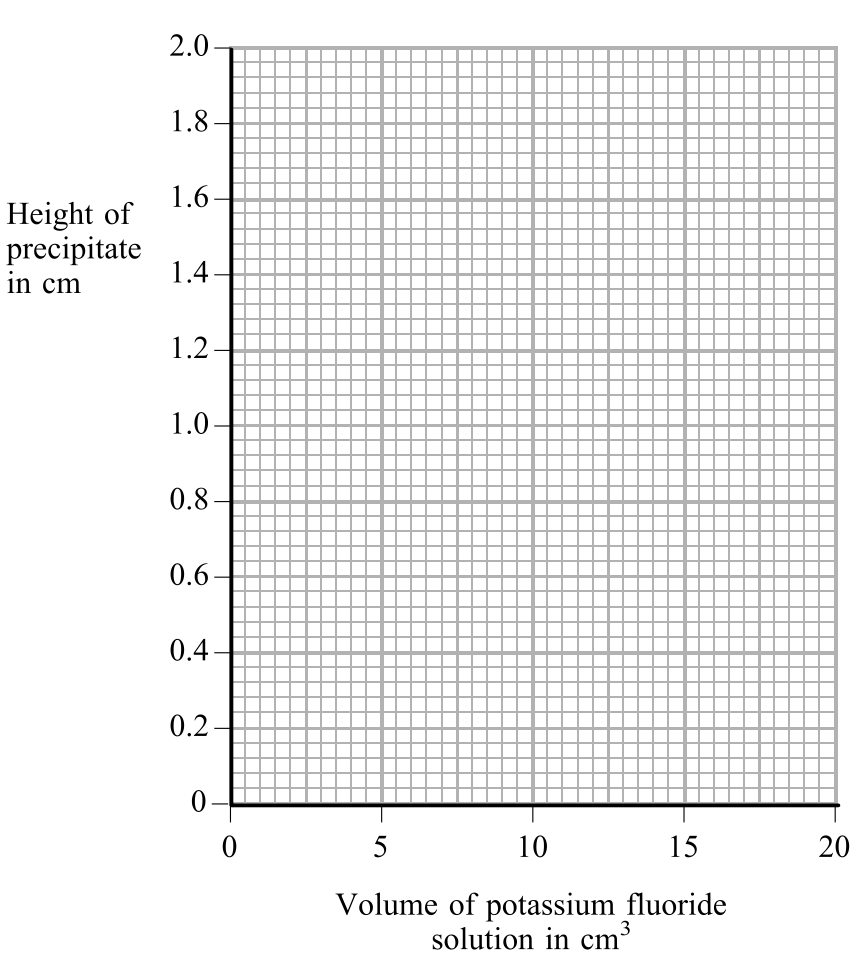
Leave blank

(c) Some students obtain the results shown in the table.

Experiment	Volume of calcium iodide solution (cm^3)	Volume of potassium fluoride solution (cm^3)	Height of precipitate (cm)
1	18	2	0.3
2	15	5	0.8
3	12	8	1.3
4	10	10	1.6
5	6	14	1.4
6	5	15	1.2
7	4	16	0.9
8	2	18	0.5

Plot these results on the grid.

Draw two lines of best fit, one for Experiments 1–4 and one for Experiments 5–8. Make sure that the two lines cross each other.



(4)

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(d) The point where the lines cross indicates the mixing of equivalent amounts, in moles, of calcium iodide solution and potassium fluoride solution. For the point where the lines cross, write down

the height of precipitate formed ..... cm

the volume of potassium fluoride solution used ..... cm^3

the volume of calcium iodide solution used ..... cm^3

(3)

(e) The height recorded in (d) may not be a reliable value. Suggest how you could check the reliability of this value.

.....

.....

(1)

(f) A student said that one problem with the method used is that the precipitate takes a long time to settle. She suggested measuring the mass of the precipitate instead.

(i) How would the results be affected if a student did not let the precipitate settle?

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(1)

(ii) Describe how the method can be changed to obtain the mass of the precipitate.

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(4)

Q3

(Total 17 marks)

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4. Barium chloride and silver nitrate solutions can be used to test for the presence of some anions in solution. The table shows the results obtained when some solutions are tested with these reagents.

Solution	**1. $BaCl_2$(aq), 2. then HCl(aq)**	**1. $AgNO_3$(aq), 2. then HNO_3(aq)**
sodium nitrate	1. no change 2. no change	1. no change 2. no change
sodium chloride	1. no change 2. no change	1. white precipitate 2. no change
sodium sulphate	1. white precipitate 2. no change	1. no change 2. no change
sodium carbonate	1. white precipitate 2. disappears, fizzing	1. white precipitate 2. disappears, fizzing

A student is given six solutions, labelled **U**, **V**, **W**, **X**, **Y** and **Z**, each containing a mixture of **two** sodium compounds from the table above. He tests each solution with the reagents shown.

The student is then told to use his results and the information from the table above to identify the two anions present.
His results and conclusions are shown below.

Solution	**1. $BaCl_2$(aq), 2. then HCl(aq)**	**1. $AgNO_3$(aq), 2. then HNO_3(aq)**	**Anions present**
U	1. white ppt 2. ppt disappears, fizzing	1. white ppt 2. ppt disappears, fizzing	*carbonate nitrate*
V	1. white ppt 2. no change	1. white ppt 2. no change	*chloride sulphate*
W	1. white ppt 2. no change	1. no change 2. no change	*chloride nitrate*
X	1. no change 2. no change	1. white ppt 2. no change	*carbonate sulphate*
Y	1. white ppt 2. fizzing	1. white ppt 2. ppt disappears, fizzing	*carbonate chloride*
Z	1. white ppt 2. ppt disappears, fizzing	1. white ppt 2. ppt remains, fizzing	*nitrate sulphate*

Leave blank

(a) Identify, choosing from the letters **U**, **V**, **W**, **X**, **Y** and **Z**, **two** solutions in which **both** anions have been **correctly** identified.

.....

(2)

(b) Identify, choosing from the letters **U**, **V**, **W**, **X**, **Y** and **Z**, **two** solutions in which **both** anions have been **wrongly** identified.

.....

(2) **Q4**

(Total 4 marks)

TOTAL FOR PAPER: 50 MARKS

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