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 7 November 2007 – Morning

Time: 1 hour 15 minutes

Materials required for examination
Ruler, pencil and calculator

Items included with question papers
Nil

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
Total	

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 references are shown above. Write the one for which you have been entered. Check that you have the correct question paper.
Answer **ALL** the questions 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 marks for individual questions are shown in round brackets: e.g. **(2)**.
There are 4 questions in this question paper. The total mark for this paper is 50.
There are 16 pages in this question paper. All blank pages are indicated.

Advice to Candidates

Write your answers neatly and in good English.

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1. In the box are the names of some common pieces of laboratory apparatus. Some are used to make measurements.

balance	Bunsen burner	burette	clamp stand
funnel	rule	stopwatch	thermometer

Complete the second column of the table by writing the name of a piece of apparatus that is used to measure the variable shown. Use only pieces of apparatus shown in the box. Each piece of apparatus may be used once, more than once or not at all.

Complete the third column of the table by stating a unit in which the variable is normally measured.

The first row has already been completed as an example.

Variable to be measured	Apparatus used	Unit of variable
time	stopwatch	s
mass		
length		
volume		
temperature		

(Total 8 marks)

Q1

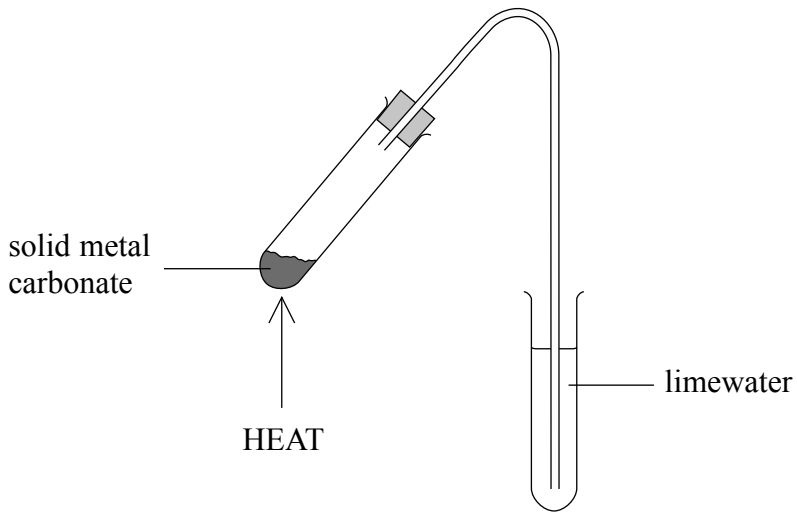
Leave blank

2. The following equation represents the thermal decomposition of a metal carbonate.

$$MCO_3(s) \rightarrow MO(s) + CO_2(g)$$

During the decomposition carbon dioxide gas is given off.

A student investigated the time taken for carbon dioxide to be given off when different metal carbonates were heated. The diagram shows the apparatus she used.



She timed how long it took for the limewater to start to turn cloudy.

The table shows her results.

Name of metal carbonate	Time for limewater to turn cloudy (s)
barium carbonate	118
calcium carbonate	50
magnesium carbonate	36
strontium carbonate	75

(a) State **two** variables the student should keep the same to make the investigation a fair test.

Variable 1 .....

Variable 2 .....

(2)

Leave blank

(b) What could the student do to check that her results are reliable?

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(1)

(c) Draw a bar chart to show these results.

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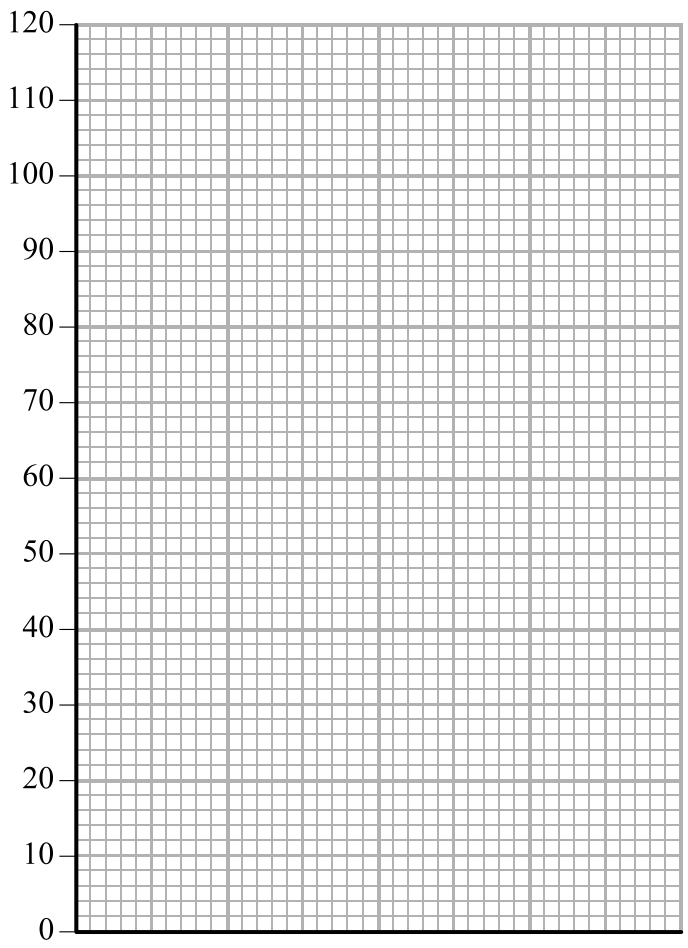

(3)

(d) Which metal carbonate decomposed most quickly?

.....

(1)

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(1)

QUESTION 2 CONTINUES ON PAGE 6

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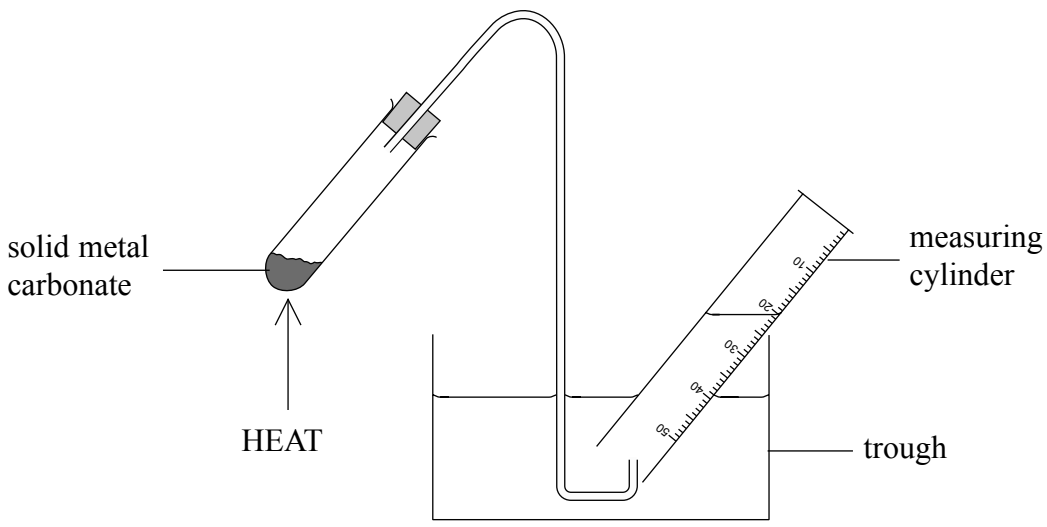
(e) Another student carried out a similar experiment but measured the volume of gas formed.
The diagram shows the apparatus he used.



He heated the solid metal carbonate and measured the volume of gas collected after 60 seconds and again after 90 seconds.

(i) Suggest **one** problem with the arrangement of the apparatus that made it difficult to measure the volume of the gas collected accurately.

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(1)

(ii) Carbon dioxide gas is slightly soluble in water. What effect does this have on the volume of gas collected?

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(1)

(iii) Give the name of another piece of apparatus that can be used to measure the volume of gas without using a trough of water.

.....

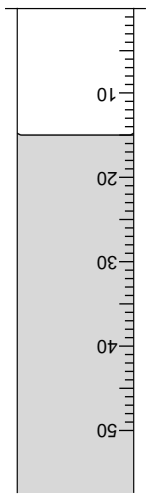
(1)

Leave blank

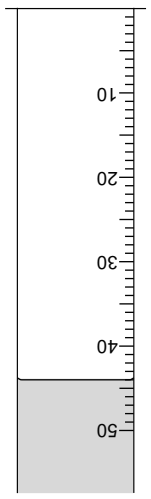
(f) The diagrams show the levels in the measuring cylinder after 60 seconds and 90 seconds.

(i) Record the volume of gas in each measuring cylinder and calculate the volume of gas collected between 60 seconds and 90 seconds.

60 seconds



90 seconds



volume at 60 s ..... volume at 90 s .....

volume collected between 60 s and 90 s .....

(3)

(ii) The rate at which gas is given off can be calculated using the equation

$$\textbf{rate} = \frac{\textbf{volume of gas given off}}{\textbf{time taken}}$$

Use your answer from part (f)(i) to calculate the rate at which gas is given off between 60 and 90 seconds. Give your answer to 2 significant figures.

Answer .....

(2)

(iii) Tick **one** box to show the correct units for the rate at which gas is given off.

cm/s ☐

cm^3/s ☐

s/cm^3 ☐

(1)

(Total 16 marks)

Q2

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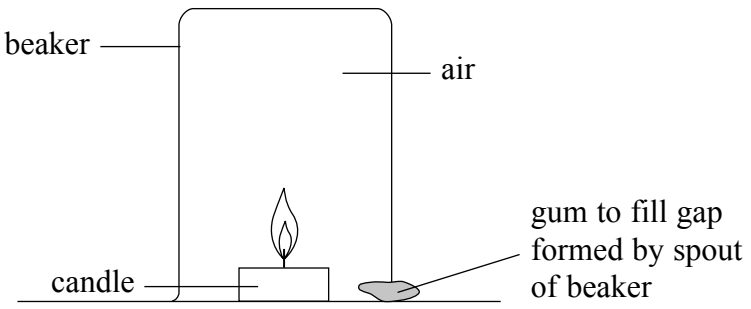
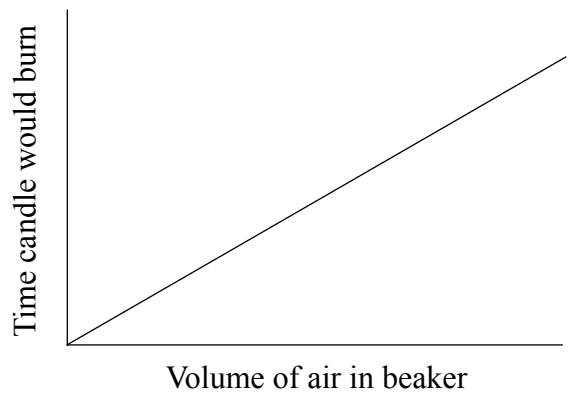
3. Air contains about 20% oxygen. When a fuel burns in air it reacts with the oxygen.

A student investigates the length of time a candle burns when it is covered by an upturned beaker. The diagram shows the apparatus she uses.



She repeats the experiment using different sizes of beaker.

(a) Before she started the experiment the student sketched a graph to show how she thought the length of time the candle would burn would depend on the volume of air in the beaker.



(i) Describe the relationship shown in her sketch graph.

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(2)

(ii) Suggest why she thought the graph was this shape.

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(2)

QUESTION 3 CONTINUES ON PAGE 10

Leave blank

(iii) Why is it important to seal the spout of the beaker with gum?

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(1)

The results the student obtains are shown in the table.

Beaker	Volume of air in beaker (cm^3)	Time for which candle burned (s)			Mean time (s)
		Run 1	Run 2	Run 3	
A	240	14	16	18	16
B	460	27	28	29	28
C	700	59	61	66	62
D	1020	68	69	73	70
E	1250	95	96	91	

(b) Suggest a method the student could use to measure the volume of the beaker used in each run accurately.

.....

.....

.....

(1)

(c) Which beaker (**A**, **B**, **C**, **D** or **E**) has results which are the **most** reliable? Explain your answer.

Most reliable results .....

Explanation .....

.....

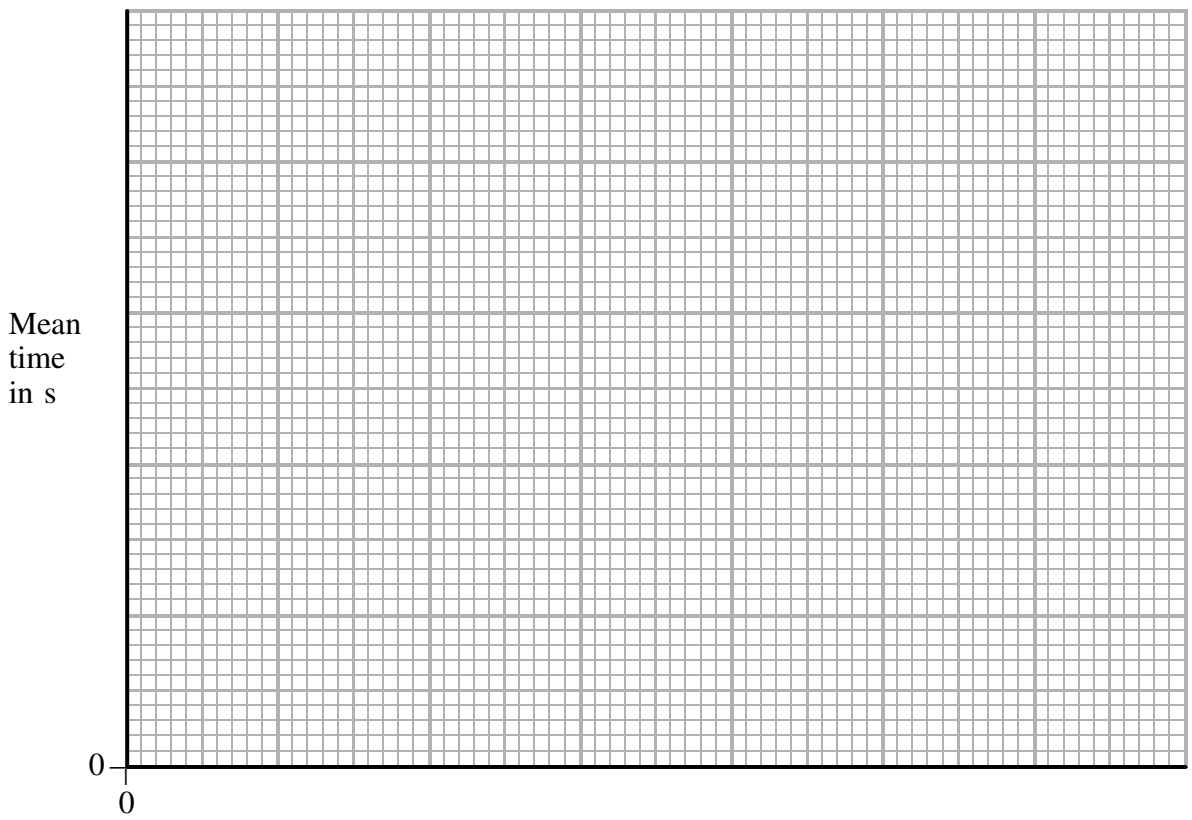
(2)

(d) Calculate the mean time for beaker **E**. Write your answer in the space in the table.

(1)

Leave blank

(e) (i) Draw a graph of the mean time for which the candle burned against volume of air in the beaker.



(4)

(ii) One of the points on your graph is anomalous. Circle this point.

(1)

QUESTION 3 CONTINUES ON PAGE 12

Leave blank

(iii) Suggest and explain what may have happened in the experiment to produce this anomalous point.

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(2)

(iv) The student was not sure whether or not the graph line went through (0,0). What further practical work should she do to help her decide?

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(1)

(f) Another student repeats the experiment using pure oxygen in place of air. She finds the candle burns for about five times longer than when air is used.

(i) Explain why the candle burns about five times longer in pure oxygen than in air.

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(1)

(ii) Use your graph to help you calculate how long a candle would burn in a beaker containing 600 cm^3 of oxygen. You must show your working.

(2) **Q3**

(Total 20 marks)

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4. The ions present in ionic compounds can be identified using simple tests.

The first table shows the flame test colours for three cations.

Cation	Flame test colour
lithium	red
sodium	yellow-orange
strontium	red

The next table shows three tests that may be used to identify anions in solution.

Anion	Result of tests when		
	nitric acid is added	magnesium sulphate solution is added	universal indicator is added
carbonate	effervescence	precipitate forms	blue
hydrogencarbonate	effervescence	no precipitate forms	dark green
hydrogensulphate	no effervescence	no precipitate forms	red
hydroxide	no effervescence	precipitate forms	blue
sulphate	no effervescence	no precipitate forms	green

Two ionic compounds, **P** and **Q**, are known to contain only anions and cations listed in the tables. They were analysed using some of the tests in the tables.

(a) Compound **P** gave a yellow-orange flame test and produced effervescence when nitric acid was added.

Suggest **two** possible identities for compound **P**.

1 .....

2 .....

(3)

Leave blank

(b) Compound **Q** gave a red flame test and caused universal indicator to turn blue.
A student concluded that compound **Q** was strontium hydroxide.

(i) Give **two** reasons why we cannot be certain this conclusion is correct.

1 .....

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2 .....

.....

(2)

(ii) Using the information in the tables, give one further test that could be done to show that compound **Q** is a hydroxide. Give the expected result of the test.

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(1) **Q4**

(Total 6 marks)

TOTAL FOR PAPER: 50 MARKS

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