No.		Paper Reference	e (complete belov	N)			
Candidate No.			//	Signature			
	Paper Reference(s) 4335/03	4437/08			Exam	iner's us	e only
	Londo	n Exam	mauo.	ns IGCSE	Team I	Leader's ι	use only
	Chemis	try - 4335	5				
	Paper 3						
	Science	(Double A	Award)) — 4437		Question Number	
	Paper 8		,			1	
	•	lation ar	nd Hid	gher Tiers		2	
			_	_		3	
		ny 7 Novemb		– Morning		4	
	Time: 1 h	our 15 minu	tes				
	Materials require Ruler, pencil and	red for examination calculator	Items includ	led with question papers			
Instructions t		washan aan didaka ma		mana initial/a) the name			
reference and ye	our signature.		-	rname, initial(s), the pape			
	ences are shown above rrect question paper.	Write the one for v	which you have	e been entered. Check th	ıat		
Answer ALL th	e questions in the spac		uestion paper.				
Show all the ste Calculators may	ps in any calculations at be used.	and state the units.					
	or Candidates						
The marks for in	ndividual questions are	shown in round brace	ckets: e.g. (2).				<u> </u>

Surname

Initial(s)

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Write your answers neatly and in good English.

 $\begin{array}{c} {\rm Printer's\ Log.\ No.} \\ H29119A \\ {\rm W850/U4335/57570} \\ \end{array} \\ {\rm 4/5/6/2/1} \end{array}$

Advice to Candidates



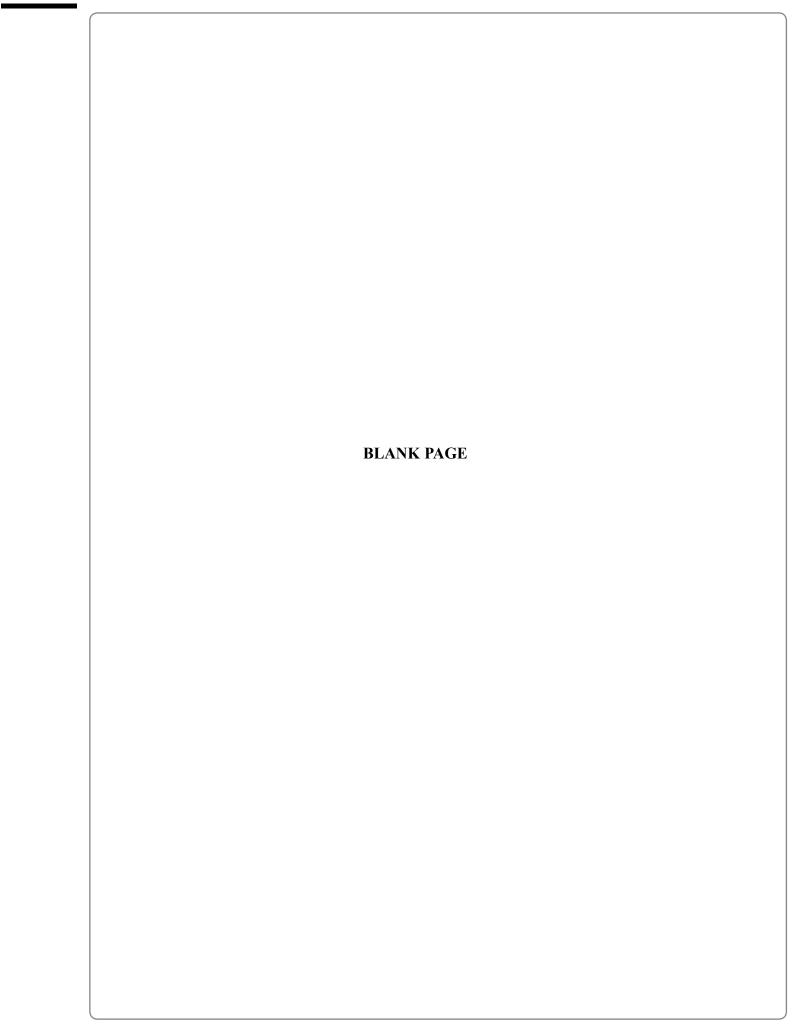
There are 4 questions in this question paper. The total mark for this paper is 50.

There are 16 pages in this question paper. All blank pages are indicated.



Turn over

Total



Leave blank

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		

Q1

(Total 8 marks)

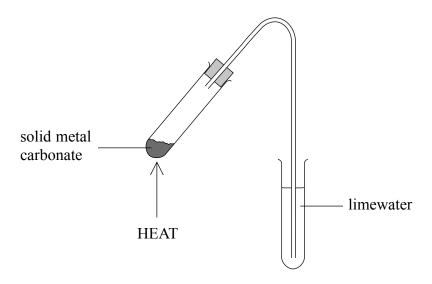
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2. The following equation represents the thermal decomposition of a metal carbonate.

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

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	l	 	 	

(2)

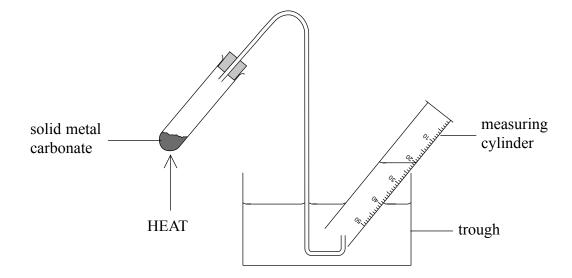
(c) Dra	w a bar chart to sho	w these	reci	ulte										(1)
c) Dia	tw a bar chart to sho	w these	103	uits	•									
		120-												
		110-												
		100-												
		90-												
		80 -												
		70-												
		60-												
		50-												
		40 -												
		30-												
		20 -												
		10-												
		0 -												
														(2)
														(3)
(d) Wh	ich metal carbonate	decomp	ose	ed m	ıost	quic	klyʻ	?						
			••••					••••	 	••••	• • • •	••••	 ••••	 (1)

Turn over

5

(e) Another student carried out a similar experiment but measured the volume of gas formed.

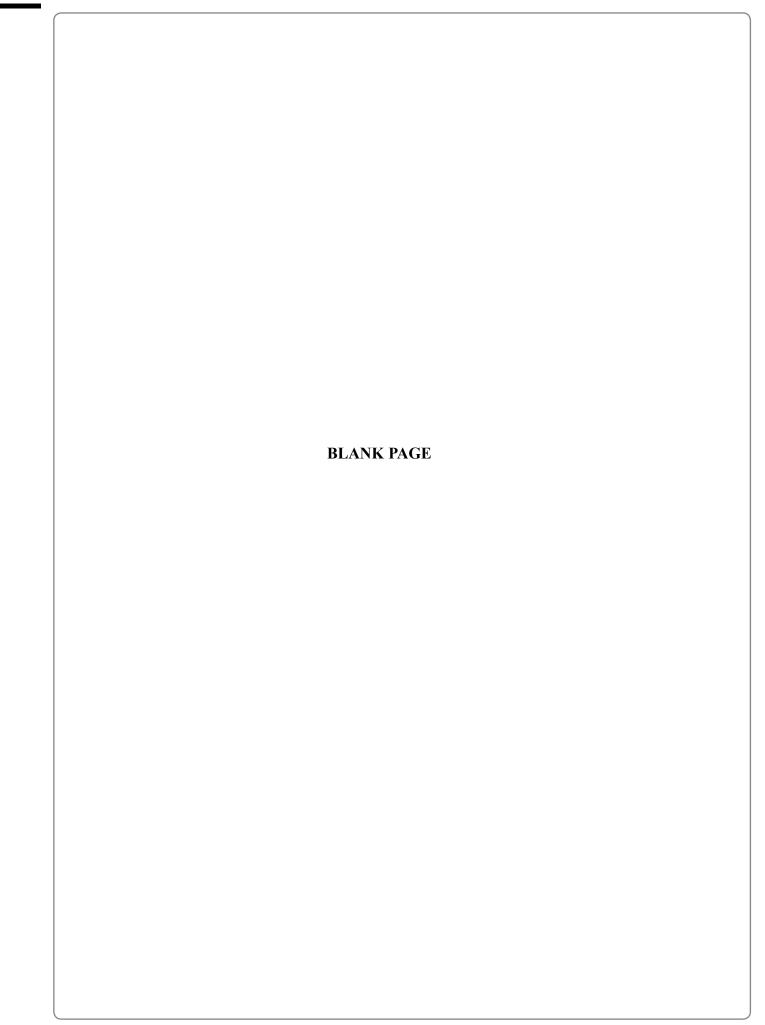
The diagram shows the apparatus he used.



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

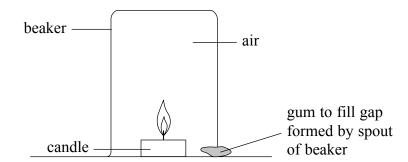
Suggest one problem with the arrangement of the apparatus that made it difficult to measure the volume of the gas collected accurately.	(i)
(1)	
Carbon dioxide gas is slightly soluble in water. What effect does this have on the volume of gas collected?	(ii)
(1)	
i) Give the name of another piece of apparatus that can be used to measure the volume of gas without using a trough of water.	(iii)
(1)	

			Leave blank
(f)		e diagrams show the levels in the measuring cylinder after 60 seconds and 90 onds.	
	(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	
		01-3	
		= 50 = = 50	
		30	
		04-	
		E-20	
		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	
		$rate = \frac{volume \text{ of gas given off}}{time \text{ taken}}$	
		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)	Q2
		(Total 16 marks)	



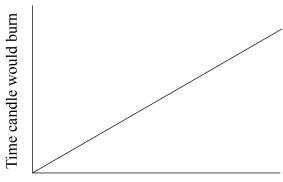
3. Air contains about 20% oxygen. When a fuel burns in air it reacts with the oxygen.

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.



Volume of air in beaker

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

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

(2)

(2)

QUESTION 3 CONTINUES ON PAGE 10



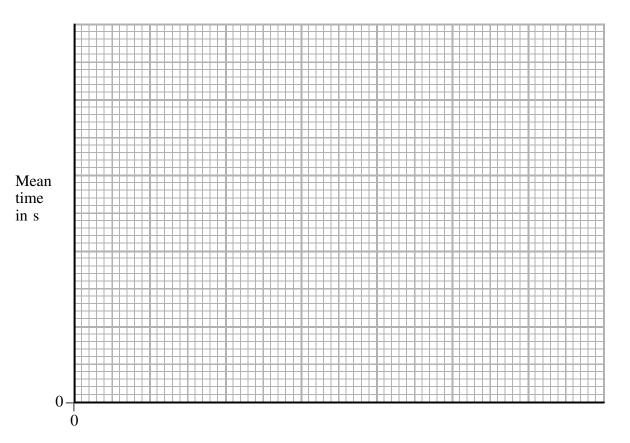
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Leave
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The results	s the student obtain	ins are show	n in the table		(
	Volume of air	Time for v	which candle	burned (s)	
Beaker	in beaker (cm³)	Run 1	Run 2	Run 3	Mean time (s)
A	240	14	16	18	16
В	460	27	28	29	28
C	700	59	61	66	62
D	1020	68	69	73	70
				0.1	
	nod the student coately.	95 uld use to m	easure the vo	91 olume of the	beaker used
ggest a meth ch run accur hich beaker (swer.	(A, B, C, D or E)	uld use to m	easure the vo	olume of the	(P Explain yo
ggest a meth ch run accur hich beaker (swer.	nod the student coately.	uld use to m	easure the vo	olume of the	(P Explain yo
ggest a meth ch run accur hich beaker (swer. ost reliable r	(A, B, C, D or E)	uld use to m	easure the vo	olume of the	Explain yo

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



Volume of air in beaker in cm³

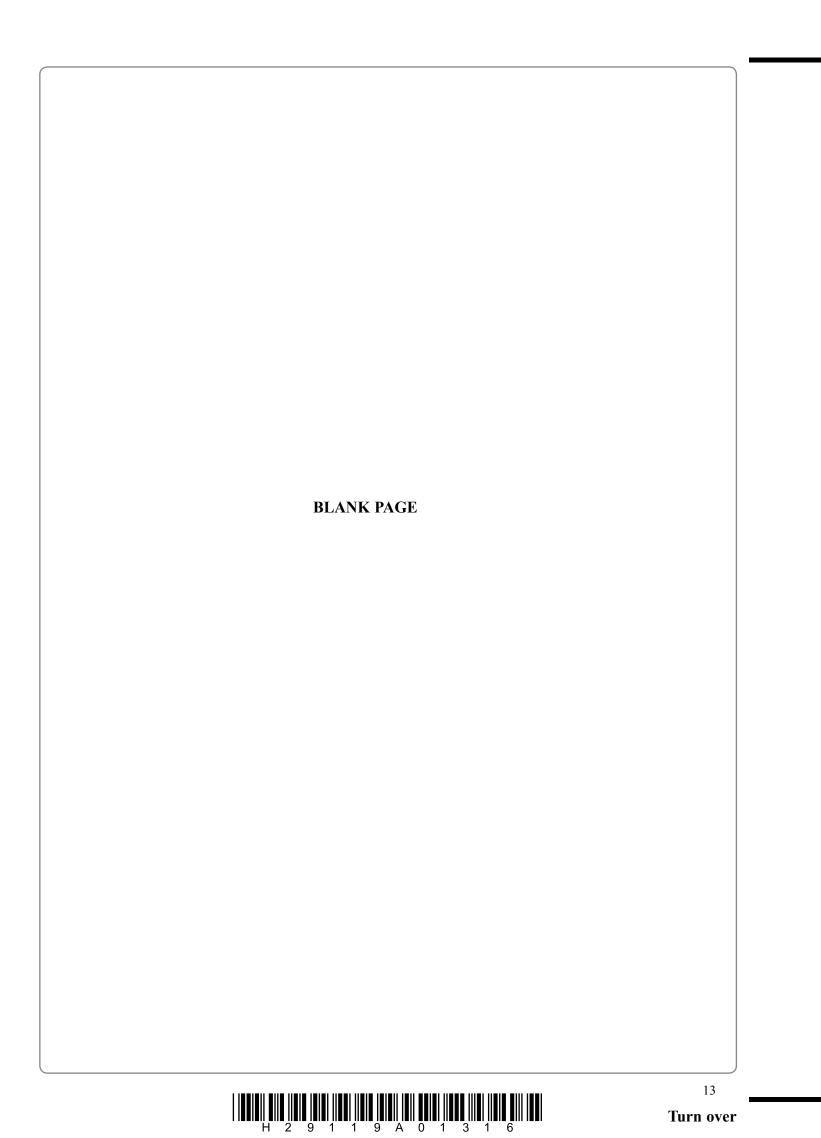
(4)

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

(1)

QUESTION 3 CONTINUES ON PAGE 12

	•••	(2)
(ne student was not sure whether or not the graph line went through (0,0). What rther practical work should she do to help her decide?
	•••	(1)
		er student repeats the experiment using pure oxygen in place of air. She finds
	ne cai	ndle burns for about five times longer than when air is used.
(xplain why the candle burns about five times longer in pure oxygen than in
((i) Ex	xplain why the candle burns about five times longer in pure oxygen than in r.
	(i) Exain	xplain why the candle burns about five times longer in pure oxygen than in
	(i) Exain	xplain why the candle burns about five times longer in pure oxygen than in r. (1) se your graph to help you calculate how long a candle would burn in a beaker



Leave blank

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.

		Result of tests when	
Anion	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, \mathbf{P} and \mathbf{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))



(b)		mpound \mathbf{Q} gave a red flame test and caused universal indicator to turn blue. tudent concluded that compound \mathbf{Q} was strontium hydroxide.	Leave blank
	(1)	Give two reasons why we cannot be certain this conclusion is correct.	
		1	
		2	
		(2)	
	(ii)	Using the information in the tables, give one further test that could be done to show that compound \mathbf{Q} is a hydroxide. Give the expected result of the test.	
		(1)	Q4
		(-)	
		(Total 6 marks)	
		(Total 6 marks) TOTAL FOR PAPER: 50 MARKS	
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