

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**Specimen for 2007****GCE A LEVEL****MARK SCHEME****MAXIMUM MARK: 30****SYLLABUS/COMPONENT: 9701/05****CHEMISTRY
PRACTICAL**

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Skill	Total marks	Approximate breakdown of marks		Question 1	Question 2
Planning	15 marks	Defining the problem	4 marks	4	0
		Methods	11 marks	11	0
Analysis, conclusions and evaluation	15 marks	Dealing with data	8 marks	0	8
		Evaluation	4 marks	0	4
		Conclusion	3 marks	0	3

PLAN = Planning
 Problem = Defining the problem
 Methods
 ACE = Analysis, conclusions and evaluation
 Data = Dealing with data
 Evaluation
 Conclusions

Question	Sections	Learning outcomes	Indicative material	mark
1	(a) (i)	PLAN Problem	• identify the independent variable in the experiment or investigation	temperature and size of marble chips 2
	(ii)		• identify the dependent variable in the experiment or investigation	volume or mass of CO ₂ 1
	(b)	PLAN Problem	• express the aim in terms of a prediction or hypothesis, and express this in words or in the form of a predicted graph	suitable hypothesis proposed e.g. rate of production of CO ₂ increases with increasing concentration of hydrochloric acid. 1

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	(c)	PLAN Methods	<ul style="list-style-type: none"> describe how the dependent variable is to be measured describe the arrangement of apparatus and the steps in the procedure to be followed describe the method to be used to vary the independent variable, and the means to ensure that its value is measured accurately describe how each of the other key variables is to be controlled describe precautions that should be taken to keep risks to a minimum suggest appropriate volumes and concentrations of reagents 	<p>appropriate apparatus to measure volume or mass of CO₂;</p> <p>diagram showing appropriate apparatus and stepwise description including time measurement</p> <p>appropriate volumes of acid and water;</p> <p>use of appropriate apparatus in measuring volumes of acid and water;</p> <p>control of temp and constant number and size of marble chips (e.g. same mass and number of chips)</p> <p>care when making up HCl from conc. HCl</p> <p>moles/mass of CaCO₃ calculated;</p> <p>initial [HCl] calculated</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>9 max 8</p>
	(d)	PLAN Methods	<ul style="list-style-type: none"> draw up tables for data that they might wish to record describe how the data might be used in order to reach a conclusion 	<p>columns for mass/concentration/time</p> <p>units correct</p> <p>calculation of CO₂ evolved, appropriate statement relating to hypothesis in (b)</p>	<p>1</p> <p>1</p> <p>1</p>
1 Total					15

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2	(a)	ACE Data	<ul style="list-style-type: none"> identify the calculations that are necessary to be able to draw conclusions from provided data 	calculates mass of X_2CO_3 used and mass of CO_2 evolved;	2
	(b)	ACE Data	<ul style="list-style-type: none"> use graphs to draw attention to the key points in quantitative data, including the variability of data 	plots mass of CO_2 on y-axis, mass of X_2CO_3 on x-axis with appropriate labels and units; suitable scales – points plotted over more than half of each axis; correct plotting of at least 10 points; appropriate best-fit line drawn	1 1 1 1
	(c)	ACE Evaluation	<ul style="list-style-type: none"> identify anomalous values in provided data and suggest appropriate means of dealing with such anomalies within familiar contexts, suggest possible explanations for anomalous readings 	identifies one point where too much CO_2 produced – (cotton wool plug not weighed at end); identifies one point where too little CO_2 produced – (solution not saturated with CO_2 at start, or not left for 10 mins for CO_2 to diffuse)	1 1
	(d)	ACE Evaluation	<ul style="list-style-type: none"> identify the extent to which provided readings have been adequately replicated, and describe the adequacy of the range of data provided 	identifies less reliability with lower masses of X_2CO_3	1
	(e)	ACE Data	<ul style="list-style-type: none"> use calculations to enable simplification or explanation of data 	values read from graph. NOT table values; calculates M_r	1 1

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	(f)	ACE Conclusions	<ul style="list-style-type: none"> draw conclusions from an investigation, providing a detailed description of the key features of the data and analyses, and considering whether experimental data supports a given hypothesis 	makes appropriate comment on whether prediction is supported by data i.e. straight line graph	1
		ACE Evaluation	<ul style="list-style-type: none"> make informed judgements on the confidence with which conclusions may be drawn 	makes appropriate comment on whether procedure is suitable for determination of M_r	1
	(g)	ACE Conclusions	<ul style="list-style-type: none"> make further predictions, ask informed and relevant questions and suggest improvements 	suggests appropriate modification to experimental procedure such as more points in range where accuracy is greatest	1
	(h)	ACE Conclusions	<ul style="list-style-type: none"> make detailed scientific explanations of the data, analysis and conclusions that they have described make further predictions, ask informed and relevant questions and suggest improvements 	uses knowledge of acid/base chemistry to describe a more appropriate way of determining M_r such as titration.	1
2 Total					15