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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 Page 2
 Mark Scheme
 Syllabus
 Paper

 GCE A LEVEL – 2007
 9701
 5

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

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
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		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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Syllabus Paper
9701 5 Page 3 Mark Scheme GCE A LEVEL - 2007

(c)	PLAN Methods	describe how the dependent variable is to be measured	appropriate apparatus to measure volume or mass of CO ₂ ;	1
		describe the arrangement of apparatus and the steps in the procedure to be followed	diagram showing appropriate apparatus and stepwise description including time measurement	1 1
		describe the method to be used to vary the independent variable, and the means to ensure that they its value is measured accurately	appropriate volumes of acid and water; use of appropriate apparatus in measuring volumes of acid and water;	1
		describe how each of the other key variables is to be controlled	control of temp and constant number and size of marble chips (e.g. same mass and number of chips)	1
		describe precautions that should be taken to keep risks to a minimum	care when making up HCl from conc. HCl	1
		suggest appropriate volumes and concentrations of reagents	moles/mass of CaCO ₃ calculated; initial [HC <i>I</i>] calculated	1 1 9 max 8
(d)	PLAN Methods	 draw up tables for data that they might wish to record describe how the data might be used in order to reach a conclusion 	columns for mass/ concentration/time units correct calculation of CO ₂ evolved, appropriate statement relating to hypothesis in (b)	1 1 1
1 Total				15

www.studyguide.pk
| Syllabus | Paper |

 Page 4
 Mark Scheme
 Syllabus
 Paper

 GCE A LEVEL – 2007
 9701
 5

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2	(a)	ACE Data	 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	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 ₂ CO 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
	(c)	ACE Evaluation	 identify anomalous values in provided data and suggest appropriate means of dealing with such anomalies within familiar contexts, suggest passible explanations 	identifies one point where too much CO ₂ produced – (cotton wool plug not weighed at end); identifies one point where too little CO ₂	1
			possible explanations for anomalous readings	produced – (solution not saturated with CO ₂ at start, or not left for 10 mins for CO ₂ to diffuse)	
	(d)	ACE Evaluation	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 ₂ CO ₃	1
	(e)	ACE Data	use calculations to enable simplification or explanation of data	values read from graph. NOT table values;	1
			•	calculates M _r	1

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Syllabus Paper
9701 5 Page 5 Mark Scheme GCE A LEVEL - 2007

(f)	ACE	draw conclusions from	makes appropriate	1
	Conclusions	an investigation, providing a detailed description of the key features of the data and analyses, and considering whether experimental data supports a given hypothesis	comment on whether prediction is supported by data i.e. straight line graph	
	ACE Evaluation	 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	 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	 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