



WJEC Chemistry 1  
Option – Higher Tier  
1.5 Mark Scheme

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
9/2	62	1			1		1
(a)							
(b)	all points plotted accurately (2) $\pm$ 1 square ecf from (a) any 5 points plotted accurately (1) curve of best fit (1)		2				
(c)	curve to left of original (1) volume of carbon dioxide goes from 0 to 90 (1)			1	3	3	3
(d)	more particles (1) greater <b>chance</b> of collisions / greater <b>frequency</b> of collisions / more collisions <b>per second</b> (1) neutral answer: more collisions higher rate (of reaction) / faster reaction (1)	3			3		
(e)	downward curve from (0,179.80) (1) becomes horizontal at (40,179.63) (1)			2	2	2	2
	<b>Question 9/2 total</b>	<b>4</b>	<b>2</b>	<b>5</b>	<b>11</b>	<b>7</b>	<b>8</b>

Higher Tier only questions

Question	Marking details	Marks available							
		AO1	AO2	AO3	Total	Maths	Prac		
4	(a)	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	accept atoms in any order	1			1	1	
	(i)		solution in water / dissolved in water	1			1		
	(ii)		sulfur forms as a solid / sulfur is insoluble / sulfur is precipitated (1)	1	1		2		2
	(iii)		solid blocks view of cross (1)						
	(b)	(i)	the mean of the results collected at 45°C / 24.3 (1)						
			either of following for (1)				2	2	
			<ul style="list-style-type: none"> <li>the middle value is very different to the other two / is an anomaly</li> <li>the middle value should not have been used in calculating the mean</li> </ul>						
		(ii)	the higher temperature the faster the reaction / higher the rate (1)				1	1	
			particles have more energy / move faster (1)						
			any of following for (1)	2				3	
			<ul style="list-style-type: none"> <li>frequency of collisions increases</li> <li>more collisions per unit time</li> <li>more collisions have minimum required energy</li> <li>more collisions achieve activation energy</li> <li>more collisions are successful</li> </ul>						
			<b>Question 4 total</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>9</b>	<b>2</b>	<b>2</b>

## HIGHER TIER ONLY QUESTIONS

Question	Marking details	Marks available				
		AO1	AO2	AO3	Total	Maths Prac
3	<p>(a)</p> <p>award (1) each for up to <b>two</b> of following</p> <ul style="list-style-type: none"> <li>• speeds up a chemical reaction</li> <li>• lowers activation energy</li> <li>• not used up during the reaction</li> </ul> <p>doesn't take part in the reaction - neutral answer</p>	2			2	
	<p>(b)</p> <p>(i)</p> <p>award (1) for any <u>comparison</u> of active ranges</p> <ul style="list-style-type: none"> <li>• <b>A</b> works in pH range of 0.5-4.5 and <b>B</b> works in pH range 3-8</li> <li>• <b>A</b> works at a lower pH range / <b>B</b> works at a higher pH range</li> <li>• <b>A</b> works over a narrower pH range / <b>B</b> works over a wider pH range</li> </ul> <p>award (1) for <u>comparison</u> of optimum pH e.g.</p> <ul style="list-style-type: none"> <li>• <b>A</b> works best at pH 2 and <b>B</b> works best at pH 5.5</li> <li>• <b>A</b> works best at a lower pH / <b>B</b> works best at a higher pH</li> </ul> <p>award (1) for <u>comparison</u> of activity at given points</p> <ul style="list-style-type: none"> <li>• both have the same activity at their optimum pH</li> <li>• both have the same activity at pH 3.75</li> </ul> <p>up to maximum (2)</p>			2	2	
	<p>(ii)</p> <p>curve drawn rising from pH 5 then falling to pH 9 (1)</p> <p>peak at pH 7 (1)</p>			2	2	

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
(c)	activity increases up to optimum temperature (1) decreases after optimum temperature (1) rate of decrease is more rapid than rate of increase (1) reference to denaturing / lock and key - neutral answers			3	3		
	<b>Question 3 total</b>	<b>2</b>	<b>0</b>	<b>7</b>	<b>9</b>	<b>0</b>	<b>0</b>

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths Prac	
8	<p>(a)</p> <p>faster reaction / higher rate at higher temperature (1)</p> <p>particles have more energy / move faster at higher temperature (1)</p> <p>award (1) for any of following</p> <ul style="list-style-type: none"> <li>• more collisions per given time</li> <li>• more frequent collisions</li> <li>• greater chance of collisions</li> <li>• more collisions have energy above activation energy</li> <li>• more successful collisions</li> </ul>	3			3		1
	<p>(b)</p> <p>rate decreases over time (1)</p> <p>due to reactant particles being used up / fewer reactant particles (1)</p>	2			2		1

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths Prac	
(c)	<p>award (1) for improvement and (1) for linked explanation</p> <p>e.g.  ensure that the concentration of acid / mass of magnesium is kept the same (1)  so that any change in results can only be as a result of changing temperature (1)</p> <p>use gas syringe (1)  more precise / easier to read accurately (1)</p> <p>use of balance (1)  record loss of mass more accurately than volume of gas (using this apparatus) (1)</p> <p>make repeat measurements (1)  calculate mean values which are more accurate (1)</p> <p>accept other sensible answers</p>			2	2		2

Question	Marking details	Marks available						
		AO1	AO2	AO3	Total	Maths Prac		
(d)	0.0185 mol of magnesium (1) 1:1 ratio / moles hydrogen produced also 0.0185 mol of hydrogen (1) 0.037 g of hydrogen (1) accept greater number of sig figs ecf possible		3		3			
(ii)	0.0185 × 24 (1) 0.444 dm <sup>3</sup> (1) accept greater number of sig figs ecf possible from (d)(i)		2		2		2	
	<b>Question 8 total</b>	<b>5</b>	<b>5</b>	<b>2</b>	<b>12</b>		<b>5</b>	<b>4</b>



Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
7 (a)	4			1	1	1	
(b)	<p><b>Y (1)</b></p> <p>award (1) for either of following</p> <p>volume of gas produced / rate of reaction increases with temperature then decreases</p> <p>it works best / has an optimum temperature at around 40°C</p> <p>enzymes are denatured at 40°C / at higher temperatures (1)</p> <p>neutral answers – broken down / damaged / killed</p>			2	3		
(c)	<b>C</b>			1	1		
	<b>Question 7 total</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>5</b>	<b>1</b>	<b>0</b>

Question	Marking details	Marks available						
		AO1	AO2	AO3	Total	Maths	Prac	
11	(a)	1.52 cm <sup>3</sup> /s (2) if incorrect award (1) for either of following (58 – 20) and (30 – 5) 38 and 25 ecf possible if one value read incorrectly from graph	2			2	2	
	(b)	(i) line steeper than original line (1) line finishing at 90 cm <sup>3</sup> (1)			2	2		2
		(ii) award (1) each for any two of following <ul style="list-style-type: none"> <li>greater surface area at the start</li> <li>more collisions per unit time / more frequent collisions</li> <li>produces 50% more gas as mass is 50% more</li> <li>carbonate is the limiting factor / reaction stops when carbonate is used up</li> </ul>	2			2		
		<b>Question 11 total</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>6</b>	<b>2</b>	<b>2</b>

Question	Marking details	Marks available						
		AO1	AO2	AO3	Total	Maths	Prac	
7				1	1			1
(a)	award (1) for either of following <ul style="list-style-type: none"> <li>prevents acid (-spray) escaping</li> <li><u>only</u> allows carbon dioxide to escape</li> </ul>			1	1			1
(b)	take the mass (after 10 s) away from 107.75 / the original mass			1	1			1
(c)	0.0082 / $8.2 \times 10^{-3}$ (3) <b>must</b> be to 2 sig figs if incorrect award (1) each for either of following appropriate <b>change</b> in mass e.g. 0.44 – 0.30 / 0.14 corresponding <b>change</b> in time e.g. 30 – 13 / 17 ecf possible from error in graph reading but must have calculated a change in mass and change in time		3		3		3	
(d)	(i) award (2) for all points plotted correctly – tolerance $\pm 1/2$ square award (1) for any four points plotted correctly award (1) for (smooth) curve drawn through points ecf possible from incorrectly plotted points		3		3		3	
(ii)	acid has lower concentration (1) so fewer particles present (in the same volume) (1) lower chance of successful collisions / lower frequency of successful collisions / fewer successful collisions (per second) (1)	2		1	3			

Question	Marking details	Marks available					
		AO1	AO2	AO3	Total	Maths	Prac
(e)	curve to the left of and above graph A starting from (0,0) and to a maximum height of 0.88 – tolerance $\pm 1/2$ square			1	1		
	<b>Question 7 total</b>	<b>2</b>	<b>6</b>	<b>4</b>	<b>12</b>	<b>6</b>	<b>2</b>