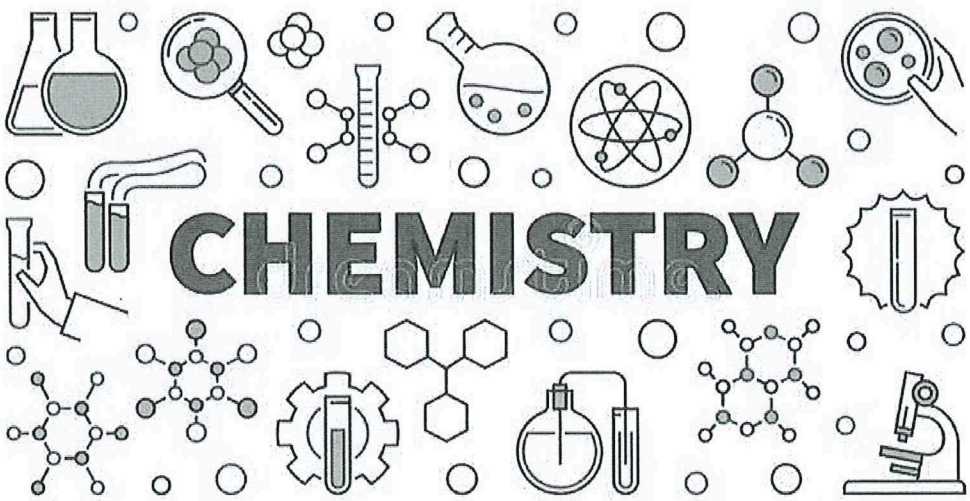
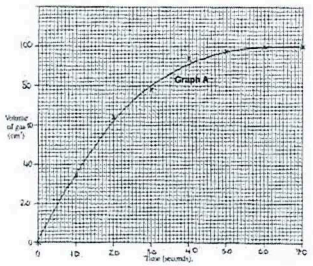
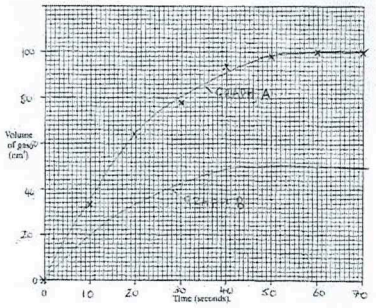


WJEC Chemistry 1

Dual Award – Higher Tier

1.5 Mark Scheme

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			 appropriate scale (1) all points plotted correctly (1) tolerance ±½ square suitable curve (1) do **not** accept points joined with ruler [assume graph **A** is the graph that is plotted]		3		3	3	3
	(b)			 curve to the right of graph **A** (1) levelling off at 50cm^3 (1)			2	2	2	2

Question	Marking details	Marks Available					
		AO1	AO2	AO3	Total	Maths	Prac
(c)	(higher temperature means) the particles have more kinetic energy / move faster (1) this means there is a greater frequency / chance of successful collisions (1)	2			2		
(d)	repeat the experiment / get more than one set of results / compare results with another group (1) take mean of repeatable / concordant / consistent results (1) accept 'reproducible' and 'reliable' results			2	2		2
(e)	advantage – award (1) for any of following • no time delay in connecting the syringe • all of the gas produced is collected **from the flask** • none of the gas escapes before the syringe is connected • measuring cylinder scale is more precise than the syringe disadvantage – award (1) for any of following • measuring cylinder scale is less precise than the syringe • difficult to read the volume in the cylinder – moving water surface • some of the gas may not end up in **measuring cylinder** • tube may move from under the measuring cylinder **NB** – precision of the scale can only be credited once neutral: reference to stability or ease of setting up apparatus			2	2		2
	Question 4 total	**2**	**3**	**6**	**11**	**5**	**9**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			**higher** temperature (1) higher rate is due to more successful collisions per second / greater frequency of successful collisions / more particles having required activation energy (1) at higher temperature particles have more (kinetic) energy / move faster so more of the collisions that occur are successful (1) **larger** surface area means that more particles are able to be involved in collisions (1)	4			4		4
	(b)			either of following • equal volume of gas produced in both experiments • graphs level off at the same volume in both experiments			1	1		1
				Question 5 total	**4**	**0**	**1**	**5**	**0**	**5**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	*(a)*			type of oil used, towel material and volume of hydrogen peroxide ☐ type of oil used, towel material and temperature of stain remover ☐ type of oil used and towel material ✓ type of oil used, towel material and cost of stain remover ☐			1	1		1
	(b)			it is the cheapest stain remover ☐ it is heat resistant ☐ it has a low concentration of hydrogen peroxide ✓ it takes a long time to work ✓ **both** needed for (1) 0 if more than two boxes ticked			1	1		1
	(c)			award (1) for either of following • stain remover **D** may have a catalyst added • stain remover **D** may have an enzyme added			1	1		1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)	(i)		0.14 / 0.143 (2) if answer incorrect award (1) for $\frac{0.4}{2.8}$ ecf possible for error in reading graph			2	2	2	
		(ii)		concentration **S** is **half** of concentration **T** (1) **half** the number of particles in the same volume (1) **half** the chance of successful collisions / **half** the number of successful collisions per second / **half** the frequency of successful collisions (1) award (2) if answered using 'lower' / 'fewer' rather than 'half' throughout	3			3		
				Question 8 total	**3**	**0**	**5**	**8**	**2**	**3**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			<table><tr><th>Concentration of sodium thiosulfate (g/dm^3)</th><th>Time 1 (s)</th><th>Time 2 (s)</th><th>Time 3 (s)</th><th>Mean time (s)</th></tr><tr><td>0.2</td><td>114</td><td>113</td><td>112</td><td>113</td></tr><tr><td>0.4</td><td>74</td><td>70</td><td>72</td><td>72</td></tr><tr><td>0.6</td><td>40</td><td>38</td><td>(57)</td><td>39</td></tr><tr><td>0.8</td><td>21</td><td>23</td><td>22</td><td>22</td></tr><tr><td>1.0</td><td>14</td><td>16</td><td>15</td><td>15</td></tr></table>			1	1	1	1
	(b)			award (2) for all points plotted correctly – tolerance ±½ small square award (1) for 3 or 4 points plotted correctly award (1) for suitable curve		3		3	2	
	(c)			the higher the concentration the higher the rate (1) because there are more particles in the same volume (1) therefore more chance of (successful) collisions / more (successful) collisions per second / greater frequency of collisions (1) or reverse argument the lower the concentration the lower the rate (1) because there are fewer particles in the same volume (1) therefore less chance of (successful) collisions / fewer (successful) collisions per second / lower frequency of collisions (1)	3			3		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)			curve drawn below / to the left of plotted curve [must cover range of at least 0.5 g / dm^3 e.g. from 0.3 to 0.8]			1	1		
	(e)			award (2) for either of following 0.0063 6.3×10^{-3} award (1) for correct answer not given to 2 significant figures if answer incorrect award (1) for M_r 158 ecf possible from incorrect M_r e.g. 71		2		2	2	
				Question 4 total	**3**	**5**	**2**	**10**	**5**	**1**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			more acid added than is needed to react with all the marble chips accept marble chips run out <u>first</u> / acid is in excess		1		1		1
	(b)			line drawn steeper / to the left of line **A** <u>and</u> reaching a maximum level of 60 cm^3		1		1		
	(c)			8.66 (2) if answer incorrect award (1) for either of following $\frac{7.8}{100}$ / 0.078 / 7.8 × 111 0.078 × 111 / $\frac{866}{100}$ ecf possible alternative method $n(CaCO_3) = 0.078$ mol ⇨ $n(CaCl_2) = 0.078$ mol (1) mass $CaCl_2 = 0.078 \times 111 = 8.66$ g (1) ecf possible		2		2	2	

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)			26.6 (2) if answer incorrect award (1) for either of following $\frac{14.3}{53.7}$ / 0.266 0.266 × 100 no ecf possible alternative methods $\frac{14.3}{0.537}$ (1) $\frac{100}{53.7} \times 14.3$ (1) 26.6 (1) 26.6 (1) no ecf possible		2		2	2	
	(e)			a catalyst lowers the minimum energy needed for reaction / successful collisions / lowers the activation energy (1) this means more <u>successful</u> collisions (per second) / higher frequency/chance of <u>successful</u> collisions (so higher rate) (1) if no reference to collisions award (1) mark for 'a catalyst provides a suitable surface for a reaction'	2			2		
				Question 5 total	**2**	**6**	**0**	**8**	**4**	**1**