

Question	Answer	Marks	Guidance
1	<p>Level 3 Complete evaluation including some information from the graph AND explanation using reacting particle model that must mention the idea of collision frequency Quality of communication does not impede communication of science at this level. (5 - 6 marks)</p> <p>Level 2 Complete evaluation including some information from the graph AND explanation using reacting particle model that must mention the idea of collisions OR explanation using reacting particle model that must mention the idea of collision frequency Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 Complete evaluation including some information from the graph OR explanation using reacting particle model that must mention the idea of collisions Quality of communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to A</p> <p>Indicative scientific points may include: Evaluation</p> <ul style="list-style-type: none"> • results support the analysis • idea that as concentration increases reaction time decreases and the rate of reaction increases <p>Reacting particle model</p> <ul style="list-style-type: none"> • as acid is more concentrated particles (of acid) are more crowded • as acid is more concentrated particles (of acid) are closer together • as acid is more concentrated more particles (of acid) per unit volume • as acid is more concentrated there are more collisions • as acid is more concentrated there are more collisions per second <p>allow collisions more often, more chance of collision, increases collision frequency for more collisions per second allow reverse argument with as acid gets less concentrated</p> <p>Use the L1, L2, L3 annotations in Scoris. Do not use ticks.</p>
Total		6	

Question	Answer	Marks	Guidance
2 a	<p>[Level 3] Explanation that the results (in relation to both volume of acid & mass of magnesium) do not support the prediction with reference to experimental data AND an explanation <i>using collision frequency</i> that reaction in experiment 4 is faster, or has a shorter reaction time, than experiment 3. Quality of communication does not impede communication of science at this level. (5-6 marks)</p> <p>[Level 2] Explanation that the results (in relation to both volume of acid & mass of magnesium) do not support the prediction with reference to experimental data AND an explanation that the reaction in experiment 4 is faster, or has a shorter reaction time, than experiment 3 <i>using idea of more collisions rather than collision frequency</i></p> <p>OR an explanation <i>using collision frequency</i> that reaction in experiment 4 is faster or has a shorter reaction time than experiment 3. Quality of written communication partly impedes communication of the science at this level. (3-4 marks)</p> <p>[Level 1] Explanation that the results (in relation to either volume of acid or mass of magnesium) do not support the prediction with reference to experimental data OR an explanation that the reaction in experiment 4 is faster or has a shorter reaction time than experiment 3 <i>using idea of more collisions rather than collision frequency</i>. Quality of communication impedes communication of the science at this level (1-2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to A*</p> <p>Indicative scientific points for explanation may include:</p> <ul style="list-style-type: none"> • results show as volume increases reaction time does not change • results show that as mass increases reaction time does not change <p>Indicative scientific points for experiments 3 and 4 may include:</p> <ul style="list-style-type: none"> • concentration is higher in experiment 4 • acid particles are more crowded in experiment 4 / acid particles are closer together / more acid particles per unit volume / more acid particles per cm³ / more acid particles in the same space • more (successful) collisions per second / collisions more often / increased collision frequency / more chance of a collision <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks</p>

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2 b	<p>(acid) particles have more energy / (acid) particles are moving faster / more collisions per second (1)</p> <p>more successful collisions / more energetic collisions / more collisions above the activation energy / more effective collisions (1)</p>	2	<p>ignore particles vibrate more or vibrate faster ignore particles move more</p> <p>allow more successful collisions per second / more frequent energetic collisions for two marks ignore harder collisions / faster collisions</p> <p>allow more collisions (1), if no other mark awarded allow rate increases / reaction is faster (1), if no other mark awarded</p>
	Total	8	

Question		Answer	Marks	Guidance
3	(a)	<p>bond breaking is endothermic / bond breaking takes in energy / bond breaking absorbs energy (1)</p> <p>bond making is exothermic / bond making gives out energy / bond making releases energy (1)</p> <p>more energy taken in than is released / more energy absorbed than given out (1)</p>	3	<p>allow heat instead of energy</p> <p>ignore more bonds are broken than are made</p>

Question		Answer	Marks	Guidance
	(b)	<p>[Level 3] Applies reacting particle model, including mention of collisions frequency and / or successful collisions, to explain the effect of temperature AND pressure on the rate of reaction. Quality of written communication does not impede communication of science at this level. (5-6 marks)</p> <p>[Level 2] Applies reacting particle theory, including mention of collisions, to explain the effect of temperature OR pressure on the rate of reaction. Quality of written communication partly impedes communication of science at this level. (3-4 marks)</p> <p>[Level 1] Applies reacting particle theory to explain the effect of temperature OR pressure on the rate of reaction. Quality of written communication impedes communication of science at this level. (1-2 marks)</p> <p>[Level 0] Insufficient or irrelevant science such as repeating the question. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to A.</p> <p>Indicative scientific points may include:</p> <ul style="list-style-type: none"> Increasing pressure gives more crowded nitrogen and oxygen molecules / molecules are closer together / more nitrogen and oxygen molecules in the same volume so there is an increased number of collisions per second / collisions more often Increasing temperature has nitrogen or oxygen molecules moving faster / molecules have more energy so more successful collisions per second / more energetic collisions. <p>Use the L1, L2, L3 annotations in scoris. Do not use ticks.</p>
		Total	9	