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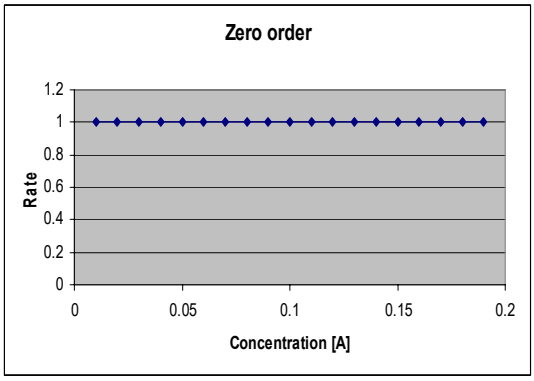
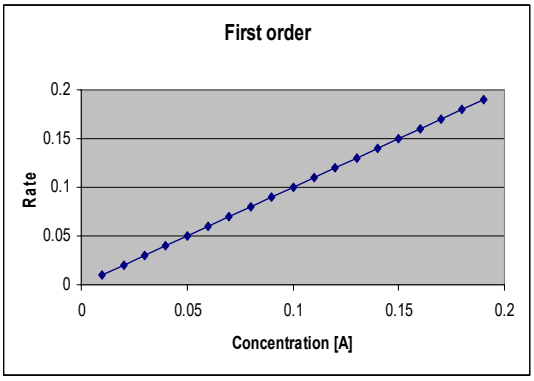
Guided Inquiry Activity
Enzyme Kinetics, Part One
Answers

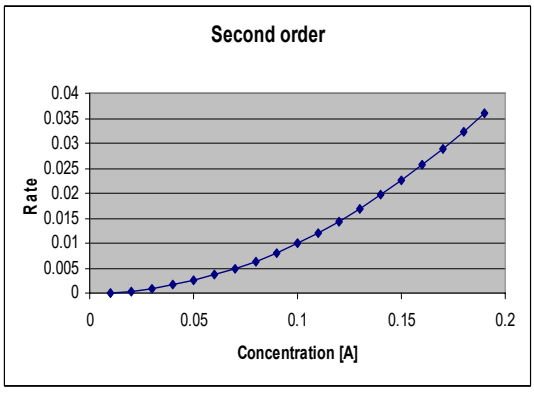
Model 1 Critical thinking questions

1. Decreases
2. It is being converted to B.
3. Decreases
4. As the concentration of A falls, the arte of conversion to B also decreases.
5. 1M/20 minutes = 0.05 M/min
6. 0.7 M/5 minutes = 0.14 M/min
7. 0.2 M/5 minutes = 0.04 M/min
8. Yes, identified that rate as decreasing with time.
9. Use a tangent line or take a derivative.

Graphs:



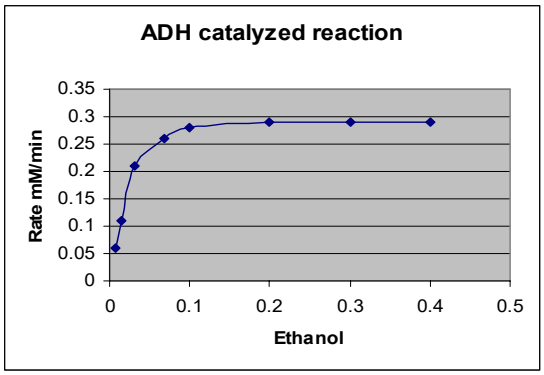




Questions related to above graphs:

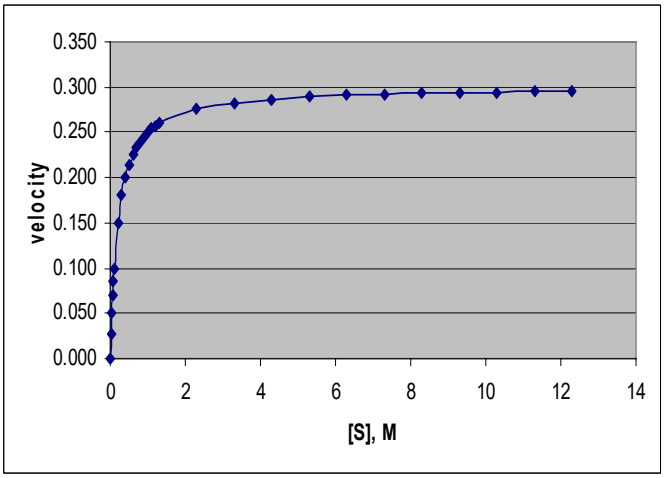
2. The rate is independent of concentration
4. The rate increases linearly with concentration
6. The rate increases exponentially with concentration.
7. As the rate constant doubles, all rates double.

Model 2

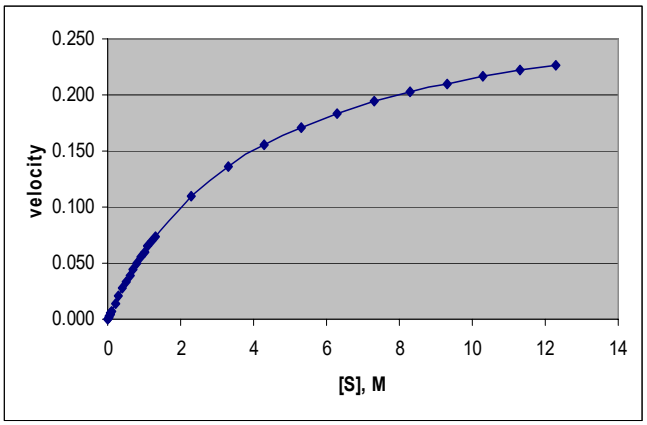


Critical Thinking questions

1. The shape is hyperbolic
2. The reaction follows first order kinetics up to about 0.031 M ethanol.
3. Zero order kinetics are observed between 0.2 and 0.4 M ethanol.
4. V_{max} is 0.29 mM/min.
5. The enzyme becomes rate limiting; all active sites are filled.



1. Yes, the Michaelis Menton model produces the expected hyperbolic curve.
2. The asymptote is 0.3, V_{max}.
3. The velocity slows, V_{max} is unchanged, but is not reached over this substrate interval.



1. V_{max}/0.5 V_{max} = 2, Km = [S] at ½ V_{max}, so it has units of concentration typically M or mM.

2. 0.5 V_{max} is 0.15 when V_{max} is 0.3.

3. The perpendiculars will give values of Km as 0.2 or 4.

4. V_{max} is approximately 2.3. 0.5 V_{max} is then 1.15. Dropping a perpendicular to the x axis here gives a Km of 0.8 – 0.9.

5. The enzyme that takes <u>less</u> substrate to reach half maximal velocity is more efficient. Hence, the enzyme that has a Km of 0.2 is more efficient than an enzyme with a Km of 4.0.