

Biophysical Chemistry – CH 4403 01
Assignment 10 (50 points)

Due Tuesday, December 2 (at the start of class)

Please complete the answers to this assignment on a separate page (or pages), showing your work and sources (if you referred elsewhere for constants, enthalpies, etc.).

1. An enzyme exhibiting Michaelis-Menton kinetics has a velocity of 0.20 v_{\max} at a substrate concentration of 0.500 mM. What substrate concentration is required to double the velocity? (7 points)
2. Tinoco chapter 10, question #2, parts (a) and (b). (5 points)
3. For an enzyme that follows Michaelis-Menten kinetics, what concentration of substrate is needed (in terms of K_M) to obtain a steady-state velocity that is 90% of v_{\max} ? (Your answer should be a numeric factor multiplied by K_M .) For a typical experiment, do you think it will be possible to estimate v_{\max} by eye from a plot of v_0 vs. $[S]$? (5 points)
4. Consider the competitive inhibition scheme discussed in class.
 - a. Show that:

$$K'_M = K_M \left(1 + \frac{[I]}{K_I} \right)$$

Where K_M is the standard Michaelis constant. (5 points)

- b. Does K'_M change in the presence of an inhibitor? Justify your answer. (3 points)
5. Tinoco chapter 10, question #27. Some of these answers are included in the back of the book; for full credit you must justify your answers. (10 points)
6. Tinoco chapter 10, question #19. (15 points)