

Name: \_\_\_\_\_

**CHEMISTRY 333**  
Kinetics Practice Problems

1. Consider the following set of data and answer the following questions:

| [S] (M)              | V (umol/min) | V (+ inhibitor) (umol/min) |
|----------------------|--------------|----------------------------|
| $6 \times 10^{-6}$   | 20.8         | 12                         |
| $1 \times 10^{-5}$   | 29           | 15                         |
| $2 \times 10^{-5}$   | 45           | 20                         |
| $6 \times 10^{-5}$   | 67.6         | 24                         |
| $1.8 \times 10^{-4}$ | 87           | 28                         |

- a. Plot the data on a Lineweaver-Burk plot (be sure to label axes)
  - b. Determine the  $K_m$
  - c. Determine the  $V_{max}$
  - d. The second set of velocities represents the rate of the reaction when an inhibitor is added. Plot these data on the same graph as above and determine the new  $K_m$  and  $V_{max}$  and the type of inhibitor (competitive, uncompetitive, non-competitive).
  - e. Can the effects of the inhibitor be over-ridden by adding more substrate? Why?
2. The kinetics of an enzyme were analyzed in the absence of inhibitors, as well as in the presence of Inhibitor **A** and Inhibitor **B**. Using the given data below, construct or calculate the following (**Make sure to label graphs with appropriate axes and equations, and circle final answers**):

| [S] mM | No Inhibitor<br>$V_0$ (mmol/min) | Inhibitor <b>A</b><br>$V_1$ (mmol/min) | Inhibitor <b>B</b><br>$V_2$ (mmol/min) |
|--------|----------------------------------|--|--|
| 3      | 3.90                             | 2.40                                   | 1.29                                   |
| 6      | 6.00                             | 3.60                                   | 2.40                                   |
| 12     | 8.40                             | 5.10                                   | 3.90                                   |
| 24     | 10.8                             | 6.60                                   | 6.30                                   |
| 36     | 12.0                             | 7.20                                   | 8.55                                   |

- a. Write out the Michaelis-Menten and Lineweaver-Burke equations
- b. Plot all of the data on one plot as Michaelis-Menten saturation curves
- c. Plot all of the data on one plot in the Lineweaver-Burk format
- d. Define  $K_m$  and  $V_{max}$
- e. **Mathematically** determine the  $K_m$  and  $V_{max}$  in the **absence** and in the **presence** of inhibitors
- f. Determine what **type** of inhibitors **A** and **B** are