1. How is it that enzymes are able to catalyze reactions so much more rapidly than chemical catalysts?
2. What is the relationship between enzyme catalysis and equilibrium?
3. During the course of a reaction, an enzyme is changed (see Koshland induced fit). Such a phenomenon is not observed for a chemical catalyst. Is it appropriate to call an enzyme a catalyst? Why or why not?
4. A scientist discovers a new enzyme mechanism she calls “rock, paper, scissors.” It catalyzes interconversion of three substrates and is related to the ping-pong mechanism. Draw how it might operate.
5. It is said that the ordered binding of enzyme substrates for multiple substrate reactions is consistent with the Koshland induced fit. Why?
6. What are the units on the velocity of an enzymatic reaction?
7. A scientist is lazy and measures velocity of an enzymatic reaction after 10 minutes instead of after 1 minute. What effect would you predict this would have on the measured velocities?
8. What is the difference between V_max/2 and K_M?
9. Why haven’t all enzymes evolved to be perfect?
10. Why does the V_max [S] plot for an allosteric enzymatic reaction resemble the % O_2 saturation vs [O_2] for hemoglobin?
11. Why is V_max dependent on the quantity of enzyme, but K_cat is not?
12. You are studying an enzyme inhibitor and notice that the V_max you observe in the presence of an inhibitor is identical to the V_max for an uninhibited reaction using only 80% of the enzyme. What type of inhibition is this? Draw a Vo vs [S] and a Lineweaver-Burk plot for the uninhibited and the inhibited reaction (both on each plot).
N.C. Inhib

$\frac{V_{\text{max}}}{K_m} \downarrow$

Km Same

$1 \bigg/ V_0$

$1 \bigg/ V_{\text{max}}$

N.C. Inhib.

Unih. Reaction

$\frac{1}{[S]}$