Chapter 12 Answers
Enzyme kinetics, inhibition and regulation

Book questions 3, 6, 7, 8, 10, 11

1) An enzyme affects the structure of which species?
The structure of the substrate
The structure of the transition state ***
The structure of the product
The structure of the intermediate
The structure of the coenzyme

2) An holoenzyme is
a coenzyme
an enzyme with its cofactor ***
an allosteric enzyme
a cofactor

3) In which of the following pathways does the enzyme exist in two different states?
The ping pong bi bi mechanism ****
The ordered sequential mechanism
The random mechanism
The disordered mechanism

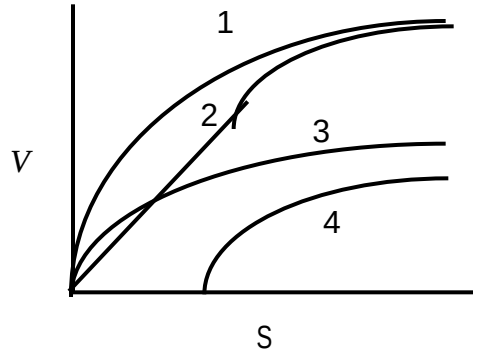
5) Which of the following is not a general property of enzymes?
5) Enzymes are almost exclusively proteins
b) Enzymes have great catalytic power
c) Enzymes use only hydrophobic interactions in binding substrates ****
d) Enzymes bind substrates specifically
e) The catalytic power of enzymes can be regulated

5) T/F The maximal velocity (V max) is equal to the maximal affinity of an enzymes for its substrate

6) If the Km of an enzyme for its substrate remains constant at the concentration of the inhibitor increases, what can be said about the mode of inhibition?
The inhibition is noncompetitive, since the proportion of bound substrate remains the same as the concentration of the inhibitor increases.

7) The kinetic data for an enzymatic reaction in the presence and absence of inhibitors are plotted below. Identify the curve that corresponds to each of the following:

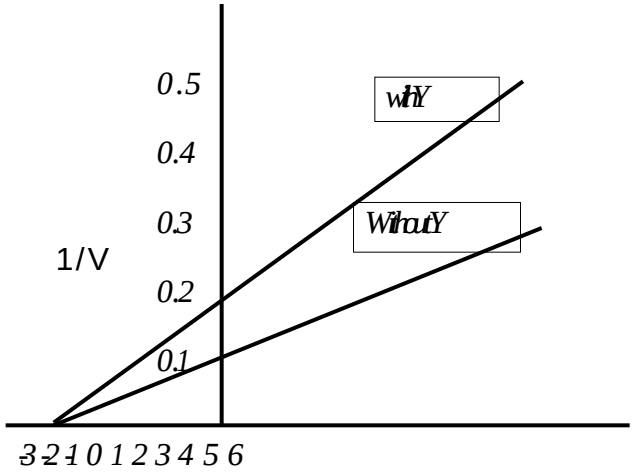
a) No inhibitor - 1
b) Noncompetitive inhibitor - 3
c) competitive inhibitor - 2
d) Uncompetitive inhibitor - 4



8) Draw the appropriate Lineweaver-Burk plots for each f the inhibitor types in the above question. What is the reaction mechanism for each reaction?

9) Suppose that the data shown in the table below are obtained for an enzyme reaction in the presence and absence of an inhibitor Y. Using the double reciprocal plots of the data, determine the type of inhibition that has occurred. Does the inhibitor Y combine with E, with ES or with both? Explain.

	V(mmol product produced / min	
[S](mM)	Without Y	With Y
0.2	5.0	2.0
0.4	7.5	3.0
0.8	10.0	4.0
1.0	10.7	4.3
2.0	12.5	5.0
4.0	13.6	5.5



The inhibition was noncompetitive as observed by the fact that the lineweaver burk plot intersects on the X axis. A noncompetitive inhibitor combines at a site other than the substrate binding site. Thus it may combine with both E and ES. In this case, the inhibitor has equal affinity for E and as described by the known mechanism of inhibitor binding and the fact that the intersection lies on the X axis.

10) Which of the following is true?
a) Competitive inhibition is reversible and can be overcome by increasing the concentration of the substrate ****
b) Competition inhibition is irreversible and cannot be overcome by increasing the concentration of the substrate
c) Non-competitive inhibition is normally irreverent but can be overcome by increasing the concentration of the substrate
d) Competitive inhibition is reversible and cannot be overcome by increasing the concentration of the substrate

11) A non-competitive inhibitor Vmax _____ ? *decreases*

12) During steady state, which of the following item (s) increases?
a) [E]
b) [ES]
c) [P]
d) [S]
e) [E} and [ES] ******

12) You would expect an Noncompetitive inhibitor to
a) decreased the - 1/Km

b) bind to the free enzyme only
c) have an unchanged Vmax
d) decreased the Vmax apparent

13) An enzyme will
a) change the $\Delta G^{o'}$ and the $\Delta G^{\ddagger}$
b) reduce the $\Delta G^{o'}$ but not the $\Delta G^{\ddagger}$
c) change neither the $\Delta G^{o'}$ or the $\Delta G^{\ddagger}$
d) not alter the $\Delta G^{o'}$ but reduce the $\Delta G^{\ddagger}$
e) Gee, no GTE

14) An inhibitor which only binds to the ES complex is a
a) competitive inhibitor
b) un competitive inhibitor
c) non competitive inhibitor
d) plays in a non-checking un-competitive league