Enzymes

1. What are the key properties of enzymes and what is their function in biological systems?

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<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>FUNCTIONS</th>
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</table>

Use the graph below to answer questions 2 – 7.

2. What is happening at letter b?

________________________________________________________________________
________________________________________________________________________
3. What is the relationship between the energy of the reactants and the energy of the products?

4. Define activation energy.

5. Which letter represents the activation energy for the reaction
   a. Without the enzyme? ________________________________
   b. With the enzyme? ________________________________

6. What does letter e represent?

7. What is the role of enzymes in biological systems?

8. What is the relationship between enzyme structure and enzyme specificity?

9. Define or describe each of the following:

<table>
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<th>Active Site</th>
<th>Substrate</th>
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10. Explain what happens in the induced-fit model of enzyme action.

_____________________________________________________________

_____________________________________________________________

_____________________________________________________________

_____________________________________________________________

11. List 4 ways enzymes can lower activation energy.

_____________________________________________________________

_____________________________________________________________

_____________________________________________________________

_____________________________________________________________

12. How does substrate concentration affect the rate of an enzyme-controlled reaction?

_____________________________________________________________

13. What happens to the rate of an enzyme-controlled reaction when the substrate level is high and remains high?

_____________________________________________________________

Why does this happen?

_____________________________________________________________

_____________________________________________________________

_____________________________________________________________

14. What environmental conditions affect enzyme activity?

_____________________________________________________________
15. Why did the reaction rate for enzyme J drop when the temperature exceeded 50°C?

________________________________

________________________________

16. What is the optimal temperature for enzyme J?

________________________________

How do you know this is the optimal temperature?

________________________________

17. Could enzyme J be an enzyme found in the human body?

________________________________

Why or why not?

________________________________

________________________________

Use the graph at the right to answer questions 18 – 20.

18. What is the optimal pH for:
   Enzyme K? ____________________
   Enzyme M? ____________________
   Enzyme L? ____________________

19. Which letter represents the activity of an enzyme that could be found in the stomach?

________________________________

Biochemistry Activity #8 page 4
20. What happens to enzyme activity when the pH is higher or lower than the optimal pH?

____________________________________________________________________________________

Why does this happen?

____________________________________________________________________________________

____________________________________________________________________________________

21. Match the definition/description with the correct term.

A. Allosteric enzymes
B. Coenzyme
C. Cofactor
D. Competitive inhibitors
E. Inhibitor
F. Noncompetitive inhibitors

______ Small, nonprotein molecules needed for enzyme reactions
______ Organic cofactors; vitamins
______ Chemicals that inhibit enzyme activity
______ Enzyme inhibitors that resemble the substrate and compete with the substrate for the active site
______ Enzyme inhibitors that bind to the enzyme at a site other than the active site and cause the enzyme to change shape
______ Enzymes with two conformations – one active and one inactive

22. What is the role of each of the following in allosteric enzyme action?

a. Inhibitor: ____________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

b. Activator: ____________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

Biochemistry Activity #8 page 5
Use the drawings below to answer questions 23 – 25.

23. Which letter represents the enzyme? _______________________________

24. If letter B represents the substrate, what kind of inhibitor (competitive or noncompetitive) does letter C represent?

_____________________________________________________________

How do you know? _____________________________________________

_____________________________________________________________

25. What kind of inhibitor (competitive or noncompetitive) does letter D represent?

_____________________________________________________________

How do you know? _____________________________________________

_____________________________________________________________


_____________________________________________________________

_____________________________________________________________

27. Describe what happens during cooperativity.

_____________________________________________________________

_____________________________________________________________