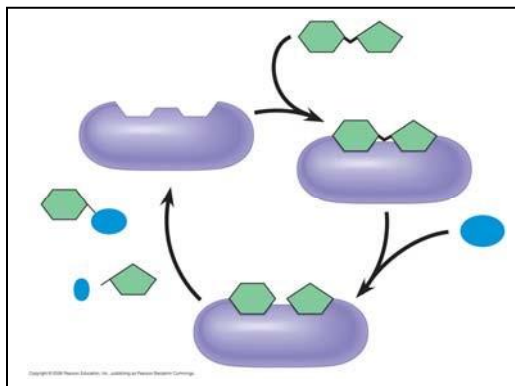


Enzymes

8.4

1. *Enzymes* are an important type of protein. For now, use this sketch to review what you know about enzymes. Label the *active site*, the *substrate*, and the *products*. Show what happens to water.

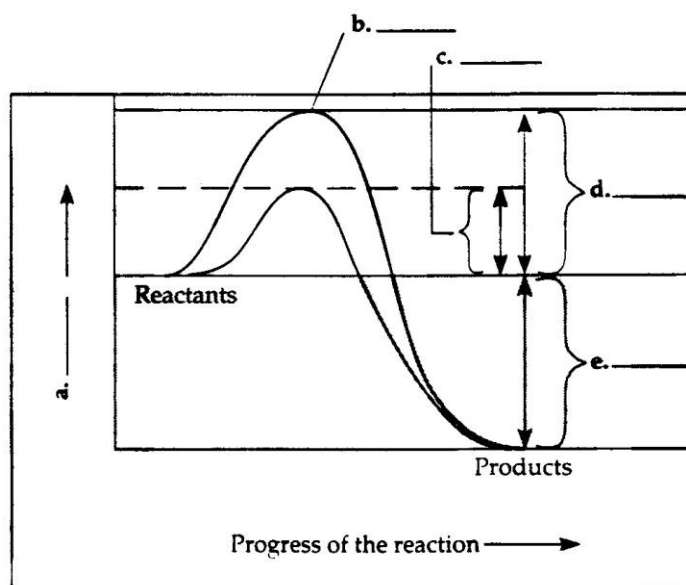


A. Is this reaction dehydration synthesis or hydrolysis? _____

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

CHARACTERISTICS	FUNCTIONS

Use the graph below to answer questions 3 – 9.



3. What is happening at letter b?

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

5. Define activation energy.

6. Which letter represents the activation energy for the reaction

a. Without the enzyme? _____

b. With the enzyme? _____

7. What does letter e represent?

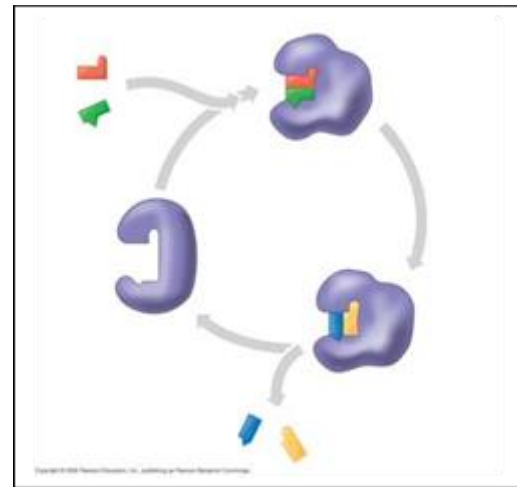
8. What is the role of enzymes in biological systems?

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

10. Define or describe each of the following:

Active Site	
Substrate	

11. Explain what happens in the induced-fit model of enzyme action. How is it shown in the figure at right?



12. List 4 ways enzymes can lower activation energy.

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

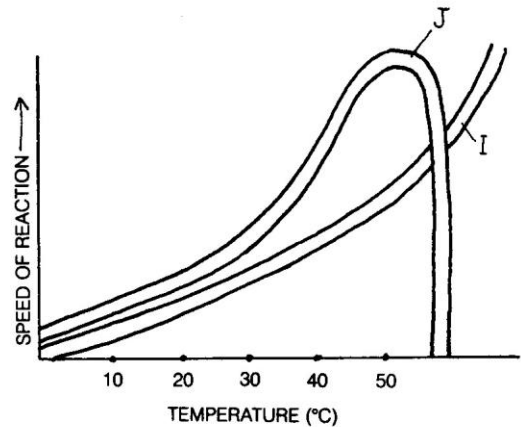
14. What happens to the rate of an enzyme-controlled reaction when the substrate level is high and remains high?

Why does this happen?

15. What environmental conditions affect enzyme activity?

Use the graph at the right to answer questions 16 – 18.

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



17. What is the optimal temperature for enzyme J?

How do you know this is the optimal temperature?

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

Why or why not?

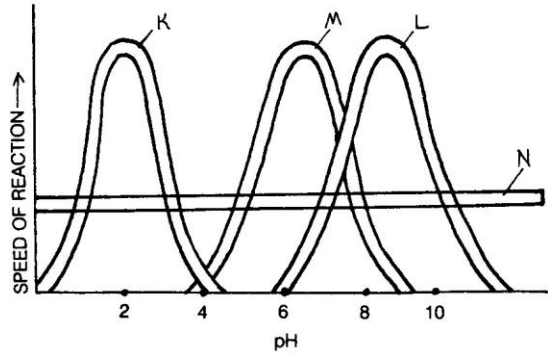
Use the graph at the right to answer questions 19 – 21.

19. What is the optimal pH for:

Enzyme K? _____

Enzyme M? _____

Enzyme L? _____



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

21. What happens to enzyme activity when the pH is higher or lower than the optimal pH?

Why does this happen?

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

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

_____ Small, non-protein 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

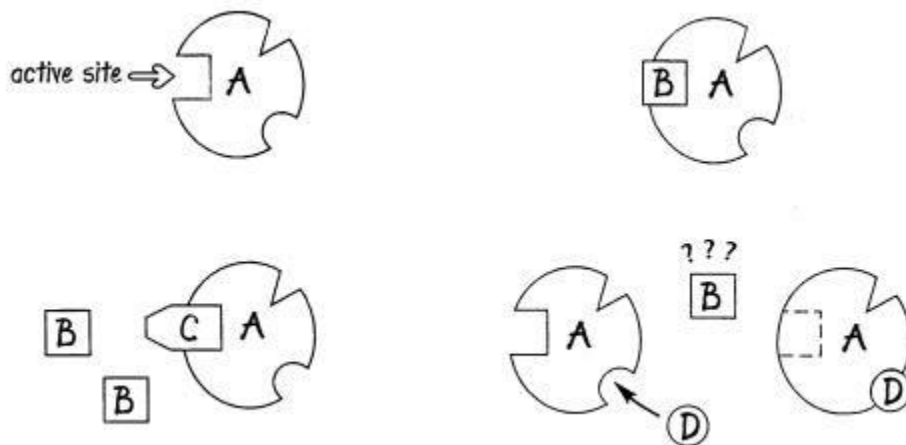
23. What is the role of each of the following in allosteric enzyme action?

a. Inhibitor: _____

b. Activator: _____

8.5

Use the drawings below to answer questions 23 – 25.



24. Which letter represents the enzyme? _____

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

How do you know? _____

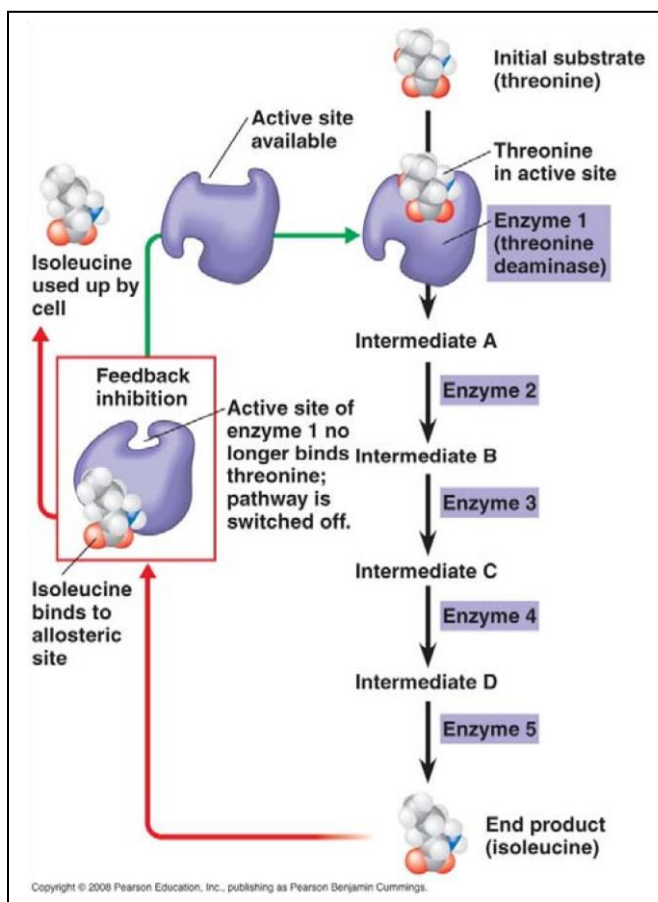
26. What kind of inhibitor (competitive or noncompetitive) does letter D represent?

How do you know? _____

27. Describe what happens in feedback inhibition.

28. Describe what happens during cooperativity. Use hemoglobin and its cooperativity in binding oxygen in the gills of a fish as an example.

29.



a. What is the substrate molecule to initiate this metabolic pathway?

b. What is the inhibitor molecule?

c. What type of inhibitor is it?

d. When does it have the most significant regulatory effect?

e. What is this type of metabolic control called?

End of Chapter Synthesis and Evaluation Problems

Do problems 4-6. Check and correct your answers 4-6 in the back of the text.

4. _____

5. _____

6. _____

Study Guide/ISN (20 points)

In your study guide book, review pages 60-62. In your ISN, do the following: Title the page **Chapter 8 Enzymes Must know!** In one color, copy down 3, 4, 5 must knows and leave space underneath to add, in a different color, a brief description, diagram, model, or mnemonic device that will help you study for the unit test and more importantly the AP test in May.

Bozeman Science/ Podcasts/AP Biology/ISN (see syllabus for format) (20 points each)

1. Bozeman science Enzymes (Big Idea 4 Systems)
2. Enzyme catalysis lab (AP Biology labs)