

Study Guidelines: **Enzymes**

Name: _____

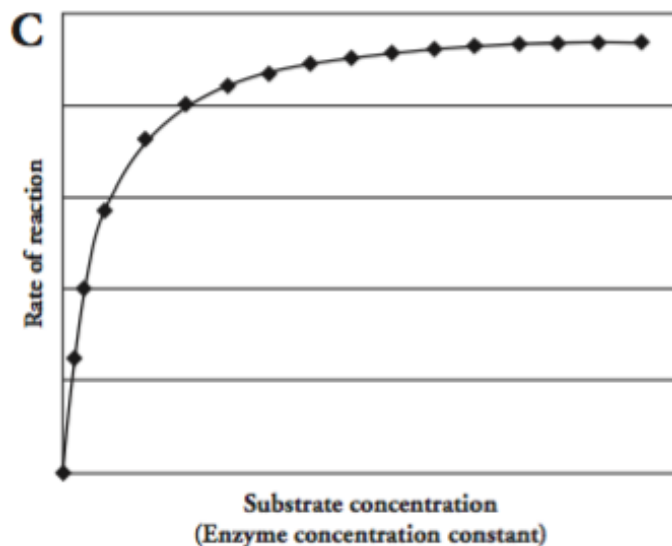
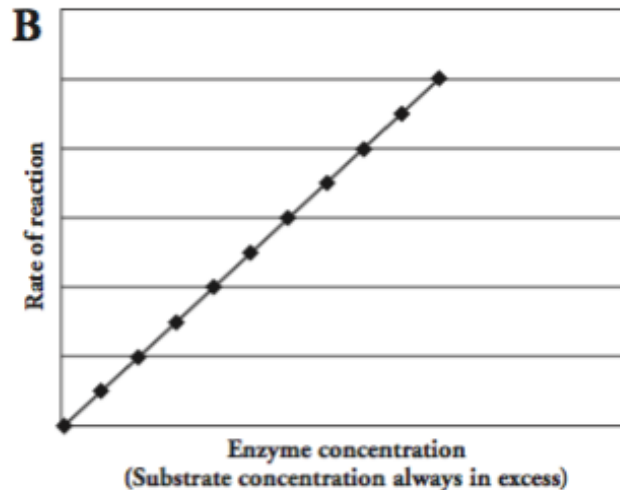
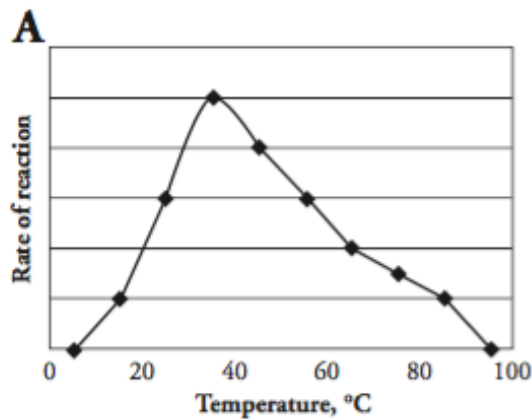
Period: ____ Seat: ____

The chemical reactions that occur inside of cells are necessary to transfer energy and materials the cells need. However, many occur so slowly, life would not be possible...that's where enzymes come in ☺

1. Explain what enzymes are and why they are important for all living things (be sure to include the type of macromolecule it is).
2. a. Sketch the basic structure of an amino acid (include the R group)
b. We can say amino acids are the same but different. Explain what makes the 20 types of amino acids the same, and what makes them different from each other.
c. Explain why amino acids are divided into 3 groups.
3. In your own short and simple words describe how:
 - a. primary structure is determined
 - b. secondary structure is determined
 - c. tertiary structure is determined
 - d. quaternary structure is determined
4. a. Identify the role a side chain (R-group) plays in protein shape
b. Describe the connection between primary structure and tertiary structure
c. Define denaturation. Why is it important?
5. a. Define activation energy b. Explain the role enzymes play in a chemical reaction in connection to activation energy.
6. a. Sketch the graph that shows activation energy for an exergonic reaction with and without an enzyme. Explain what the graph shows/tells us.
b. Sketch a graph of what you think an endergonic graph for activation energy would look like. (include with and without an enzyme)
7. a. Name the 3 most important things about an enzymes shape. b. Sketch a pic to show these things.
8. Describe the specificity of enzymes (don't forget about substrates)
9. a. Explain why the induced fit model is better than the lock and key model.
b. Explain how induced fit lowers activation energy.
10. List the 4 ways enzymes lower activation energy.
11. Do the Scientific Skills Exercise on Page 128 in your book (it looks like it's a lot but its just doing a graph and then analyzing it.)
12. Identify the difference between activators and inhibitors.
13. a. Explain what a cofactor is
b. Name the 2 types of cofactors and identify the differences between them.

14. a. Compare and contrast competitive inhibitors and noncompetitive inhibitors
 b. Explain what an irreversible inhibitor is and why they can be dangerous/deadly
15. Describe the connection between inhibitors and metabolic pathways
16. a. Explain how enzyme concentration and substrate concentration affect the enzyme reaction rates. b. Sketch a graph for each c. Why do they look so similar?
17. a. Sketch a picture of the graph that shows the effects of temperature on enzyme reaction rates. b. Explain how temperature affects enzyme reaction rates by explaining what is going on with the rise and fall of the curve on the graph. c. What is meant by optimal temperature and what is it for humans?
18. a. Sketch a picture of the graph that shows the effects of pH on enzyme reaction rates. b. Explain how pH affects enzyme reaction rates by explaining what is going on with the rise and fall of the curve on the graph. c. What is meant by optimal pH and what is it for humans?
19. a. Sketch a picture of the graph that shows the effects of salinity on enzyme reaction rates. b. Explain how salinity affects enzyme reaction rates by explaining what is going on with the rise and fall of the curve on the graph.
20. Read the case study from the website and answer the questions at the end of the case study.
Write your answers into pg 18 of your notebook.

***Use the graphs for the enzyme amylase to answer the questions below.



Amylase is an enzyme that catalyzes the digestion of carbohydrates. The graphs above provide data on several factors that affect the function of amylase in the body.

21.
 - a. The relationship between which two variables is illustrated in graph A?
 - b. The relationship between which two variables is illustrated in graph B?
 - c. The relationship between which two variables is illustrated in graph C?

22.
 - a. What is the optimum temperature for amylase?
 - b. What is the biological significance of the optimal temperature at which the amylase-catalyzed reaction is fastest?
 - c. What happens to the enzyme after optimal temperature?

23.
 - a. What is the relationship between enzyme concentration and reaction rate based on graph B above?
 - b. Why is this graph different than the graph I gave you in the notes?

24.
 - a. Use graph C to explain the relationship between substrate concentration and reaction rate.
 - b. What causes the reaction rate to hit a maximum in the graph?