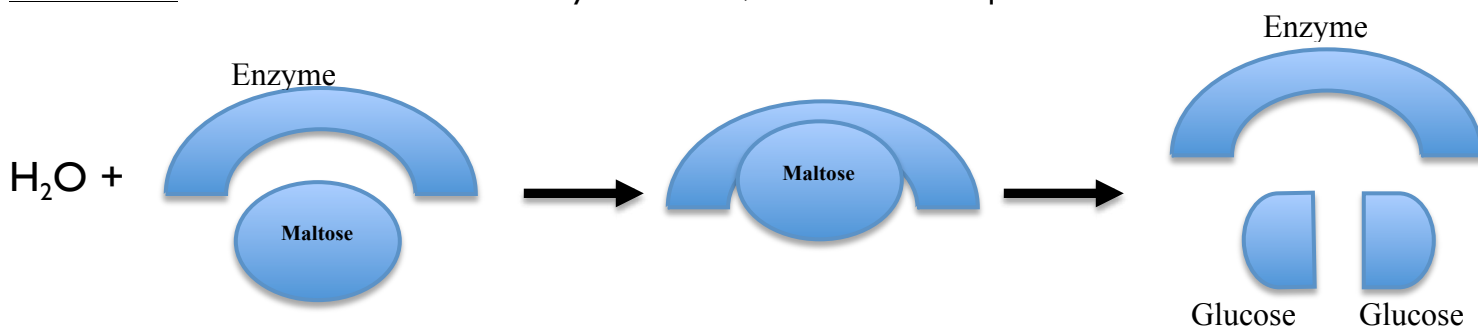


Unit 4 – Enzymes and Reaction Rates
Worksheet – Enzyme Structure and Function

Directions: Complete the chart by checking the correct column for each example.

Example	Potential Energy	Kinetic Energy	Activation Energy	Chemical Energy	Heat Energy
1. Girl playing basketball		* X			
2. Match being used to light a candle	Candle → X	X	Match *	Candle X	Match
3. Glucose Molecule	* X			X	
4. Windmill blades turning		* X			
5. Waterfall	Top X	Falling * X			
6. Heart beating		* X			
7. Sled positioned at the top of the hill	* X				
8. Beginning of a rollercoaster ride	X		Example of AE *		

Directions: Examine this model of an enzyme reaction, then answer the questions that follow.



9. What is the name of the enzyme shown in the model? Maltase
10. What is the substrate for this enzyme? Maltose
11. What type of reaction is occurring in this diagram? (Think about the last unit) Hydrolysis
12. How are enzyme named? –ase + name of substrate

13. To what class of biological compounds do enzymes belong? Proteins

14. Explain how enzymes affect activation energy and reaction temperatures.

Lower AE and temperature for reactions to occur

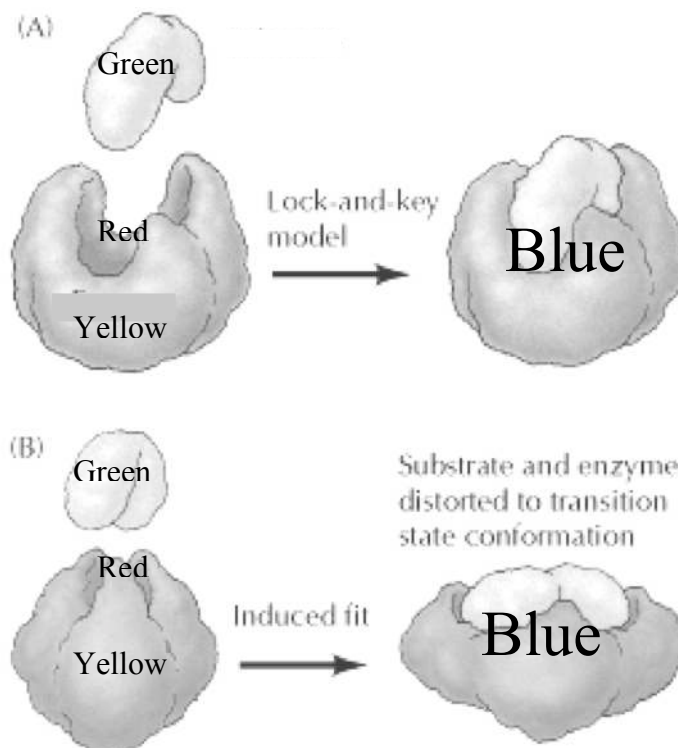
15. Color the parts of the illustration below as indicated:

Red – Active Sites

Green – Substrates

Yellow – Enzyme

Blue – Enzyme Substrate Complex



16. How does the modern induced fit model of enzyme-substrate interaction differ from the original lock and key model?

Enzymes are flexible and altered by the substrate.

17. Is an enzyme “used up” by the reaction it catalyzes? NO

18. What is the active site of an enzyme?

Location where an enzyme binds to its substrate

19. What is meant by enzyme specificity?

3D structure makes enzymes have a unique shape/active site

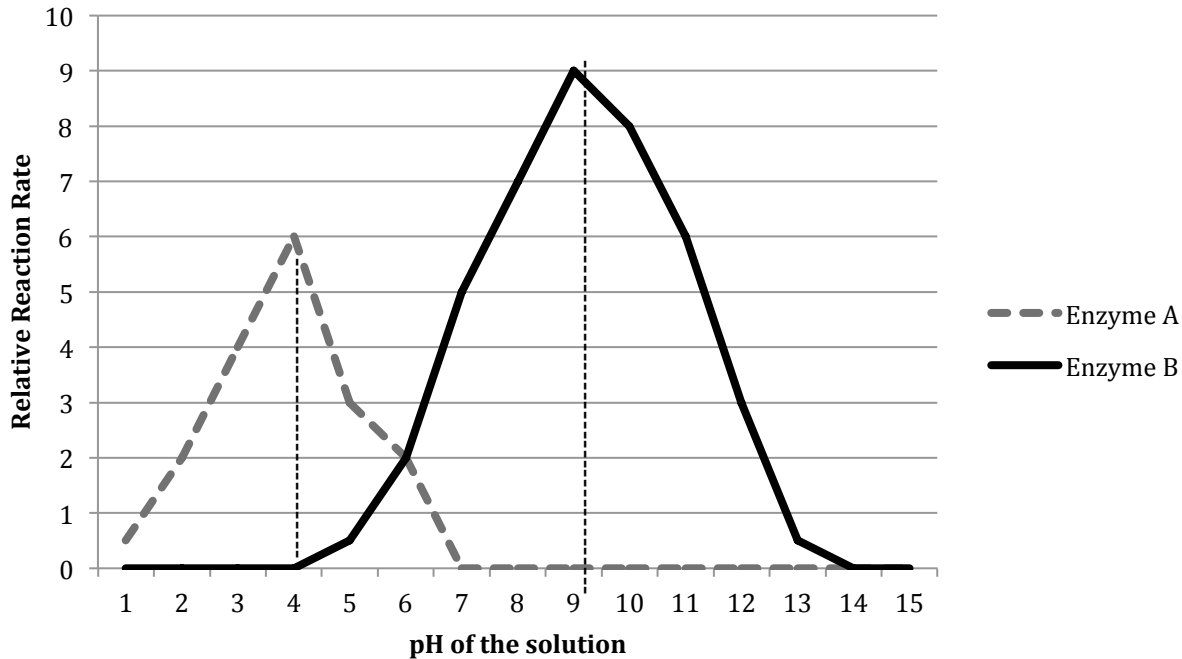
20. Explain how enzymes are essential to all living organisms.

Reactions in the cells would be too slow if no enzymes existed. Processes like photosynthesis and cellular respiration depend on enzymes.

Critical Thinking – pH and Enzyme Action

This experiment was designed to determine the effect of pH on the rate of enzyme action for two protein-digesting enzymes. Enzyme A is found in the stomach. Enzyme B is found in the intestine. Data collected during the experiment are illustrated in the graph below. Use the graph to answer the questions that follow.

Enzyme Reaction Rates as pH Increases



21. What is the optimum pH for Enzyme A? Enzyme B?

A~3.7 --- B~8.8

22. Compare the reaction rates of the enzymes at a pH of 5.

Enzyme B is lower than Enzyme A

23. Based on your data what can you infer about the relative pH of the stomach and the intestines? Explain your answer.

Stomach pH=3 so Enzyme A is active in low pH

Intestine pH=8 so Enzyme B is active in high pH

24. Suppose a mutation caused the locations of the enzymes to be switched. What effect might this have on the digestive process of the organism?

Neither enzyme would function. Digestion would suffer.