Internet Assignment:

Enzyme Catalyzed Reactions

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Class: \_\_\_\_\_\_

# How Enzymes Work

Go to the website below and answer the questions

<http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter2/animation__how_enzymes_work.html>

1. What do enzymes do
2. What part of the enzyme binds the substrate?
3. When the substrate is bound to the enzyme what do we call it?
4. How does the enzyme affect the substrates
5. Are enzymes reusable?

# Enzymes & Activation Energy

<http://www.sumanasinc.com/webcontent/animations/content/enzymes/enzymes.html>

1. On ancient Earth, what provided the energy for chemical reactions?
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What is the difference between an exergonic reaction & endergonic reaction (not found in animation, look it up if you don’t know)?
   1. Endergonic\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Exergonic\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Can energy from food molecules be used directly to power chemical reactions? Explain.
4. The animation claims that “when chemical bonds in ATP are broken, energy is released” What’s wrong with this statement, and what’s a better way to say that?
6. Sketch the molecule of ATP below, and use your notes to label each part
7. How much energy is released in this reaction: ATP + H2O 🡪 ADP + Pi \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. What does Ea stand for?
9. What is happening in the part of the graph labeled Ea? Why is this called a “transition state”?
10. Sketch and Label the entire graph
11. Is this an endergonic or exergonic reaction? How can you tell just by looking at the graph?
12. Without catalysts, how does Ea effect chemical reactions?
13. What do catalysts do (be specific)?
14. Re-draw the graph above, including a dashed line representing an enzyme catalyzed reaction.

1. Do exergonic enzyme catalyzed reactions release more energy than uncatalyzed reactions? Explain.
2. What determines an enzymes function?
3. What level of protein structure is most likely to be responsible for enzymatic activity?
4. How can you inactivate an enzyme, and what types of things are responsible for this?
5. Based on what you know, could hexokinase catalyze a reaction with fructose as its substrate? Explain?
6. How is the lock-and-key model different from the induced-fit model of enzyme function?

# Allosteric Regulation of Enzymes

Read the introduction 1st, then watch the animation and take the quiz

<http://bcs.whfreeman.com/thelifewire/content/chp06/0602002.html>

1. What is allosteric regulation?
2. Do allosteric regulators activate or inhibit enzymes?
3. What’s another word for an allosteric inhibitor
4. What happens when the allosteric inhibitor binds the enzyme?
5. How does substrate binding effect enzyme conformation?
6. If an enzyme has multiple subunits:
   1. What level of protein structure is this? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. How does binding of a substrate to 1 subunit affect substrate binding to the other subunit? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. What is this process known as (not in animation)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. How does the allosteric inhibitor affect enzyme conformation?
8. Is allosteric inactivation permanent or reversible?

***Read the conclusion & take the quiz***

# Enzyme Regulation

<http://bcs.whfreeman.com/thelifewire/content/chp06/0602001.html>

Read the Introduction, and then watch the animation answering the questions

1. What happens when you add substrate to the testube but not enzyme?
2. What happens when you add substrate to the testube and enzyme?
3. Watch substrate + enzyme + competitive inhibitors, and the noncompetitive inhibitors. Compare and contrast competitive inhibitors with noncompetitive inhibitors in terms of binding and reaction rates

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