Enzymes Review Sheet

1. Explain why enzymes are called biological catalysts.

They act as catalysis for biological reactions – ie speed up reactions in the body that are naturally occurring but need to happen faster for survival.

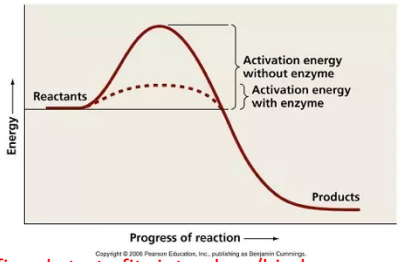
2. How do enzymes speed up chemical reactions? Why is this is important in biology?

Lower activation energy. Heat also lowers activation energy but proteins would denature if heated to the point where reactions happening fast enough to sustain life.

3. What is the **induced fit model**? Why is this important for enzyme function?

The enzyme changes shape slightly once the substate has bound to the active site making the enzyme-substate complex a more suitable environment for reactions to take place, making it more efficient at catalyzing reactions.

4. Sketch and label a potential energy diagram that outlines the effect of an enzyme on a reaction.



5. Describe the role of the active site in the lock and key model of enzyme action.

The active site is where substrate binds to enzyme. It is a specific shape/configuration so only a specific substrate fits into place/binds

6. Provide an example from this unit of a catabolic reaction that uses enzymes.

Breakdown of lactose molecule in milk by lactase, breakdown of starches by amylose.

7. Provide an example from this unit of an anabolic reaction that uses enzymes.

Creating of polypeptide chain in primary level of protein formation. Creation of starches in plants from glucose monomers.

8. Catabolic reactions are often exergonic and anabolic reactions are often endergonic. Explain why you think this may be so.

Exergonic = release of energy. Bonds are broken in catabolic reactions and remaining molecules are less structures and require less energy to be kept in place
Endergonic = absorption/input of energy. Bonds are formed in anabolic reactions and it requires energy to keep molecules in a less random state.

Day 2 Questions

1. Describe two different factors that affect enzyme activity. **Explain** why each has an impact on the rate of enzyme activity.

Heat – too much can denature proteins causing inability to function
pH – tertiary structure is dependent on the environment, changing pH can change structure & function

2. Explain how a competitive inhibitor can inhibit an enzyme's function.

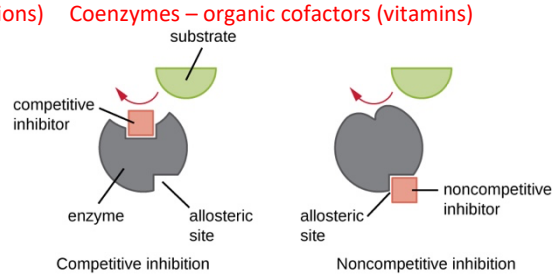
Similar shape to substrate, can bind to active site and block substrate from binding to enzyme

3. What is the difference between cofactors and coenzymes?

Cofactors – activate enzyme, sometime needed for enzyme to function (Ca^{2+}, Zn^{+} ions) Coenzymes – organic cofactors (vitamins)

4. What is the difference between competitive inhibitors and non-competitive inhibitors? Draw a sketch to support your answer.

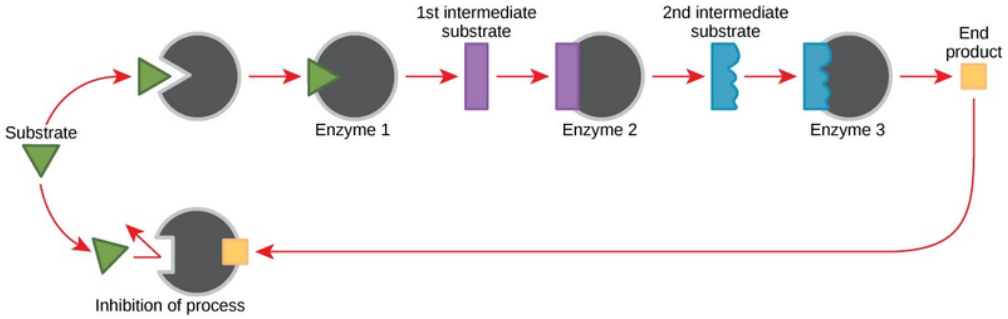
Competitive – directly block binding of substrate
Noncompetitive – cause change in shape/configuration of active site leading to inability of substrate to bind



5. What is the difference between an allosteric activator and an allosteric inhibitor?

Activator – turns on enzyme, changes shape of enzyme so active site fits substrate
Inhibitor – turns off enzyme, changes shape of enzyme so substrate can no longer bind
Both bind to allosteric site NOT active site.

6. Draw a diagram that demonstrates how allosteric regulation is used in feedback inhibition.



7. Describe feedback inhibition and give 2 examples of where it is used in the human body.

Products from an enzyme catalyzed reaction later in a biological process prevent binding of substrate to enzyme earlier in the process.
Ex. PFK in glycolysis, amino acid production - isoleucine