**Enzymes Guided Notes**

Enzymes are \_\_\_\_\_\_\_\_\_\_\_\_\_ for chemical reactions in living things. They lower the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy and increase the rate of chemical reactions.

Why are enzymes important to living things?

Enzymes are involved in almost every \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in an organism from breaking down \_\_\_\_\_\_\_\_\_\_ to building \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (Quick check: what are the building blocks of all proteins? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_).

-Example: The enzyme \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is found in \_\_\_\_\_\_\_\_\_\_\_\_ and it breaks down starch into simple sugars. (Quick check: what macromolecule makes up sugars? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

**Activation Energy**

-Activation energy is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of energy that needs to be absorbed (taken in) for a chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to begin. By lowering the activation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, reactions can happen more \_\_\_\_\_\_\_\_\_\_\_\_\_\_. Activation energy for a chemical reaction comes from an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in temperature. The higher the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the faster the chemical reaction will be. If the temperature is too \_\_\_\_\_\_\_\_\_\_\_, the reaction will slow or \_\_\_\_\_\_\_\_\_\_\_ because it isn’t adapted to that environment.

**What are enzymes made up of?**

Almost all enzymes are made up of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that are made from long chains of amino acids. Enzymes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on its structure to function properly. Things like temperature and \_\_\_\_\_\_\_ (acids and bases) can affect the \_\_\_\_\_\_\_\_\_\_\_\_\_ and function of an enzyme.

**Enzyme Structure**

Enzyme structure is important because each enzyme’s \_\_\_\_\_\_\_\_\_\_\_\_\_ will allow only certain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to bind to an enzyme. The specific reactants that an enzyme uses are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The substrate binds to the \_\_\_\_\_\_\_\_\_\_\_\_\_ site on the enzyme which allows the enzyme to \_\_\_\_\_\_\_\_\_\_\_\_\_ up a chemical reaction.

**Lock and Key Model**

This model explains how enzymes work. First, enzymes bring \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ close together. Second, enzymes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ activation energy and weakens the bond. The reaction then forms a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that is released from the enzyme.

**Induced Fit Model**

This model explains how an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can slightly change its \_\_\_\_\_\_\_\_\_\_\_\_\_ to fit a substrate. Once the enzyme fits the substrate, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ takes place and the product is \_\_\_\_\_\_\_\_\_\_\_\_\_.

**Chemical Reaction Notes**

What is a chemical reaction?

A chemical reaction changes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ such as oxygen or sugar into different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by breaking and then making new bonds. It chemically changes the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Examples include photosynthesis and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ respiration.

Reactant vs. Product

A substrate is what gets chemically \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a reaction. A product is what is formed after the chemical reaction is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Types of Reactions:

Exothermic reactions release more \_\_\_\_\_\_\_\_\_\_\_\_\_\_ than it absorbs (takes in). For example, fireflies give off light that comes from an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reaction.

Endothermic reactions \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ more energy than it releases. For example, photosynthesis absorbs \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that is used to fuel plants.