The body NEEDS enzymes

- http://www.youtube.com/watch?v=B1kE60gAtIA

Enzymes are like… tools

- How quickly would your Kool-Aid be ready if you couldn't use a spoon to mix it?
- Which method of farming is most efficient?

- Enzymes allow cells to work as efficiently as possible

What do these words have in common?

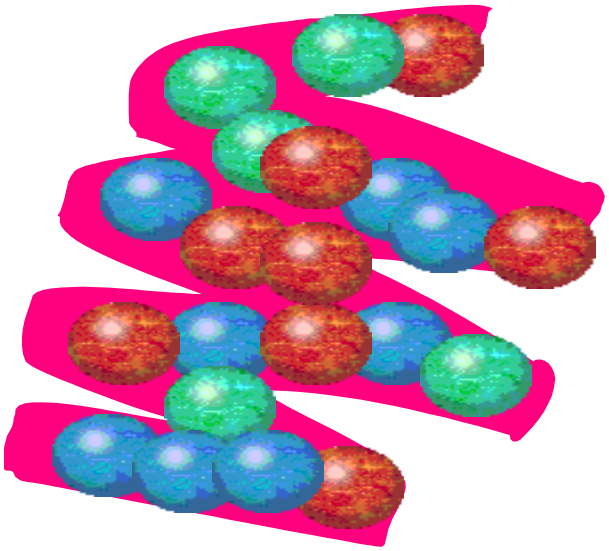
Lactase - breaks down lactose (milk sugars)
Maltase - digests disaccharides to monosaccharides (malt sugars)
Invertase - breaks down sucrose (table sugar)
Glucoamylase - breaks down starch to glucose
Protease - breaks down proteins found in meats, nuts, eggs, and cheese
Pepsin - breaks down proteins into peptides
Peptidase - breaks down small peptide proteins to amino acids
Lipase - breaks down fats found in most dairy products, nuts, oils, and meat
Cellulase - breaks down cellulose, plant fiber; not found in humans
DNA Polymerase I (DNA replication)
RNA Polymerase- joins nucleotides during mRNA synthesis
Helicase cleaves and unwinds DNA during replication
Ligase- links two pieces of DNA together during DNA replication

Enzymes

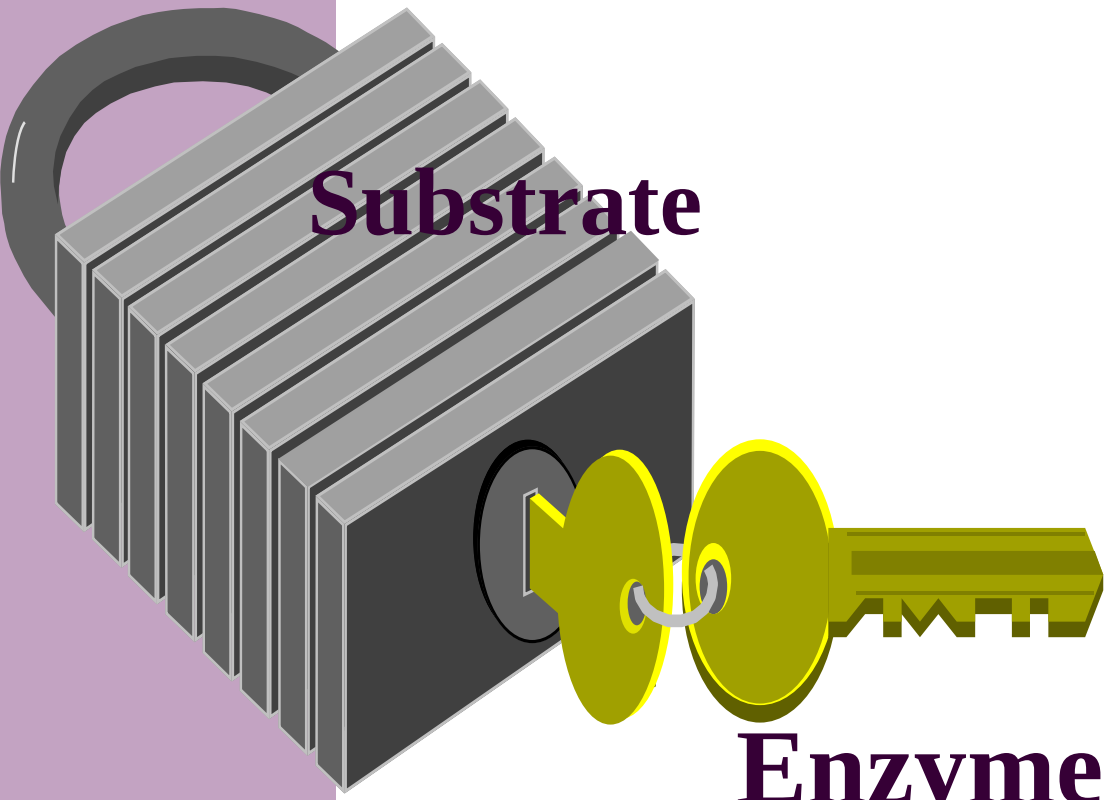
Enzymes provide a place (active site) where reactants can come together to react and yield products. Enzymes reduce activation energy needed for reaction to occur.

Properties of Enzymes

- **Proteins**
- **Speed reactions (catalysts)**
- **Work quickly**
- **Break down (denature) at high temperatures**
- **Names often end in “ase”**



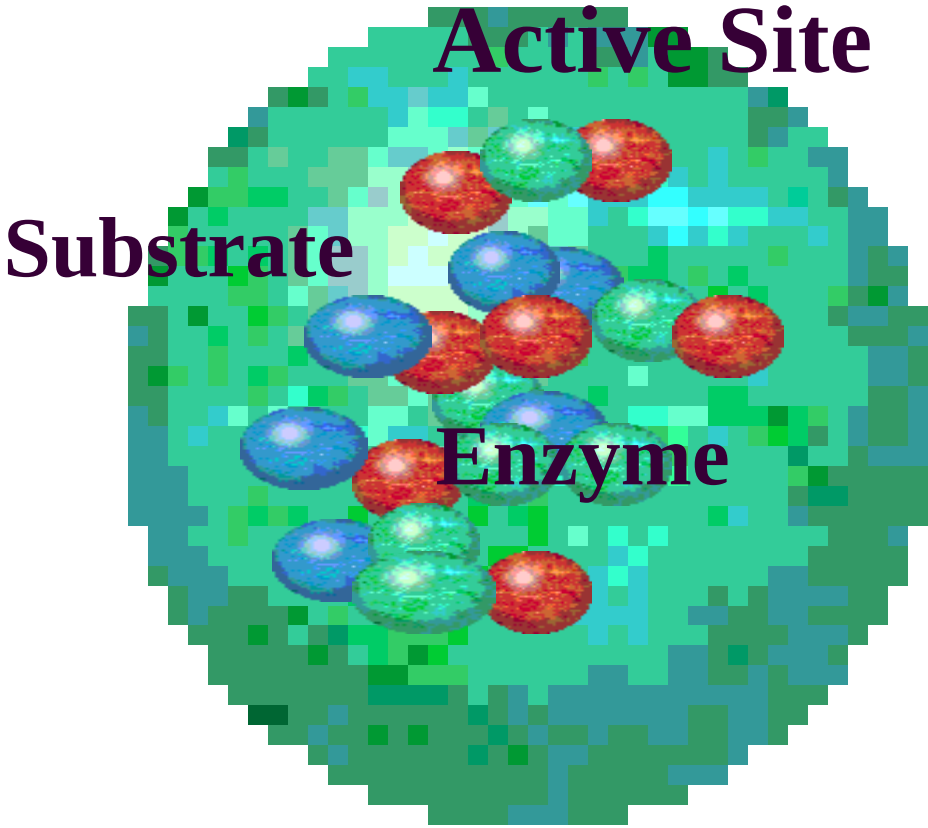
Lock & Key Model



- **<u>One</u> enzyme for every substrate**
- **unique fit**

Enzyme-Substrate complex

<u>Active site</u> = where the substrate (reaction molecule) connects to enzyme



Enzymes remain unchanged!

- **Enzymes are <u>not</u> used up**
- **No more substrate = end of the reaction**
- **Synthesis (make) or decomposition (break down) reactions**
- **Speed up reaction rate with more enzyme**

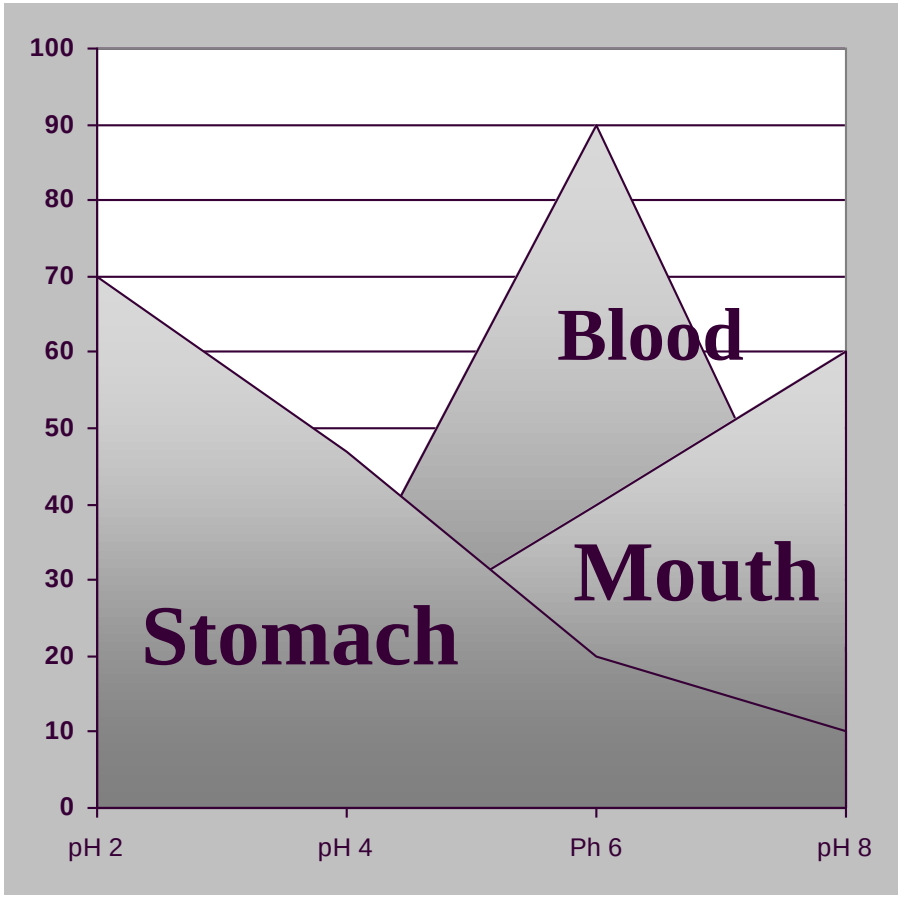
Enzymes are pH specific

- Different enzymes
- Different body areas
- Different optimum pH
- Examples:

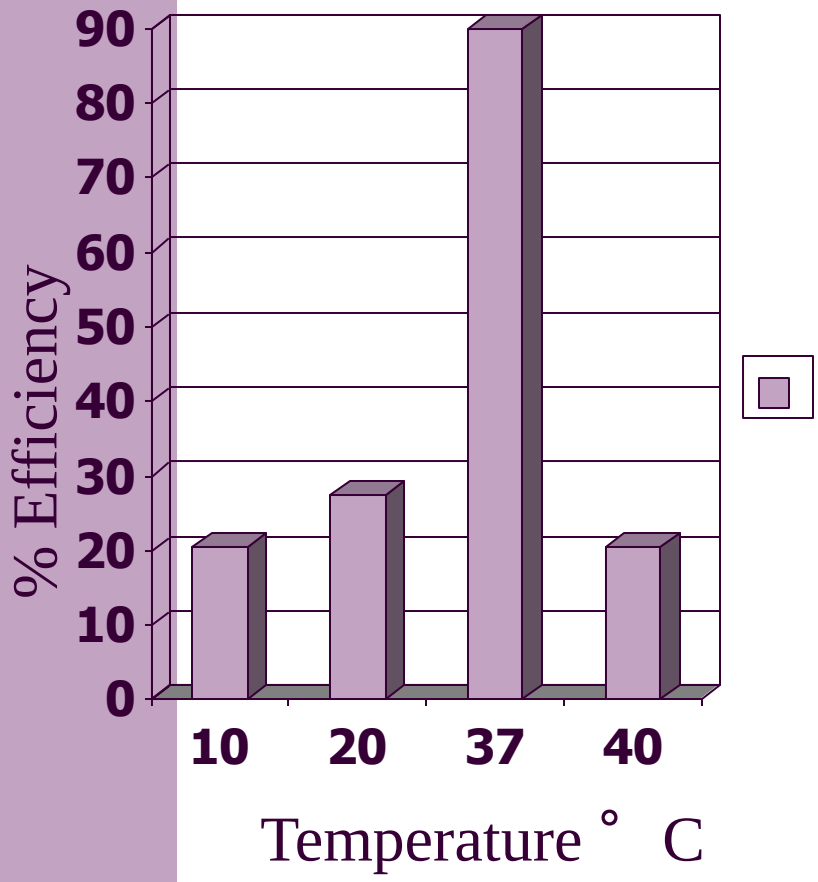
  Stomach= acidic pH

  Mouth=

  neutral to basic pH



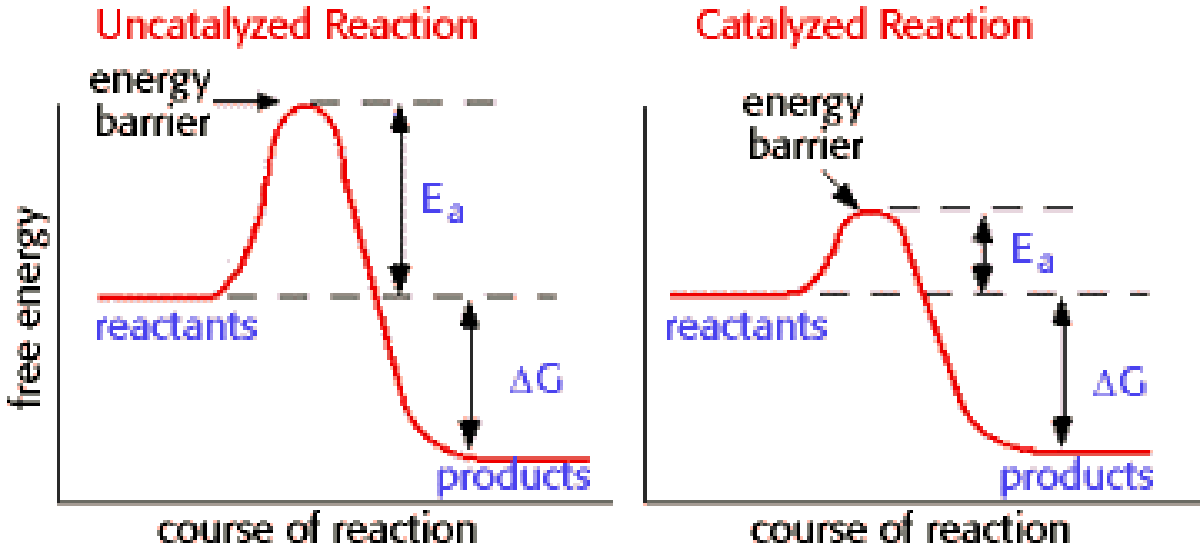
Enzymes are temperature dependent.....



- Most at body temperature
- 37°C
- Denature at high temperatures

Activation Energy

- The energy needed to start a reaction is the **activation energy**.
- Enzymes **lower** the activation energy, allowing chemical reactions to occur more easily.

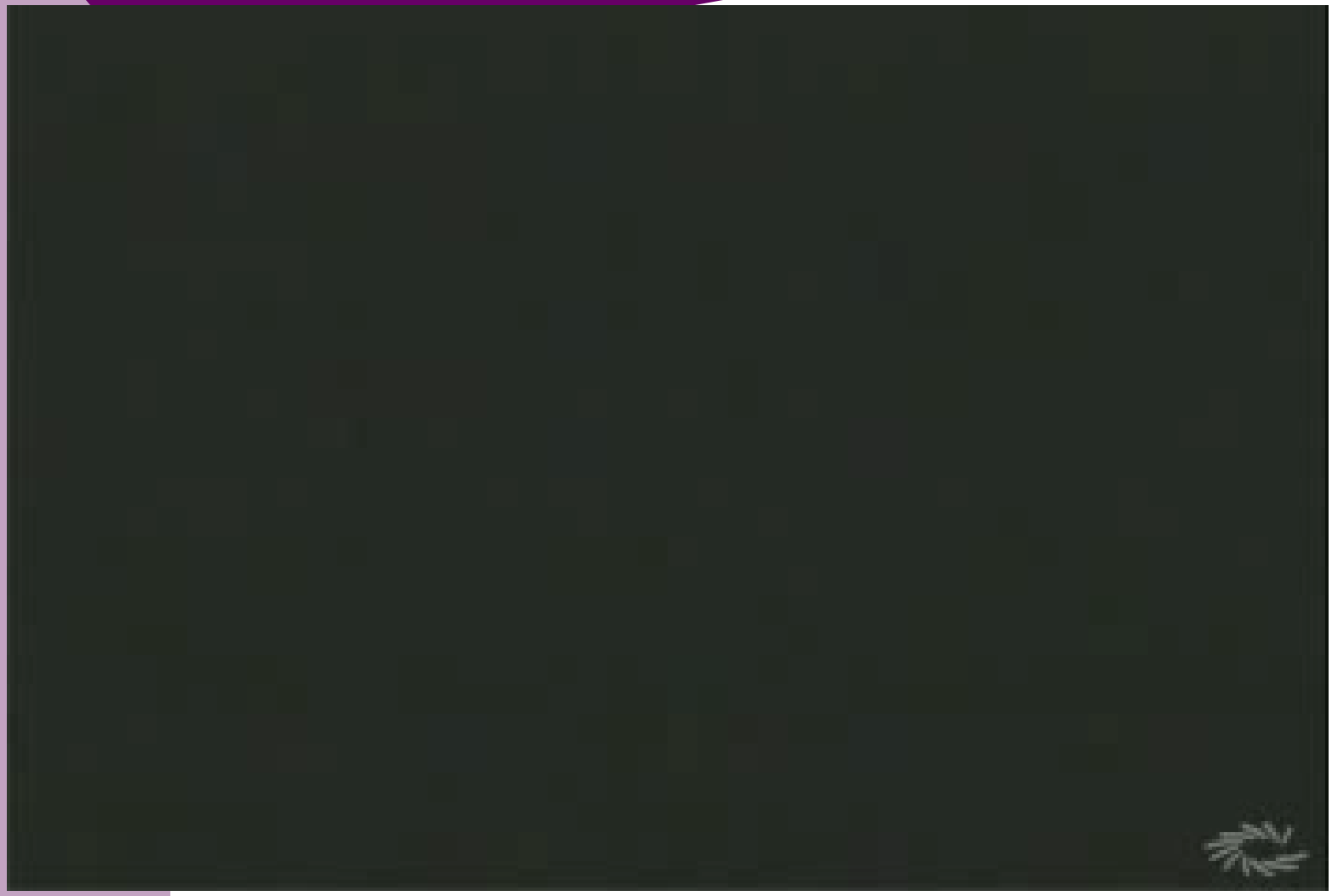


Carbonic anhydrase

- What compound do we exhale?
- How do our bodies accomplish this?
- ex. CO_2 + H_2O <-> H_2CO_3

carbon dioxide + water reversible reaction *carbonic anhydrase* bicarbonate

Enzyme Video



A substance that speeds up the rate of a chemical reaction is called a (an)..

A. Lipid
B. Autotroph
C. Carbohydrate
D. Enzyme

Practice Questions

In an enzyme-catalyzed reaction, what role does the active site play in the reaction?

Discuss the role of the enzyme in this graph