Enzymes

Digestion and enzymes

- http://www.youtube.com/watch?v=AFbPHlhI13g

What is an enzyme?

- A catalyst
- A biological catalyst
- http://www.youtube.com/watch?v=cbZsXjgPDLQ&feature=related

What is an enzyme?

- An enzyme can increase the rate (speed) at which chemical reactions happen.
- Without them the reaction might still occur but at such a slow rate so that life as we know it could not happen.
- Enzymes increase the efficiency of cell reactions.

How does an enzyme work?

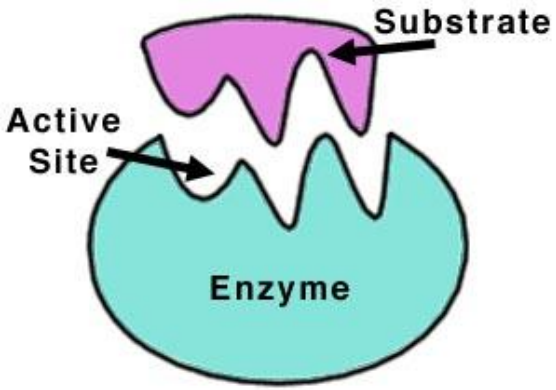
- The substances that enzymes bind to are called substrates.
- The part of the enzyme that binds to the site is called the active site.

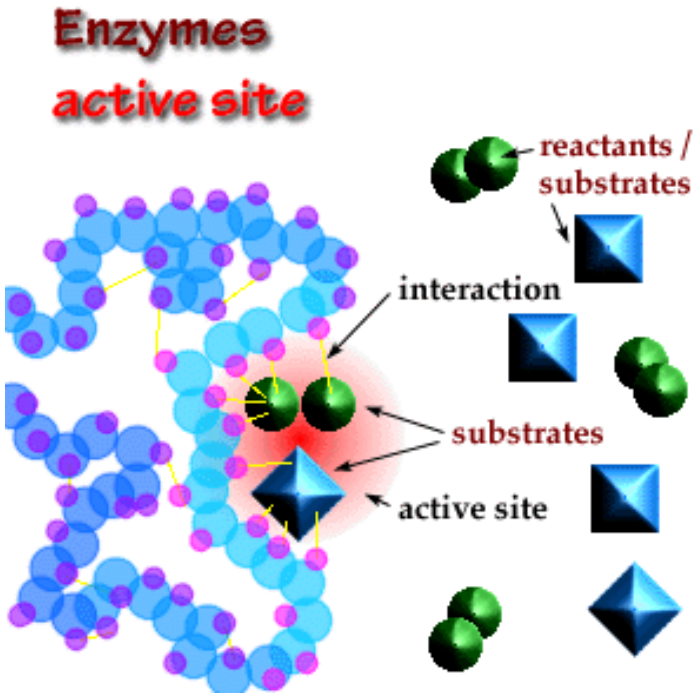
Demo Liver prac

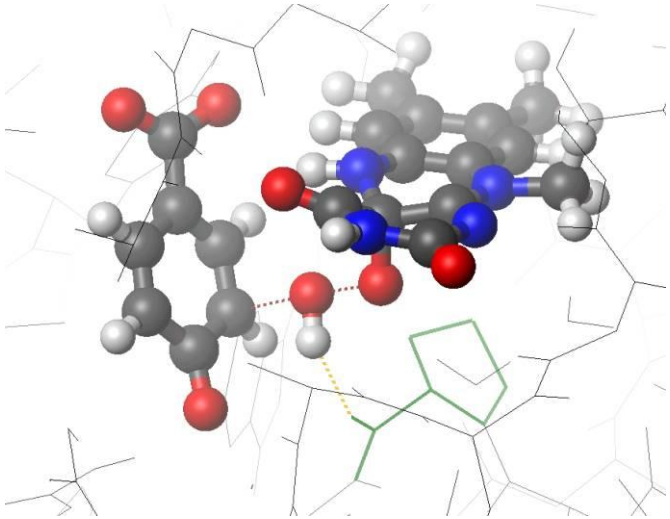
Video – first part talks about catalase and how it works.

- http://www.youtube.com/watch?v=ok9esggzN18

How do enzymes work?



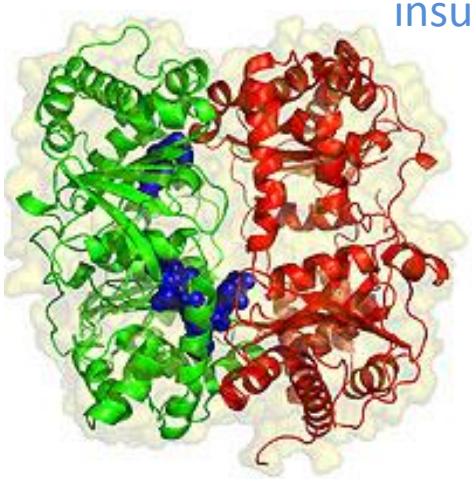




How do enzymes work?

- Enzymes are not used up in cellular reactions so they can be used over and over again
- They do get ‘worn out’ and must be replaced.
- This makes them effective in low concentrations.
- Vitamins in our diet are often required to make new enzymes.

How do enzymes work?


insulin

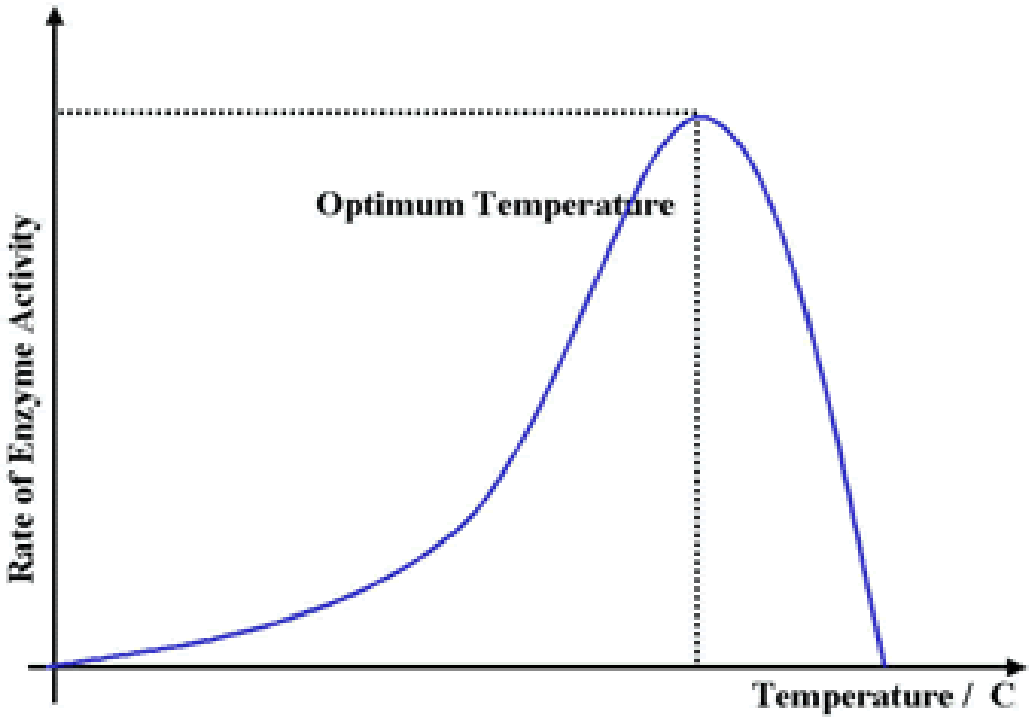
- Enzymes are specific to particular type of reactions
- They have 3-D structures.
- Active site is a special shape on the enzyme that fits a special substrate molecule(s) called reactant or substrate.
- When the reactant binds with the enzyme the shape of the molecule changes and a new product(s) are formed.
- The enzyme does not make this happen but speeds up the reaction to make more product when required.

Animation
http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter2/animation__how_enzymes_work.html
Video
http://www.youtube.com/watch?v=CZD5xsOKres&feature=related

Factors that affect enzyme activity

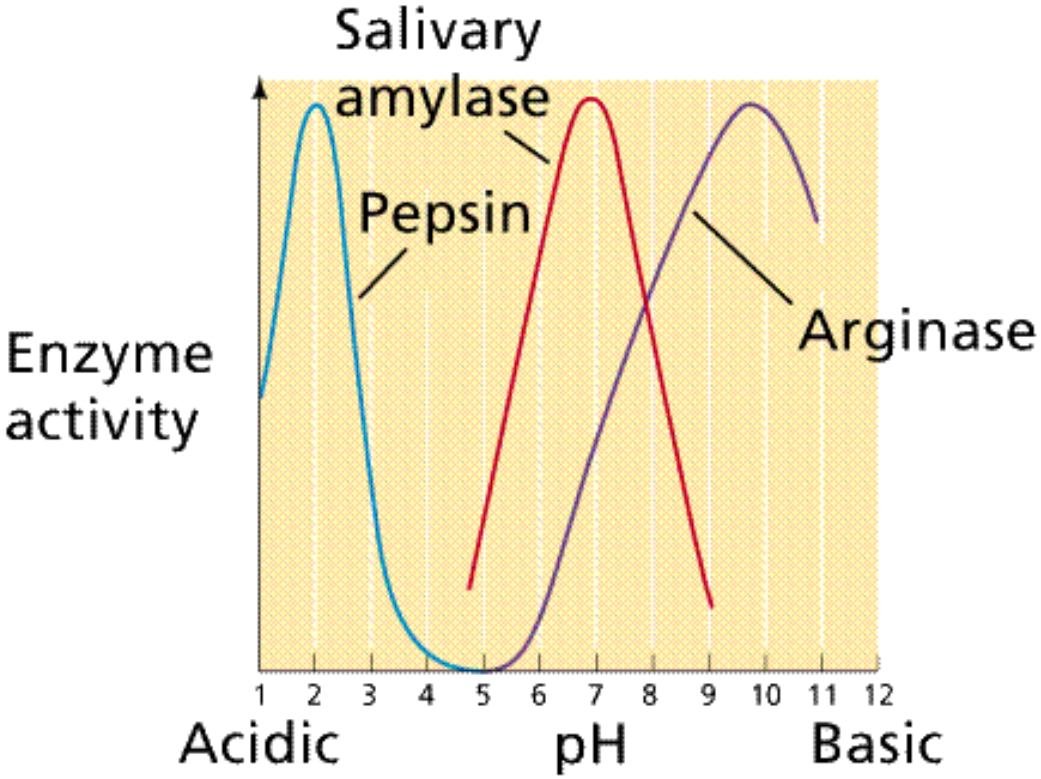
1. Temperature
2. pH
3. Salt Concentrations
4. Allosteric regulators

Temperature



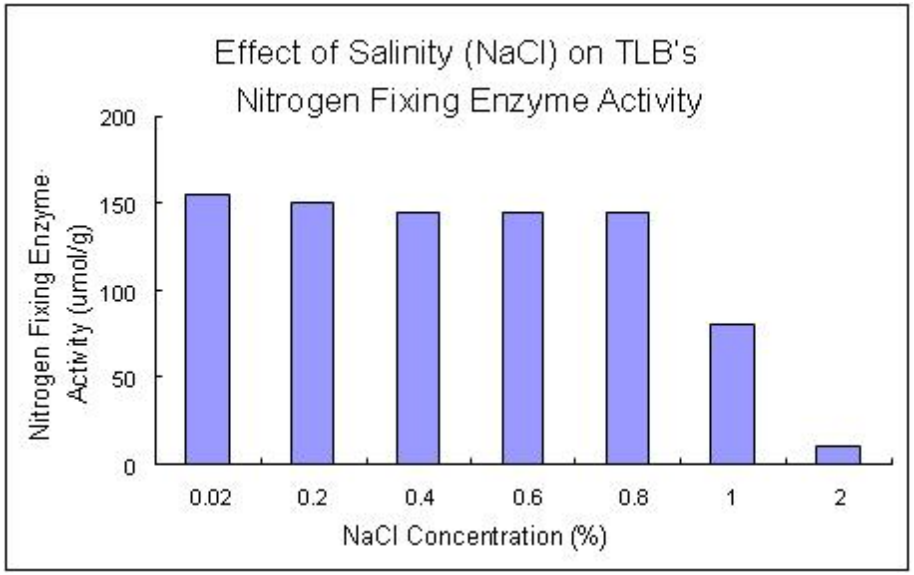
- Low temperatures enzymes do not work well as activity is slow and substrate does not bind as much with enzyme
- As temperature increases molecules move faster.
- When enzyme gets too hot bonds that hold enzyme together begin to break down
- Enzyme loses 3-D shape which means substrate will no longer fit into active site.
- This is called denaturation
- This process is irreversible.

pH



- Most enzymes work best at neutral pH i.e. somewhere between 6 and 8
- If too acidic or too basic the enzyme will denature
- Not all enzymes fit into this category. E.g. pepsin Why do you think this is the case?
- Arginase is involved in the removal of urea in mammals. What can you say about it's optimal pH?

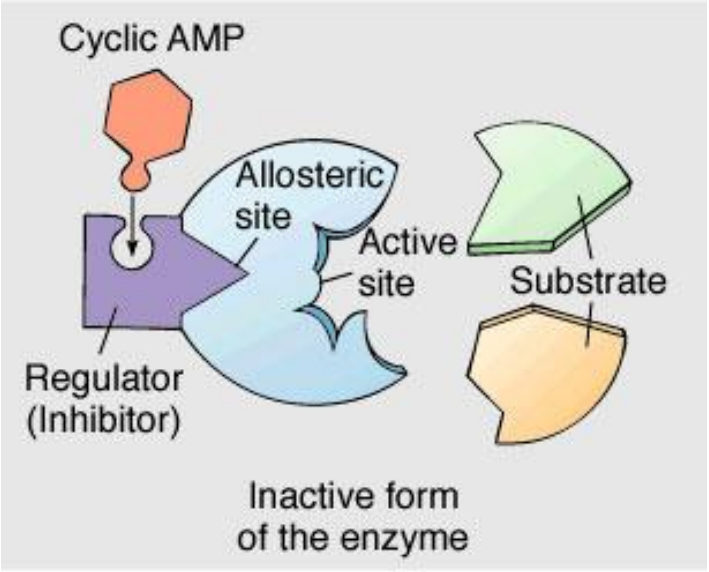
Salt Concentration

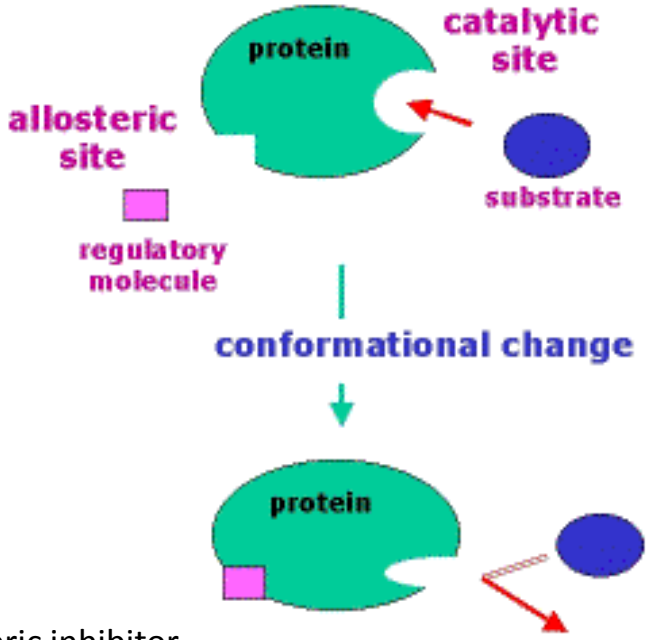


When the salinity is too high or too low the Hydrogen bonds that hold the enzyme in their 3-D shape are disrupted.

Allosteric Regulator

- Allosteric means different structure
- Molecules bind to a sit e other than the effective site
  - Active site changes shape
  - Prevents or induces enzyme action
  - Reversible
- Used to regulate – can be turned on and off depending on bodies needs.





Allosteric inhibitor

Resources

Video – factors that affect enzyme activity

- http://www.youtube.com/watch?v=w2Cph1Cgv34