Unit 5 Enzymes

- A catalyst speeds up a chemical reaction and remains unchanged at the end of the reaction

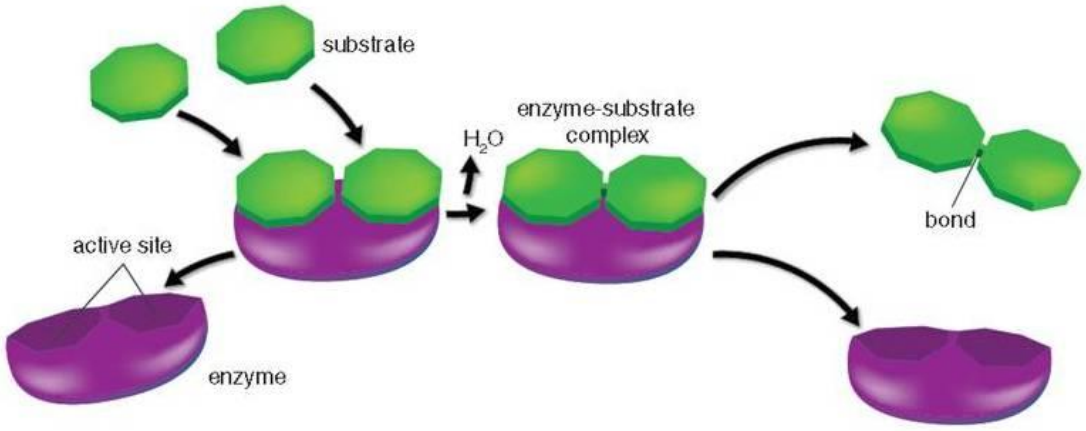
How enzymes work

- Enzymes are biological catalysts, they speed up chemical reactions and remain unchanged at the end of the reactions.

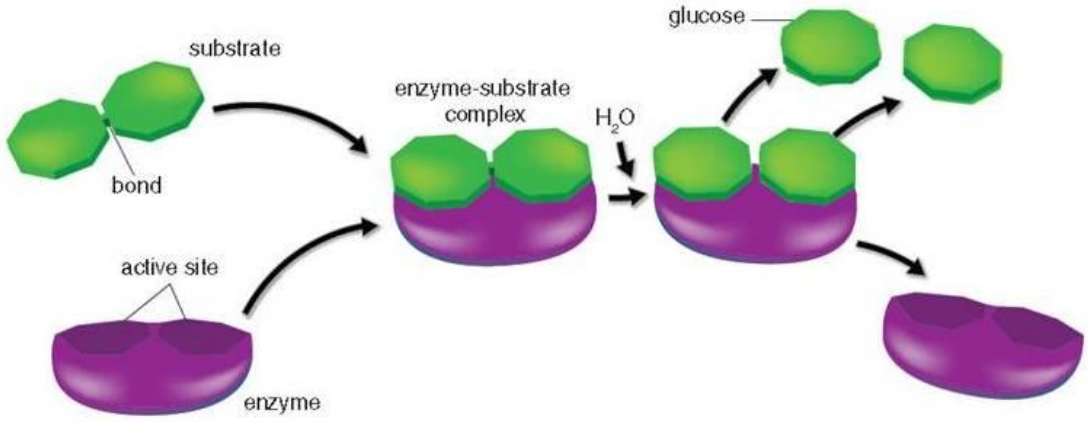
  The reactions that enzymes catalyze can be divided into 3 groups:

  i. Breaking large molecules into small ones- This is important in nutrition when large food molecules are broken down into small ones so that they can be absorbed and used
  ii. Building up large molecules from smaller ones- Small molecules, such as glucose are joined together to make large molecules. These enzymes work inside cells to speed up the formation of storage molecules, such as starch, and structural molecules such as cellulose for cell walls of plants
  iii. Converting one small molecules into another- Many of the chemical reactions that occur inside cells involve small changes to molecules, such as adding or removing atoms of groups of atoms.

Anabolic Reaction



Catabolic Reaction



All enzymes:

- They are all proteins
- Each enzyme only catalyzes one reaction
- They can be used again and again
- They are influenced by temperature
- They are influenced by pH

- Enzymes catalyze reactions in which substrates are converted into products. The enzyme and the substrate have shapes that are complimentary so that they fit together. Once they fit together the reaction van take place. When the reaction is over, the product, or products leave the enzyme and another substrate molecule enters

- The part of the enzyme where the substrate fit and where the reaction takes place is the active site. The way of describing how enzymes work is known as the lock and key model. The enzyme and substrate combine like a key entering a lock to form an enzyme-substrate complex.

Factors that affect enzyme action

Temperature

- The temperature at which the maximum rat of reaction occurs is called the optimum temperature. This is the best temperature for the enzyme.
- Increasing the temperature of an enzyme controlled reaction increases the rate of reaction up to a maximum, which occurs at the optimum temperature. This is because the greater kinetic energy is causing a greater number of collisions between enzyme and substrate molecules.
- At higher temperatures the rate of reaction decreases until it stops acting as a catalyst. This is due to a change in the active site which means the substrate can no longer fit. The enzyme is now denatured

pH

- Most enzymes work best at one value of pH
- At either side of their optimum pH value, enzyme activity decreases
- At some values of pH the shape of the active site changes so that substrate molecules no longer fit.