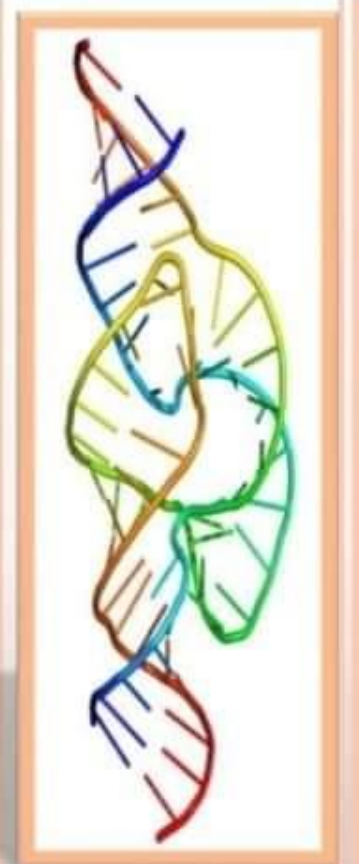


Introduction

- Enzymes are *biological catalysts* that speed up the rate of the biochemical reaction.
- Most enzymes are three dimensional *globular proteins* (tertiary and quaternary structure).
- Some special RNA species also act as enzymes and are called *Ribozymes* e.g. hammerhead ribozyme.



Hammerhead enzyme

STRUCTURE OF ENZYMES

- The *active site* of an enzyme is the region that binds substrates, co-factors and prosthetic groups and contains residue that helps to hold the substrate.
- Active sites generally occupy less than 5% of the total surface area of enzyme.
- Active site has a *specific shape* due to tertiary structure of protein.
- A change in the shape of protein affects the shape of active site and function of the enzyme.

SUBSTRATE

- The reactant in biochemical reaction is termed as *substrate*.
- When a substrate binds to an enzyme it forms an *enzyme-substrate complex*.



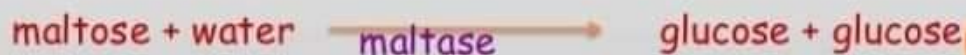
NOMENCLATURE OF ENZYMES

- An enzyme is named according to the name of the substrate it catalyses.
- Some enzymes were named before a systematic way of naming enzyme was formed.

Example: pepsin, trypsin and rennin

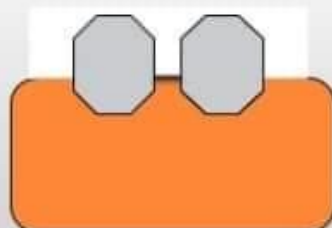
- By adding suffix **-ase** at the end of the name of the substrate, enzymes are named.
- Enzyme for catalyzing the hydrolysis is termed as hydrolase.

Example :



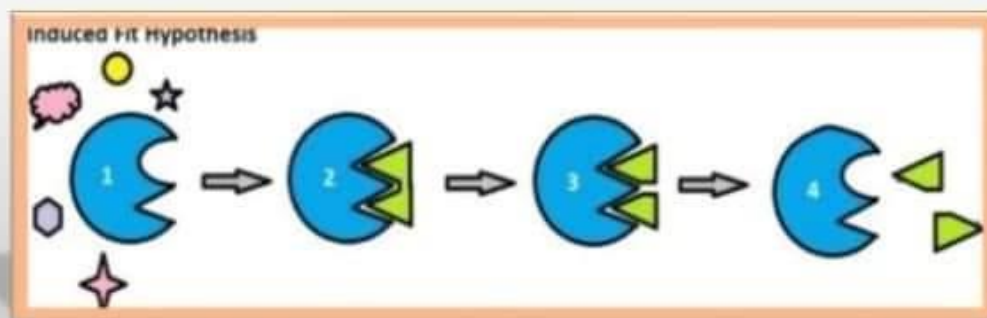
LOCK AND KEY MODEL

- Proposed by EMIL FISCHER in 1894.
- Lock and key hypothesis assumes the active site of an enzymes are rigid in its shape.
- There is no change in the active site before and after a chemical reaction.



INDUCED FIT MODEL

- More recent studies have revealed that the process is much more likely to involve an induced fit model (proposed by DANIAL KOSH LAND in 1958).
- According to this exposure of an enzyme to substrate cause a change in enzyme, which causes the active site to change it's shape to allow enzyme and substrate to bind.

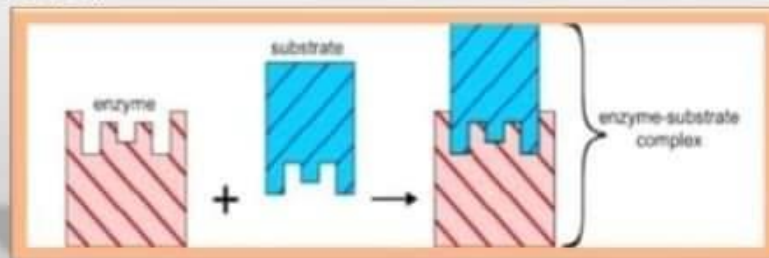


ENZYLE SPECIFICITY

- Enzymes are highly specific in nature, interacting with one or few substrates and catalyzing only one type of chemical reaction.
- Substrate specificity is due to complete fitting of active site and substrate .

Example:

- Oxydoreductase do not catalyze hydrolase reactions and hydrolase do not catalyze reaction involving oxidation and reduction.



TYPES OF ENZYME SPECIFICITY

- Enzymes show different degrees of specificity:
 - Bond specificity.
 - Group specificity.
 - Absolute specificity.
 - Optical or stereo-specificity.
 - Dual specificity.

