

Enzymes

- Enzymes are mostly tertiary & quaternary proteins

(*) Enzymes structure cannot be primary & secondary proteins but it is ~~the~~ its tertiary & quaternary structure are crucial for enzyme's functionality.

Types of structure of enzymes:-

- There are 4 levels for enzyme structure:-

1) Primary structure:- Specific sequence of amino acids in polypeptide chain

2) Secondary structure:- Local folding patterns of polypeptide chain like alpha helices and beta sheets formed through ~~to~~ hydrogen bonding between backbone atoms (Nitrogen, α -Carbon, Carbon of carboxyl group)

3) Tertiary structure:- The 3-Dimensional shape of a single polypeptide chain which gives enzymes the active site for substrate binding

4) Quaternary structure:- Assembly of multiple polypeptide chains (subunits) into single functional protein complex. Eg:- Haemoglobin (in RBC cell)
 \downarrow
 transport of O_2 from lungs to tissues

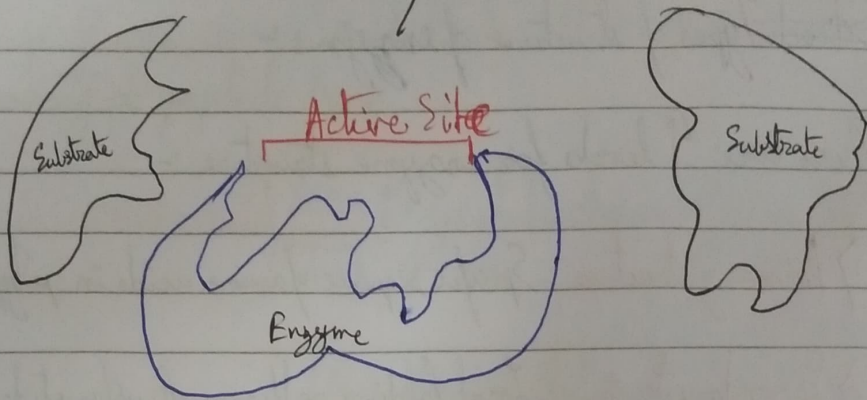
- Active sites in enzymes form only when those enzymes attain higher levels of protein structure

These active sites are essential for substrate binding to perform specific function.

- Active sites have different shapes. Only specific substrate can attach ~~themselves~~ itself to active site of enzymes depending on its shape.

How Enzymes Work? :-

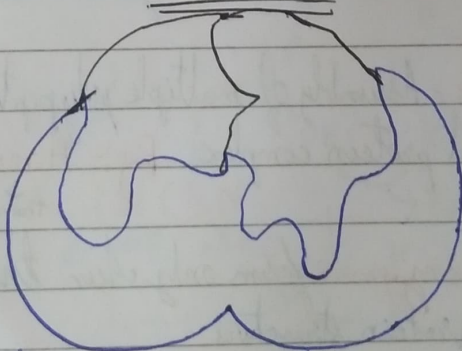
- Cells rely on proteins called enzymes to kick start chemical reactions and speed them up
- This enables cells to get most of out of the energy resources available to them
- Enzymes kick starts reactions by binding with one or more molecules called reactant/substrate,



Here, Enzymes have Active Site

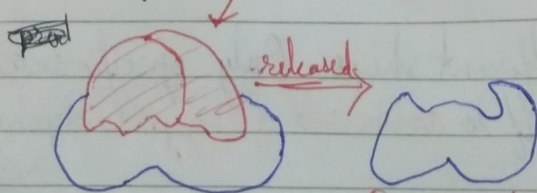
These Active Sites have a particular shape

Because of their unique shape, only substrates that match the shape of Active site can bind with the Enzyme



Enzyme-substrate complex

As the substrate reacts with the enzyme, the chemical bond betⁿ substrate and enzyme weaken and lead to ~~formation of~~ formation of product (by linking up)

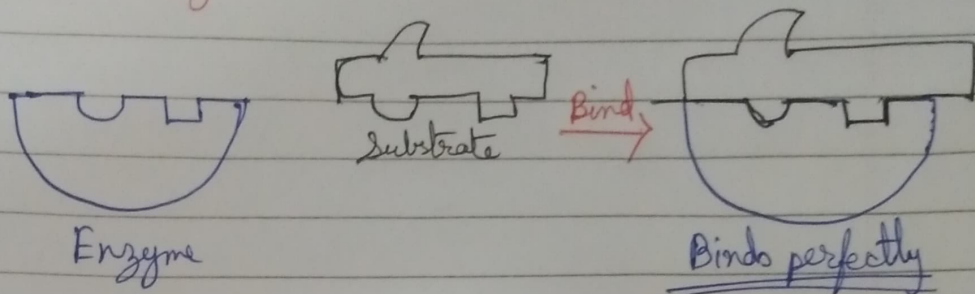


Product is released from the Active Site

Enzyme returns to original state → And the process continues

Enzymes have specificity
i.e. Only substrates with matching special characteristics
can bind with the Enzyme

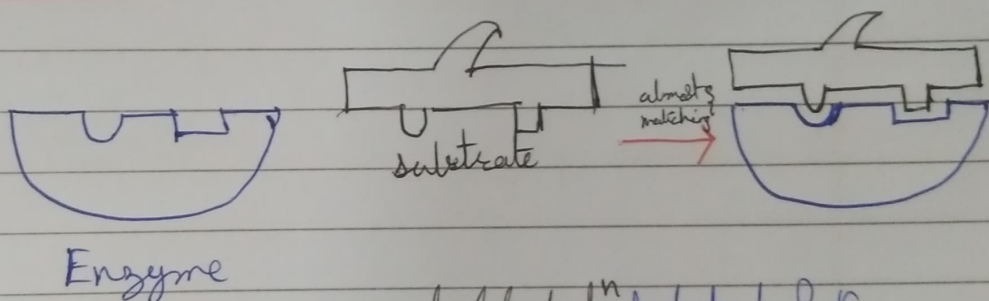
1) Lock and Key :-



Here, Enzyme \rightarrow Lock
Substrate \rightarrow Key

\therefore Substrate is the key to unlock the enzymes in order to kick start a reaction

2) Induced Fit :-



When there is loose spacial fit betⁿ Substrate & Enzyme

In such a case, the Enzyme & substrate change their conformation / shape (slightly) to allow tighter fit

