Enzymes

• Prop/Characteristics of enzymes:-

i) All enzymes are Proteins except Ribozyme (catalytic RNA molecule).

ii) They enhance rate of rxn by forming weak non covalent interaction with substrate

iii) They decrease the activation energy (energy req by substrate to achieve transition state)

iv) They do not change the equilibrium i.e Keq. (enzyme बस Keq को attain करने वाला समय कम करता है)

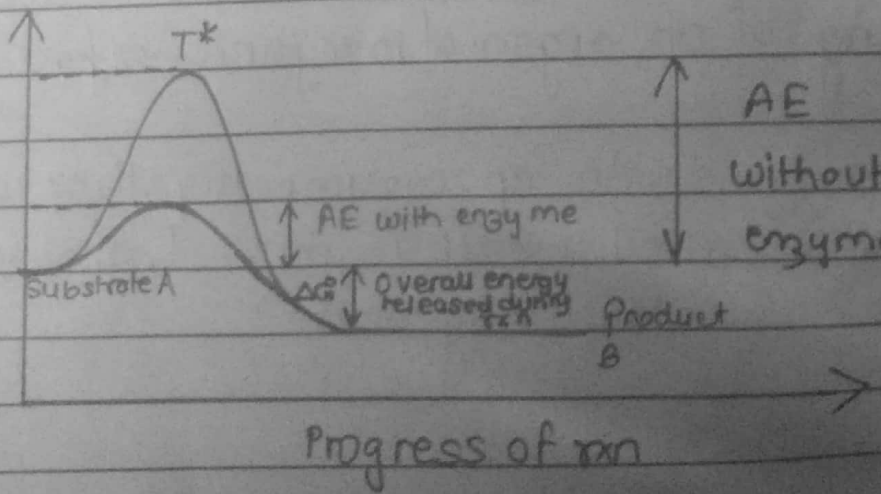
v) They do not influence free energy change.

$$\Delta G^\circ = -2.303\, RT \log K_{eq}$$

जब Keq change नहीं हो रहा, तो ΔG° भी change नहीं होगा।

Keq of uncatalyzed rxn = Keq of catalysed rxn & ΔG° of uncatalyzed rxn = ΔG° of catalysed rxn

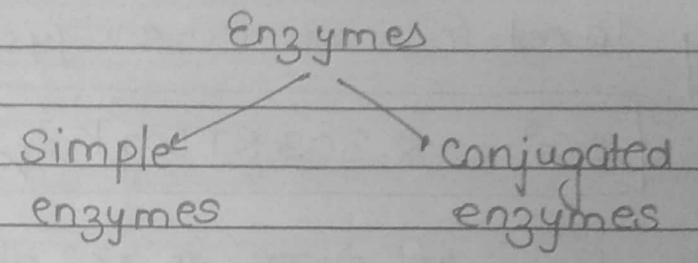
vi) Enzyme has high degree of specificity for it's substrate.



Note: Enzyme ने essentially activation energy को कम कर दिया by providing an alternative pathway. How?

Binding energy (BE): The energy released during formation of weak non covalent bond blw enzyme & substrate is used to decrease the activation energy.

Classification & class of enzymes:

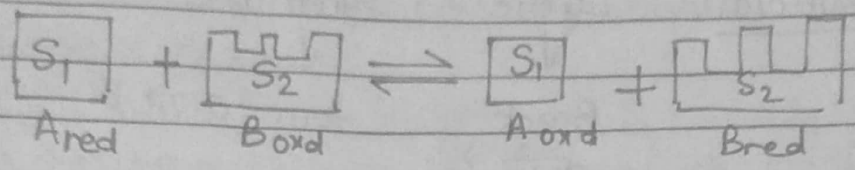


- Simple enzyme: जो बस protein से बना होता है।
- Conjugated enzyme: They constitute protein part (Co-enzyme) as well as non protein part (Co-factor)

Note:
- Apoenzyme: An apoenzyme is an inactive enzyme, activation of the enzyme occurs upon binding of an organic/inorganic cofactor.
- Holoenzyme: An apoenzyme together with its cofactor is called a Holoenzyme. A holoenzyme is complete & catalytically active.

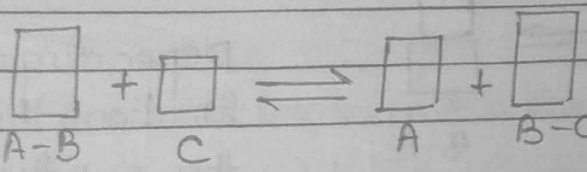
• 6 Major Enzyme class:

* Class 1 :- Oxidoreductase : Involved in transfer of e⁻ from one substrate to another



Sub class: Dehydrogenase, Oxidase, Reductase, Peroxidase, Oxygenase

* Class 2 :- Transferase : which are involved in transfer of some functional grp from one substrate to another.



Depending upon कि enzyme किसे group को transfer कर रहा है,

हमारे पास :- (Subclass में)

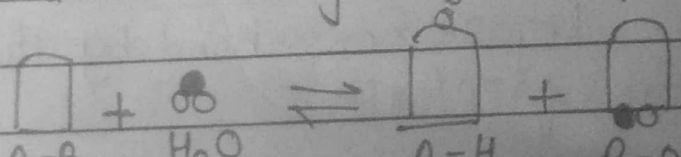
i) Kinase (That catalyses the transfer of phosphate grps)

ii) Methyl Transferase

iii) Amino Transferase

iv) Glycosyl Transferase (Transfers sugar)

* Class 3 :- Hydrolase : They are most often used to cleave a covalent bond by utilization of water



Sub class:

i) Protease

ii) Amylase

iii) Lipase

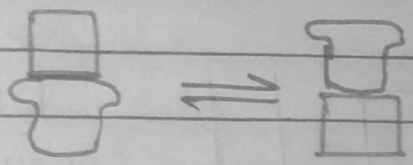
iv) Amidase

v) Glycosidase

Class 4- Lyase : They are responsible for catalysing add^n & elimination rxn (break/form bonds) without involvment of energy.

Subclass: Lyase , Synthase , RUBISCO
↓ ↓
Break form करते हैं।
करते हैं।

Class 5- Isomerase : They change the pos^n of functional group within the substrate/ change the functional grp itself.



A-B B-A

Depending upon the functions they perform, they are further divided as:-

① Epimerase, racemase : Catalyse the inversion of stereochemistry.

② Mutase : Catalyses the movement of functional grp from one pos^n to other within same molecule.

③ Cis-Trans isomerase : It catalyses the isomerisation of geometric isomers.

Class 6- Ligase :- Ligase forms bond by utilization of energy in the form of ATP/ GTP.