

Topic: Enzyme(Nomenclature & Classification)

Class: B.Sc Part –III (Hons.)

Paper- V

Group – A

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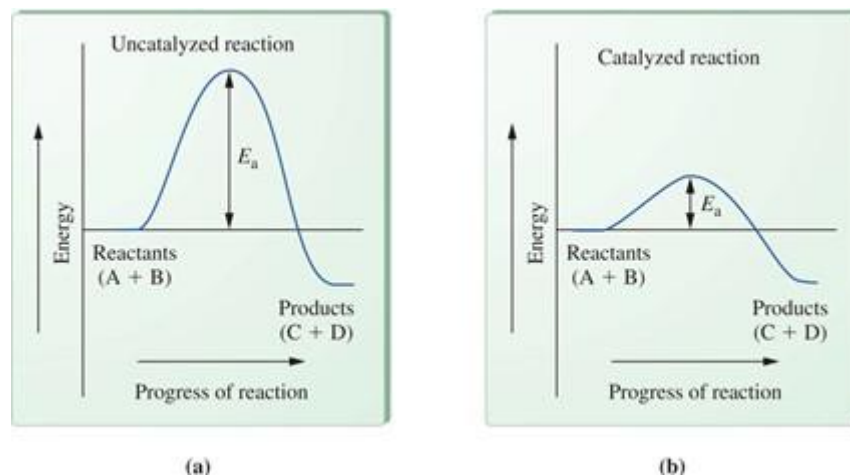
The Effect of Enzymes on the Activation Energy of a Reaction

- An enzyme speeds a reaction by lowering the activation energy, changing the reaction pathway
- This provides a lower energy route for conversion of substrate to product



- Every chemical reaction is characterized by an equilibrium constant, K_{eq} , which is a reflection of the difference in energy between reactants, aA , and products, bB

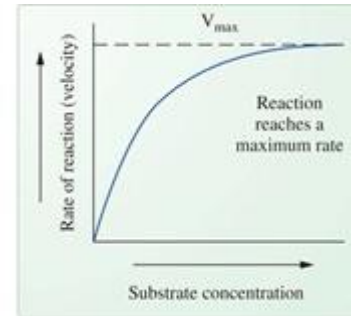
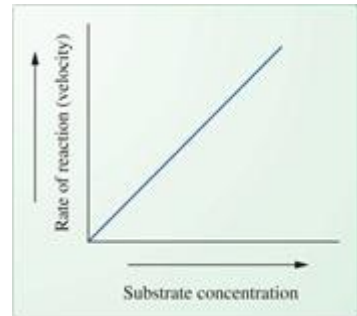
Diagram of Energy Difference Between Reactants and Products



- The uncatalyzed reaction has a large activation energy, E_a , seen at left above
- In the catalyzed reaction, above right, the activation energy has been lowered significantly increasing the rate of the reaction

The Effect of Substrate Concentration on Enzyme-Catalyzed Reactions

- Rates of uncatalyzed reactions increase as the substrate concentration increases
- Rates of enzyme-catalyzed reactions show two stages
- The first stage is the formation of an enzyme-substrate complex



- This is followed by slow conversion to product
- Rate is limited by enzyme availability

Enzyme-Substrate Complex Details

- The part of the enzyme combining with the substrate is the active site
- Active sites characteristics include:
 - Pockets or clefts in the surface of the enzyme
- R groups at active site are called catalytic groups
 - Shape of active site is complimentary to the shape of the substrate
 - The enzyme attracts and holds the enzyme using weak noncovalent interactions
 - Conformation of the active site determines the specificity of the enzyme

Lock and Key Enzyme Model

- In the lock-and-key model, the enzyme is assumed to be the lock and the substrate the key
- -The enzyme and substrate are made to fit exactly
- This model fails to take into account proteins conformational changes to accommodate a substrate molecule

Lock and Key Enzyme Model

