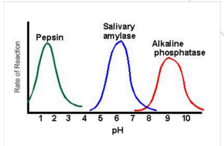
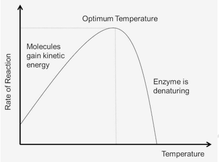
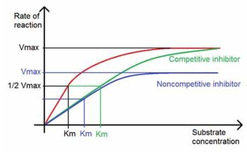
Enzyme

- mode of actions of enzyme
  - lock and key hypothesis
    - substrate bind to the enzyme by successful collision
    - formation of enzyme-substrate complex
    - the E-S complex allow the catalysts to happen
    - the product are released from the active site
  - induced-fit hypothesis
    - the substrate is not completely complementary to the active site
    - upon binding, the enzyme can change the shape of the active site to maximize the binding
    - the enzyme catalyse the reaction of substrate
    - the products leave the active site and the enzyme resumed the shape of active site





- factors that effect enzyme actions
  - temperature
    - lower than optimum temperature
      - temperature increase> kinetic energy increase> successful collision more likely to occur> more E-S complex formed> rate of reaction increase
    - optimum temperature: the greatest rate of reaction
    - higher than optimum temperature
      - temperature increase> the hydrogen bond will break> the shape active site change> enzyme is denatured
  - pH value
    - optimum pH value: the greatest rate of reaction
    - denature on the both side
      - the ionic bond and hydrogen bond will break> change the tertiary structure of enzyme> the shape of active site will be altered> less E-S complex formed
  - substrate concentration
    - substrate concentration increase, rate of reaction increase
    - when reach to the Vmax, the active sites are fully occupied, rate of reaction keep constant
  - enzyme concentration
    - enzyme concentration increase, rate of reaction increase(substrate is excess)
- lower the activation energy
- Km contant
  - Vmax
    - the maximum rate of enzyme activity
  - Km
    - the substrate concentration required when 1/ 2 Vmax is reached
    - Km is inversely proportional to the affinity of enzyme



- inhibitor
  - competitive inhibitor (Vmax constant/ Km increase)
    - has the similar shape to the substrate
    - the competitive inhibitor compete active site with substrate
    - increase the concentration of substrate can reduce inhibition
    - sub A> sub B> subC> subD
    - sub D(competitive inhibitor to the sub A)
      - negative feedback loop
      - common mechanism to maintain the concentration of certain substrate
  - non-competitive inhibitor (Vmax decrease Km constant)
    - binds to the allosteric site of the enzyme
    - the binding stimulates the enzyme to change the shape of active site, so that substrate can no longer bind to the active site
    - the inhibition occurs regardless of the substrate concentration
- immobilized enzyme
  - soluble globular protein
  - heat and pH tolerant
- enzyme is a biological catalyst that can speed up the rate of metabolic reaction
  - intercellular
  - extracellular
  - catabolic reaction
    - break down of big molecule
  - anabolic reaction
    - the formation of complex molecule

XMind Evaluation