SI SESSION 10

10/06

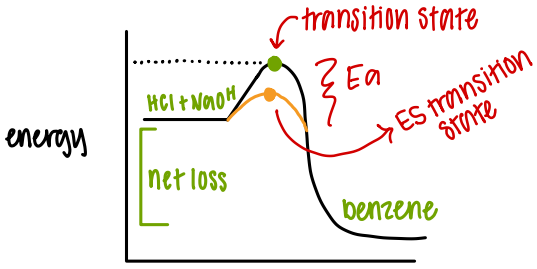
- All enzymes are proteins, except for ribozymes.
  ↓
  made of RNA
- Most enzymes end with?
  - ase
- What is the function of an enzyme?
  To catalyze/speed up reactions (not consumed)

- Define energy activation

  The energy needed to complete a reaction.

  This energy comes from the breaking or formation of bonds

- Draw the graph of Ea of HCl + NaOH → Benzene with and without the presence of an enzyme.



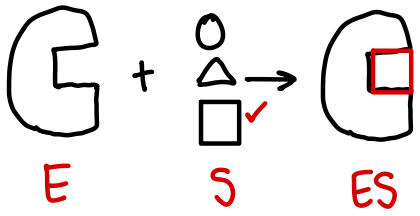
- Whether an enzyme is present or not, what does not change?

  The overall energy change is still the same!

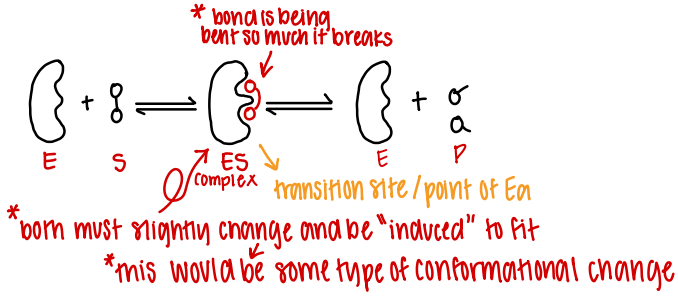
- Define Active site vs Binding Site
  Active site: Where substrates [redacted] bind on an ENZYME and are chemically transformed.
  Binding site: site where a ligand binds toa protein or enzyme with no chemical change

- What determines specificity of the [redacted] substrates)?
  The shape (which is caused by arrangements of R groups of enzymes)

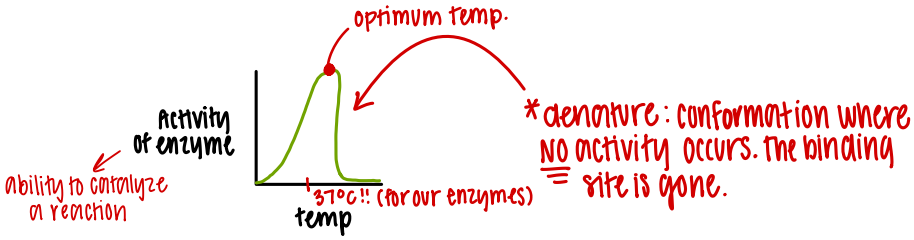
- Draw the lock and key model



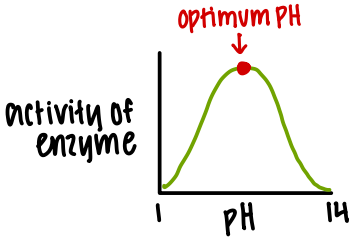
- Draw the induced fit model



- What are the rules of a chemical reaction?
  1. Substrates must be close together
  2. Substrates must be correctly oriented towards each other
  3. Bonds must be broken and/or formed
- How are enzymes regulated?
  1. Allostery: The binding of a ligand to a site other than the active site causes the enzyme to go from an inactive to active conformation.
  2. Binding of a cofactor, prosthetic group, coenzyme, metal ion (anything other than an amino acid): commonly needed for enzymatic activity.
  3. Temperature: optimal temperature that an enzyme functions at



  4. pH: Optimal pH that enzyme functions at



5. Zymogens: Enzymes is synthesized in an inactive state and must be proteolytically cleaved to become active. Timing is important here! EXAMPLE: ability to form blood clots at the correct time!! (when its needed)

   Trypsinogen (inactive) vs trypsin (active)

6. Inhibition: molecules that bind to enzymes to reduce activity of enzyme

7. Genetic: Regulators within the cell that can limit production of enzymes in transcription and translation

- Constitutively expressed: genes that are always turned on
- Induced expression: forced to make mRNA (which will increase enzymes/protein production). These genes cannot be turned on or off.

- Name the classes of enzymes. How many are there?

  Class 1: Oxidoreductase
  In redox reactions; loss or gain of electrons (transfer)

  Class 2: Transferase
  A molecular group is being transferred from one molecule to another

  Class 3: Hydrolase
  Water is being used to cleave a covalent bond

  Class 4: Lyase
  Formation of a double bond by cleaving C-O, C-N, or C-C bond. C=C bond is usually formed

  Class 5: Isomerase
  Enzyme rearranges a molecule and creates an isomer

  Class 6: Ligase (only class that requires energy)
  Formation of covalent bond between two molecules using energy