

Chapter 6 Ground Rules of Metabolism

Energy & Life

- Energy is the capacity for _____
- Two _____ govern energy changes:
 - The _____ of Thermodynamics
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- The 1st Law states that energy cannot be _____ or _____; it can only change _____
- In other words: energy is _____
 - Therefore, _____ cannot make energy
 - Energy can be _____ quality & usable (like _____) or _____ quality (_____ that is released)
- The 2nd Law states that energy flows _____ from high quality to _____
- In other words: as energy _____ form, some _____ is always lost to the environment
- As systems lose energy, they gain _____
- The only reason that the _____ can continue to support life is because we are constantly receiving energy from the _____

Metabolism and Energy Changes

- In _____ reactions, the _____ may have either more or less energy than the _____
- Most reactions are _____
- Reversible reactions move toward _____
- Reactions that _____ off energy are called “_____”
- Reactions that _____ in energy are called “_____”
- When a reaction reaches dynamic _____, the forward and reverse reactions have _____ rates
- Reactions at _____ have no _____ change in concentration

Metabolic Pathways

- For metabolic _____ to occur: the molecules must be _____ enough to collide, but _____ enough to prevent harmful side effects
- Metabolic _____ are a series of reactions that use _____ to regulate the _____ of reactants
- Metabolic pathways are _____ as:
 - _____, where large molecules are _____ down to release energy
 - _____, where small molecules are _____ together to make large molecules
- Metabolic _____:
 - _____ (also called _____)
 - _____ - compounds formed _____
 - _____ - proteins that _____ reactions
 - _____ - help by carrying e^- or H^+
 - Energy _____ - mainly ATP
 - End _____

Enzymes

- All enzymes are _____
- Enzymes _____ up reactions
- Enzymes can be _____
- Enzymes are very _____ based on _____
- Some enzymes _____ both forward and reverse reactions
- The “_____ site” of an enzyme is an _____ where the substrate attaches during a reaction
 - This is sometimes described as a “_____” fit
 - A better description may be “_____” where the enzyme _____ shape to allow a better fit
- Reactants must reach a “_____” state in order to react
 - _____ energy is needed to bring _____ molecules to the _____ state
 - Enzymes increase reaction _____ by effectively _____ the activation energy needed

Affecting Enzyme Activity

- High _____ decrease reaction rate by disrupting the _____ shape of the enzyme (_____)
- Extreme _____ changes can also denature proteins
- Most enzymes function best near a pH of _____ and at “_____ temperature”

- Some enzymes are controlled by _____ that can _____ their active site
- _____ enzymes have regulatory sites where _____ substances attach to affect the enzyme’s activity

- Some enzymes are helped by _____ “cofactors” that attach and make them _____ reactive
 - _____ are large organic molecules (like _____) that carry p+ or _____ from one substrate to another
 - Inorganic _____ ions (like Fe²⁺) assist in _____ transfers

Electron Transfers

- In metabolic pathways, _____ is released from molecules (such as glucose) in _____ controlled steps
- This is done by passing _____ from one molecule to another
- Every time an e⁻ is passed, the energy can be used to move _____ ions, making _____ production possible

Energy Carriers

- Before cells can use the energy of _____ or _____, they must transfer the energy to _____ molecules
- ATP is made of _____, _____, and three _____
- When a phosphate is removed, energy is _____ and a reusable _____ is formed