AP Biology Unit 1: Biochemistry Cheat Sheet

by hlewsey via cheatography.com/36676/cs/11528/

Properties of Water

Polarity:
- allows cohesion, adhesion, surface tension

High Specific Heat:
- resists temp change
- high heat of vaporization
- allows evaporative cooling (high energy particles vaporize)

Universal Solvent:
- dissolves hydrophilic/repels hydrophobic

Properties of Carbon

tetravalence	4 bonds->complex molecules
hydrocarbons	C and H, release energy
structural isomer	differs in covalent arrangement of atoms
geometric isomer	differs in spacial arrangements around double bonds
enantiomer	mirror image of 4 molecules attached to asymmetric carbon

Functional Groups

-OH	hydroxyl	polar/hydrophilic
-CH3	methyl	nonpolar/hydrophobic
-COOH	carboxyl	polar/hydrophilic
-COH	carbonyl	polar/hydrophilic
-NH2	amino	polar/hydrophilic
-SH	sulfhydryl	nonpolar/hydrophobic
-PO4	phosphate	polar/hydrophilic

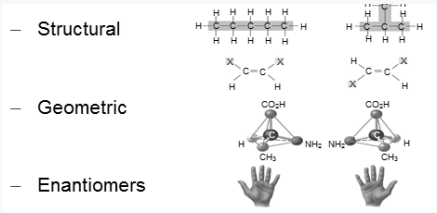
Acids and Bases

Acid	increases H+ in solution
Base	reduces H+ in solution (accepts H+or donates OH-)
pH	=-log[H+]
Buffer	accepts/donates H+ to stabilize pH

Metabolism

metabolic pathway	a specific molecule that is altered in defined steps catalyzed by enzymes that result in a certain product
catabolic pathway	releases energy by breaking down complex molecules
anabolic pathway	consumes energy to build more complex molecules
energy	the capacity to cause change or rearrange matter

Isomers



Laws of Thermodynamics

1st Law of Thermodynamics

> energy can be transferred and transformed but not created or destroyed

2nd Law of Thermodynamics

> every energy transfer/transformation increases the entropy of the universe; a process must increase entropy to be spontaneous

Free Energy

Gibbs free energy- ΔG=ΔH-TΔS

> energy in a temp/pressure constant system that can perform work

exergonic

> has a net release of free energy (-ΔG)

endergonic

> absorbs free energy (+ΔG)

ATP

> ribose, adenine, 3 phosphate groups
> hydrolyzed to ADP+P_i
> phosphorylated molecules=more reactive

Large Biomolecules

Carbohydrates

> -monosaccharides held by glycosidic linkages
> -energy storage, structure, protection

Lipids

> -fatty acids held by ester linkages
> -hydrophobic, saturated/unsaturated, hormones

Nucleic Acids

> -nucleotides held by phosphodiester H-bonds
> -enable reproduction, controls protein synthesis

Proteins

> -amino acids held by peptide bonds
> -follow varied instructions from DNA

Enzymes

Enzymes

> these macromolecules act as catalysts that lower activation energy barriers by forming an induced fit w/substrate in the active site

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Enzymes (cont)

Enzyme Activation

-gene regulation= enzymes produced when needed
-activators=cofactors (inorganic) and coenzymes (organic) make up and help enzymes function

Enzyme Inhibition

-competitive=inhibitor molecule binds to active site to block substrate
-allosteric=inhibitor molecule binds to allosteric site to cover or change shape of the active site

Optimal Conditions

-enzymes have optimal temp+pH
-cofactors+coenzymes bind to enzyme or substrate

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