Water Chemistry

Properties

1. Cohesion: water sticking to itself with hydrogen bonds (causes surface tension)

2. Adhesion: water sticking to other polar/-charged molecules (causes capillary action)

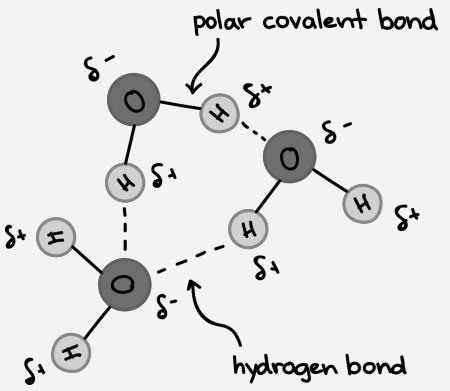
3. High specific heat: water can absorb a lot of heat without changing temperature

4. Excellent solvent: can bond with and 'dissolve' other charged or polar molecules

Water is polar: it has one partially positive side (Hs) and one partially negative side (O), due to uneven sharing of electrons

Water is polar. That polarity causes hydrogen bonds to form and makes water the *solvent of life*

Forming Hydrogen Bonds



Hydrolysis and Dehydration Synthesis

Hydrolysis	Dehydration Synthesis
hydro - water lysis - break down	dehydration - remove water synthesis - building
- process using water to break bonds in a polymer	- process creating polymers from monomers and removing water

Hydrolysis and Dehydration Synthesis (cont)

Polymer + H2O -> Monomer	Monomers -> Polymers +H2O

Process used to build polymers (**dehydration synthesis**) and break down polymers (**hydrolysis**)

Activation Energy

Carbohydrates

- Monosaccharides - single unit sugar (glucose, fructose, etc)

- Polysaccharides - multiple unit sugar (starch, sucrose, lactose)

Use for short term, quick energy

Cx H2x Ox <-- chemical formula

Carbohydrates contain **CARBON, HYDROGEN, and OXYGEN**

Lipids

-fatty acids, triglycerides, and phospholipids

-stored in long chains with significantly MORE hydrogens and carbons than oxygens

1. *unsaturated fatty acids* - contain a 'kink' in the tail caused by 1 or more double bonds. Liquid at room temperature due to loose packing of the fatty acid chains. Many plant fats.

2. *saturated fatty acids* - very straight chain caused by full saturation of hydrogens (no double bonds). Solid at room temperature. MAny animal fats (and modified plant fats)

Lipids contain **CARBON, HYDROGEN, and OXYGEN** *sometimes include phosphorus*

Proteins

Primary structure:	the sequence/order of amino acids
Secondary structure:	the hydrogen bonds occurring between the backbones of the amino acids (does not involve R groups)
Tertiary structure:	R group interactions (polar versus nonpolar, hydrophobicity, and charge)
Quaternary structure:	Multiple polypeptide chains

monomer: amino acids (there are 20 total)

polymer: polypeptide/proteins

includes: enzymes, structural proteins, transport proteins, etc.

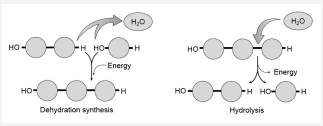
Contains **CARBON, HYDROGEN, OXYGEN, NITROGEN** *sometimes sulfur*

Nucleic Acids

Nucleotides (monomer):	contains, nitrogen base (A, T, C, G, or U), sugar (deoxyribose or ribose), and a phosphate group
DNA	*RNA*
double-stranded	single-stranded
deoxyribose sugar	ribose sugar
genetic code found in nucelus	genetic copy that is the intermediate to make a protein

contains **CARBON, HYDROGEN, OXYGEN, PHOSPHORUS, and NITROGEN**

Reaction Types



Enzymes

Substrate:	*reactant*, acted on by the enzyme
Active Site:	region of the enzyme that the substrate binds to

Enzymes are catalysts - they help speed up a reaction (lower activation energy) but are reusable

Enzymes can be **denatured** - this means tht the enzyme loses it's ability to function

- temperature changes (heat and cold), pH changes, salinity, etc.

Enzyme and substrate concentration can also affect function

as substrate concentration increases, the reaction rate will also increase UNTIL it reaches the saturation point

as enzyme concentration increases, reaction rate will also increase exponentially as long as substrate presence is constant

competitive inhibitors bind at the active site and compete with substrates

noncompetitive inhibitors bind a different part of the enzyme and cause the enzyme to change shape and not be able to bind the substrate anymore

Proteins that are designed to accelerate chemical reactions in living systems