Chemical Bonds

ELEMENTS OF BIOCHEMISTRY

- C, H, O, and N make up 96.3%of an organism's weight
- They can form covalent bonds that are weak enough to be broken at temperatures that are consistent with life
- H and O are dominant in the process of evolution, and many other molecules with elements are soluble gases

IONIC BONDS

- Atoms with greater electro negativities pull electrons from an atom with a lower electronegativity and become negative ions
- Ions: charged particles
- Oppositely charged ions attract and form ionic bonds

COVALENT BONDS

- Covalent bonds form when atoms of similar electronegativities share electrons
- There are nonpolar covalent bonds and polar covalent bonds
- Nonpolar covalent bonds share electrons equally and has no poles, resulting in a bond with no charge
- Polar covalent bonds do not share electrons equally, causing a difference in the charge of the bond

HYDROGEN BONDS

- Hydrogen bonds are bonds that hydrogen bonds to
- They are often between oppositely charged polar covalent molecules
- They often exist with oxygen and nitrogen

SHAPE AND FUNCTION

- The shape and function of a bond is important because chemical reactions with enzymes have particular shapes
- Properties of water:
  - Can arrange molecules that don't like water to interact
  - Acts as a magnet when bonding with oxygen
  - Solvent for ions and polar molecules
  - Has a high specific heat and heat of vaporization
  - Reaches maximum density at 40°C

IONIZATION OF WATER

- Water is called a polar molecule because the bonds between the hydrogen and oxygens form polar covalent bonds
- The equation for calculating pH is $pH = -\log[H+]$
- Acid: substance that increases H+ concentration in solution
- Base: substance that decreases H+ concentration in solution
- The pH of acids range from 0-7, and the pH of bases range from 7-14
- Pure water has a pH of 7, where one increase in pH is x10 more moles
- Buffers stabilize the pH to what it is supposed to be by releasing H+
- The most common buffer is the bicarbonate ion
- Acid precipitation refers to any form of precipitation with a pH lower than 5.2

CARBON

- Because carbon forms 4 covalent bonds, it can bond with other carbons
- When bonding with other carbons, it can either form a:
  - Straight chain
    C = C = C
  - Branched chain