Small Molecules: Structure & Function

A. Atoms: The Constituents of Matter

1. An element is made up of only one kind of atom
2. The number of protons identifies the element
3. Isotopes differ in the number of neutrons
4. Electron behavior determines chemical bonding
    a. Octet Rule

B. Chemical Bonds: Linking Atoms Together

1. Covalent bonds consist of shared pairs of electrons
    a. polar covalent bonds
2. Ions form bonds by electrical attraction
3. Hydrogen bonds may form between molecules
4. Nonpolar substances have no attraction for polar substances
    a. Hydrophobic vs. Hydrophilic
    b. van der Waals forces – membranes!

C. Eggs by the Dozen: Molecules by the Mole

1. Calculate the number of molecules by weighing – Avogadro's #
2. Reactions take place in solutions

D. Chemical Reactions: Atoms Change Partners

1. Conservation of Matter & Energy – Just changes form
2. Redox reactions in biological systems

E. Water Structure and Properties

1. Water has a unique structure and special properties
    a. Heat Capacity
    b. Phase change
    c. Cohesive Strength
    d. Surface Tension
    e. Latent Heat of Vaporization

2. Water molecules sometimes form ions

F. Acids, Bases, & pH Scale

1. Acids donate H+, bases accept H+
2. pH is the measure of hydrogen ion concentration
3. Buffers minimize pH changes

G. Properties of Molecules

1. Functional groups give specific properties to molecules
2. Isomers have different arrangements of the same atom
    a. Optical isomers aka enantimers
    b. Structural isomers
    c. Geometric isomers