

Microbiology and Man

Chapter 2

- Covalent Bonds

- Polar vs. Non-polar
 - Polar: uneven distribution of charges
 - Example: Water
 - Non-polar: even distribution of charges
- Single, Double, and Triple Covalent bonds

- Ionic Bonds

- One ion loses an electron and one gains, permanent
- Valence electrons
- Cation vs. Anion

- Hydrogen Bonds

- Usually between hydrogen and nitrogen (or oxygen)
- Very weak
- Electronegativity: move more towards the negative atom than towards the positive atom
 - Example: oxygen is very electronegative
 - Polar dynamic: large difference in charges

- Important Biological Molecules

- Organic vs. Inorganic
 - Be able to identify organic vs inorganic on models and structures
- 92 Naturally occurring elements
- The 6 elements most living organisms are composed of

- Carbon (4 covalent bonds)
- Hydrogen (1 covalent bonds)
- Nitrogen (3 covalent bonds)
- Oxygen (2 covalent bonds)
- Phosphorus (4 covalent bonds)
- Sulfur (2 covalent bonds)
- Carbon through oxygen make up 96.5% of an organism's weight
- **Water**
 - Polar molecule (due to partial positive and partial negative charges)
 - VERY POLAR
 - Hydrophilic = Polar
 - Loves water
 - Polarity allows water to:
 - Act as a solvent (universal solvent)
 - Used in chemical reactions
 - Temperature buffer
 - Polar substances dissociate, forming solutes
 - **7 characteristics and 3 states**
 - Characteristics:
 - 1. Polar
 - 2. Universal solvent
 - 3. High specific heat
 - 4. Cohesion (water to water) and adhesion (water to anything else)

- 5. Surface tension
- 6. Variable pH
- 7. Dissociation
- States:
 - Solid
 - Liquid
 - Gas
- **Water video WATCH 3 TIMES**
 - Transports dissolves and _____ while transporting away waste
 - All organisms utilize it
 - Bonds between water molecules are very weak
 - Surface tension allows water droplets
 - Too much hydrogen it becomes acidic and too little becomes basic
 - H^+ and OH^- participate in chemical reactions
 - Hydrolysis (hydrolytic reactions) use water to break bonds
 - Hydrogen bonding between water molecules makes water a temperature buffer
- **Acids, Bases and Salts**
 - Acids donate H^+ ions
 - Bases accept H^+
 - A salt is a substance that dissociates into cations and anions that are neither H^+ or OH^-
 - Acid Base Balance:
 - Count how many spaces for pH and that's the number of zeros and add a 1
 - Example pH 3 = 1000