Biochemistry: Notes

In this lesson…

- Water Properties
- Acids and Bases
- Macromolecules

Water Properties:

- **Polar**
  - Water has unequal charged ends
- **Cohesion**
  - Attraction between properties of the same substance
  - One water molecule bonding to another water molecule
  - Example:
    - Water touching water
- **Adhesion**
  - Attraction between two different substances
  - Examples:
    - Capillary action
    - Transpiration
- **Surface Tension**
  - A film on water caused by cohesion
  - Example:
    - Produces a surface that allows insects to walk on the surface of water
- **Capillary Action**
  - Water molecules will "tow" each other along similarly to a thin glass tube
  - Example:
    - Transpiration
- **Transpiration**
  - Process in which plants and trees remove water from the soil, and paper towels soak up water
- **Solute**
  - Substance being dissolved
  - Example:
    - Salt
- **Solvent**
  - Substance into which solute dissolves

    - Example: water
- **Buffer**
    - Made of a weak acid or base that absorbs additional H+ or OH- ions so that the solution will maintain a stable pH
    - Example:
        - Baking soda, Tums
- **Indicator**
    - A substance that changes color in the presence of an acid or base
    - Example:
        - Cabbage juice
- **Organic**
    - Contains carbon
- **Monomer**
    - Building blocks of macromolecules
- **Polymer**
    - macromolecules
- **Hydrolysis**
    - Separates monomers by “adding water”
- **Dehydration Synthesis**
    - Forms polymers by combining monomers by “removing water”

Acids and Bases:

Property	**Acids**	**Bases**	**Neutral Substances**
Taste	sour	bitter	-
Example 1	Hydrochloric Acid	Acetone	-
Example 2	Acetic Acid	Ammonia	water
Reaction w/ metals	React	Don’t React	-
Kind of ion	H^+	OH^-	-
pH numbers	0-6.9	7.1-14	7

Macromolecules:

- **Organic:** contains carbon
- **Carbon**
  - Can form covalent bonds as many as 4 other atoms (elements)
- **Macromolecules (Polymers)**
  - Large organic molecules
- **Monomer**
  - Building blocks of macromolecules
  - Each polymer has a different monomer

Polymer	**Monomer**
Carbohydrates	Monosaccharides
Lipids	Fatty Acids
Proteins	Amino Acids
Nucleic Acids	Nucleotide

- **Dehydration Synthesis (condensation reaction):**
  - Forms polymers by combining monomers by “removing water”
- **Hydrolysis**
  - Separates monomers by “adding water”

- **Carbohydrate**

Monomer	Monosaccharide
Function	Short term energy
Elements	Carbon, hydrogen, oxygen
Shape	Ring

- **Monosaccharide**
  - One sugar unit
  - Examples:
    - Glucose
    - Fructose
    - Galactose
    - Deoxyribose (DNA)
    - Ribose (RNA)
- **Disaccharide**
  - 2 sugar units
  - Examples
    - Sucrose (glucose + fructose)
    - Lactose (glucose + galactose)
    - Maltose (glucose + glucose)
- **Polysaccharide**
  - Many sugar units

- **Types of Carbohydrates**

Starch	How plants store glucose
Glycogen	How animals store glucose
Cellulose	Makes up plant cell wall (fiber)

- **Lipids**

Monomer	Fatty Acids (Triglyceride)
Function	Long term energy, cell membrane
Elements	Carbon, hydrogen, oxygen
Shape	E-shape

- **Lipid Examples**
  - Fats
  - Phospholipids
  - Oils
  - Steroid hormones
- **Saturated Fats:** no double bonds (Bad)
- **Unsaturated Fats:** no double bonds (Good)

- **Protein**

Monomer	Amino Acids (20 different kinds)
Function	Body Structure (muscles, organs), enzymes
Elements	Carbon, hydrogen, oxygen, nitrogen
Shape	No set shape; Shape determines function

- **Enzymes**
    - Proteins
    - Speed up chemical reactions and require little energy (ATP)
    - Put things together and take them apart

- **Nucleic Acids**

Monomer	Nucleotide
Function	Contain genetic information
Elements	Carbon, hydrogen, oxygen, nitrogen, phosphate
Shape	Helix

- **Nucleotide**
  - Phosphate group
  - Sugar (5 carbon)
  - Nitrogenous Base
    - Adenine (A)
    - Thymine (T)
    - Cytosine (C)
    - Guanine (G)
    - Uracil (U)