Properties of Water (1.1)

Structure of Water: Made up of two hydrogens and one oxygen atom that are held together by a covalent bond

Bonds: Water molecules bond with each other through hydrogen bonds between neighboring hydrogens and oxygen atoms.

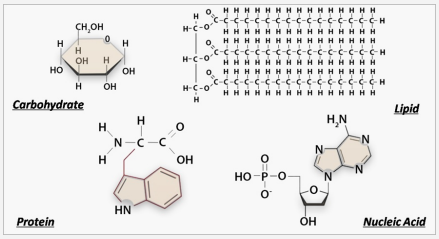
Adhesion and Cohesion: Adhesion is the sticking of water to other things and cohesion is the sticking of water to itself. Cohesion is responsible for surface tension (water droplets resist rupture when pressure is added).

Capillary Action: Movement of water molecules up very thin xylem tubes and evaporation from stomata in plants. Water molecules cling to each other through cohesion and cling to the walls of the xylem tube through adhesion.

Water: Water has a high specific heat(the amount of heat required to raise the temperature of a substance) due to the strength of the hydrogen bonds that need a lot of movement to break apart. **Water is less dense as a solid than as a liquid**

How does life depend on water?: Water is essential for life on Earth because it functions as a solvent. The chemical and physical properites of water allow it to dissolce more substances than other liquids. It is capable of dissolving substances and enabling key chemical reactions in organisms.

Biological Macromolecules (1.5)



Carbohydrates

Monomer:	Monosaccharides that are linked together into polysaccharides through dehydration reaction
Function:	Act as an energy source to provide energy for the organism such as glycogen and structural support such as cellulose for plant cell walls.
Remember:	Carbohydrates have a ratio of 1 carbon, 2 hydrogen, and 1 oxygen

Acids and Bases

pH Scale:	Measures acidity and basicness of aqueous solution (0-14)
Acids:	Excess of H+ ions, more H+ than OH-
Bases:	Excess of OH- ions, more OH- than H+
Water:	Water is neutral with a pH of 7

Elements of Life (1.2)

Building of Biological Molecules: Hydrogen, oxygen, nitrogen, phosphorus, and sulfur are the main atoms that build biological molecules. Carbohydrates, amino acids, lipids, and nucleotides are the main monomers used to build molecules.

How Organisms Exchange Matter: Organisms must exhange matter with the environemtn to grow, reproduce, and maintain organization. The intake of needed materials and the excretion of waste happen all through the transport of molecules across the membrane.

Intro to Biological Macromolecules (1.3)

Hydrolysis	Reaction where a larger molecules forms two or more smaller molecules. Water is added to the large molecule to break it up into the smaller molecules.
Dehydration	Reaction where two molecules are combined together through the removal of water.
Molecule Binding	Molecules bind due to the interaction of valence electrons between one molecule and another. Molecules aminly form covalent bonds with each other to bind as one. This means atoms will share electrons together to bond with each other.

Proteins

Monomer:	Amino acids linked together by peptide bonds from dehydration reactions between amino and carboxyl groups of adjacent amino acids.
Functions:	Structural support, building blocks, and enzymes.
Primary Structure:	Unique sequence of amino acids linked together to form a polypeptide chain
Secondary Structure:	Polypeptide chain with regionsof amino acid chains that are stabilized by hydrogen bonds from the polypeptide backbone. These hydrogen bonds create alpha helixes and beta sheets.

Proteins (cont)

Tertiary Structure:	The three-dimensional arrangement of a protein's polypeptide chain. The structure is driven by hydrophobic interactions, disulfide bridge, H-bonds, and ionic bonds.
Quaternary Structure:	Arrangement of protein chains into a closely packed arrangements(only occurs in some proteins)
Denaturing:	Unideal temperature or pH levels cause the unfolding of the protein structure causing denaturing.
Amino Acids:	Contains an amino group(-basic), carboxylic group(acidic), and a side chain(r-group).

Properties of Biological Molecules (1.4)

Property: Biological molecules are organic, meaning they contain carbon. **All organic compounds contain carbon and major elements of life are CHONS**

Carbon: Carbon has four valence electrons which means it is the most agile and suitable atom for complex bonds. Carbon has the ability to form stable bonds with many elements which allows it to form large and complex molecules needed for organisms.

Isomers: Molecules that have the same molecular formula but differ in atom arrangement. This can result in molecules that are very different in their biological activities such as glucose and fructose.

Lipids

Monomer:	N/A since lipids arent polymers because they are not composed of repeating units of the same molecules or atoms. **All are hydrophobic**
Function:	Phospholipid bilayer, energy storage, protection
Fats(Triglycerides):	Glycerol bound to three fatty acid molecules. Fatty acids are nonpolar hydrocarbon chains)
Saturated Fatty Acids:	Fatty acids that have hydrocarbon chains connected by single bonds only. There are no double carbon bonds and it is solid at room temperature.
Unsaturated Fatty Acids:	Some double carbon bonds(cis or trans) that result in kinks in the fatty acid tail. It is liquid at room temperature.
Phospholipids:	Hydrophilic head with two hydrophobic fatty acid tails
Steroids:	Carbon skeleton of 4 rings that are fused together such as cholesterol.

Nucleic Acids

Monomer:	Nucleotides
Function:	Genetic information that codes amino acid sequences, also RNA and DNA.

Nucleic Acids (cont)

Nucleotides:	Nucleotides are made up of three parts: nitrogenous base, sugar, and the phosphate group