

Life's Chemistry

- A molecule's shape determines its functions
 - How certain things taste or smell
 - The structure certain cells have
 - What can or can't move into/out of the cell
- Cellulose is found in plants, which composes the cell wall
- Protein receptors only interact with another molecule of a complementary shape
- An element is a substance that cannot be broken down into anything else
- Atoms are the smallest component of any element
 - Made up of subatomic particles
 - Protons and neutrons in nucleus, electrons in electron cloud
- Atomic number is the number of protons in the atom's nucleus
- When the number of protons is equal to the number of the electrons, it is neutral
- When the number of protons does not equal the number of electrons, the atom is an ion
- Electrons exist in energy cells
 - The first shell holds two electrons
 - The second shell holds eight electrons
 - Octet rule: an atom is most stable when it has eight electrons in the outer shell
 - If the outer energy shell is full, the atom is stable and will not react with anything
 - If the outer energy shell is not full, the atom will lose/gain electrons in its outer shell to become stable
- A molecule is a stable association between two or more atoms
- A covalent bond is when two or more atoms share electrons
 - Sharing of electrons isn't always equal
 - Some electrons may spend more time around a certain atom in a molecule
 - Creates poles of partial positive and negative charges
 - A nonpolar molecule is equal sharing
 - A polar molecule is unequal sharing with poles of partial positive/negative charges (water is a polar molecule)
- An ionic bond is when atoms exchange electrons --> between two oppositely charged ions
- A hydrogen bond is when polar molecules orient themselves so that the positive pole of one molecule is next to the negative end of another molecule
- Hydrogen bonds are weaker than ionic bonds, which are weaker than covalent bonds
- Water has special properties due to hydrogen bonds
 - High surface tension because of cohesion
 - When water freezes, it is less dense than liquid water because as water freezes, it becomes less tightly packed because of hydrogen bonds (explains why ice floats)
 - Good solvent because polar molecules dissolve in water (salt), but not nonpolar molecules (fats and oils)