Chapter 10- Molecular Mixing and The Mole

- **Submicroscopic Particles**
  - Substances are made of submicroscopic particles
    - Ionic compounds
      - Made up of ions
    - Covalent compound
      - Made up of molecules
    - Elements
      - Made up of atoms

- **Electrical attractions between submicroscopic particles**
  - *Dipole-* separation of charge
    - Ex. Water molecule, have a slightly opposite and negative side
  - Opposite charges attract one another
    - Ex. Polar molecule (water) when in the presence of the ionic compounds
  - The positive ion is attracted to the negative end of the molecule
  - negative ion is attracted to the positive end of the molecule
  - This is called an ion-dipole attraction
  - Too many ion dipole attraction will disrupt the ionic bond
    - Ex. NaCl in H2O the water separates the NaCl and forms an **Aqueous solution** --> a solution in water

- **Polar Molecule attracts polar molecules**
  - dipole-dipole: An attraction between 2 polar molecules
    - ex. water
  - Hydrogen Bond: the attraction between hydrogen and the negatively charged atom of another molecule (oxygen)

- **The Hydrogen Bond**
  - The strength of a H bond depends on
    1. The strength of the dipoles involved
    2. How strongly nonbonding electrons in one molecule can attract a H atom on another molecule

- **Importance of the H bond**
  - Gives water many of its properties
  - Found in DNA, RNA, and carbohydrates

- **Dissolving**
  - The component that has the largest amount is the **solvent**
  - The other components are the **solute(s)**
    - Ex. Sugar mixed with water
  - Water- solvent
  - Sugar- solute
  - **Dissolving** - the mixing of a solute in solvent
  - **Saturated solution** - the solvent (water) cannot accept anymore solute (sugar)
  - Unsaturated solution - it can accept more solute

- **Solubility**
  - Solubility - the ability of a solute is its ability to dissolve in a solvent
  - **Insoluble** - a material that does not dissolve in a solvent
    - Ex. Insoluble in water: sand and glass
  - Just because a material isn't soluble in one solvent, doesn't mean it won't dissolve...
    - Ex. Sand and glass are soluble in hydrofluoric acid
  - Ex. Hydrofluoric acid is used to give frosted the decorative look
  - Ex. Styrofoam is insoluble in water, but soluble in acetone

- **Solubility and temperature**
  - solubility increases with increasing temperatures
  - Hot molecules have greater kinetic energy and can collide with the solid solute with more force
  - **Solids**
    - Ex. Sugar (sucrose), heat to almost a boil
    - This is how syrup and hard candy are made
  - **Gases**
    - Solubility of gases in liquids decrease with increasing temperatures
    - Particles are moving too fast
    - This is why warm carbonated drinks (soda) go "flat" faster than cold
    - High temp. Makes the molecules of CO₂ gas leave the drink faster