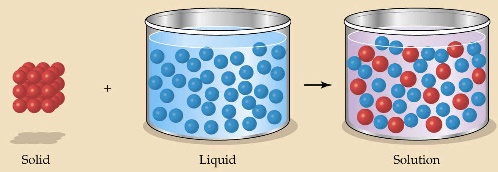
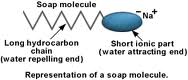
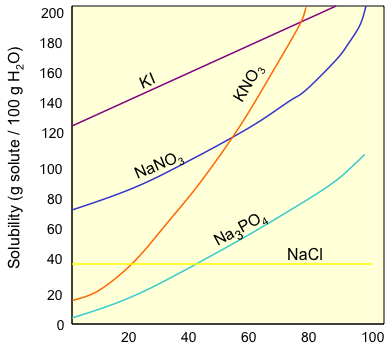
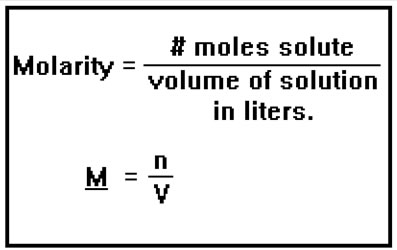
1. Solution - a homogeneous mixture
   1. evenly mixed at the particle level
      1. Ex: salt water
   2. Alloy - a solid solutions of metals
      1. Ex: bronze = Cu and Sn; brass = Cu and Zn
   3. Solvent - the substance that dissolves the solute
      1. Water Salt
   4. Soluble - "will dissolve in"
      1. Ex: Salt will dissolve in water
   5. Miscible - refers to two gases or two liquids that form a solution
      1. This is more specific than soluble
      2. Ex: food coloring in water
2. Factors affecting solution formation
   1. temperature
      1. As temperature increases, the rate increases
      2. As temperature decreases, the rate decreases
   2. particle size
      1. As particle size increases, the rate decreases
      2. As particle size decreases, the rate increases
   3. Mixing
      1. As mixing increases, the rate increases
      2. As mixing decreases, the rate decreases
   4. The nature of solvent and/or solute
3. Classes of Solutions
   1. aqueous solution - solvent is water (H2O)
      1. water = "the universal solvent"
   2. amalgam - solvent is mercury (Hg)
      1. Ex: dental amalgam (Hg + Sn + Ag)
   3. tincture - solvent is alcohol
      1. Ex: tincture of iodine (for cuts)
   4. organic solution - solvent contains carbon
      1. Ex: gasoline, benzene, toluene, hexane
4. Non-Soluble Definitions
   1. insoluble - "will not dissolve in"
      1. Sand will not dissolve in water
   2. immiscible - refers to two gases or two liquids that will NOT form a solution
      1. Ex: water and oil
   3. suspension - appears uniform while being stirred, but settles over time
      1. Ex: orange juice
5. Molecular Polarity
   1. non-polar molecules - electrons are shared equally and tend to be symmetric
      1. Ex: Fats and Oils
   2. polar molecules - electrons are not shared equally
      1. Ex: water
   3. "Like dissolves Like"
      1. polar + polar = solution
      2. nonpolar + nonpolar = solution
      3. polar + nonpolar = suspension (won't mix evenly)
6. Applications of Solubility Principles
   1. Chemicals used by body obey solubility principles
      1. water-soluble vitamins: Vitamin C
      2. fat-soluble vitamins: Vitamins A and D
   2. Dry Cleaning employs non-polar liquids
      1. polar liquids damage wool and silk
      2. also, dry cleaning removes ink, rust, and grease
      3. they use tetrachloroethylene
   3. Emulsifying Agent (emulsifier):
      1. molecules with both a polar **AND** a nonpolar end
      2. allows polar and nonpolar substances to mix
      3. Examples:
         1. soap -made from animal and vegetable fats
         2. detergent -made from petroleum
            1. works better in hard water
      4. Model of a soap molecule
         1. Hard water contains minerals with ions (Ca2+, Mg2+, and Fe3+ that replace Na1+ at polar end of soap molecule.
         2. Soap is then changed from an emulsifier into an insoluble precipitate (soap scum)
7. **Solubility Curves**
   1. Solubility - how much solute dissolves in a given amount of solvent at a given temperature
      1. It is a general rule is that the solubility of solids increases with increasing temp.
      2. Solubility is expressed as:
         1. the mass of solute per volume - (g/L)
         2. the mass of solute per mas of solute - (g/g)
         3. the mols of solute per volume - (mol/L)



1. **Saturation Terms**
   1. Saturated - A solution that contains the maximum possible amount of solute
   2. Unsaturated - If a solution contains less than the maximum amount of solute
   3. Supersaturated - when a solution is prepared at a higher temperature and then allowed to cool, there is more solute then its saturation point
2. Solubility of Gases
   1. Gases have the opposite relationship between temp and solubility
   2. As temperature increases, the solubility decreases
   3. Example: Which goes flat first: a cold pop or a warm pop.
3. Concentration - a measure of solute-to-solvent ratio
   1. concentrated - "lots of solute"
   2. dilute - "not much solute", "watery"
   3. Concentration Units
      1. mass % = mass of solute/mass of solvent
      2. parts per million (ppm) - commonly used for minerals or contaminants in water supplies
      3. molarity (M) = moles of solute/liters of solution
         1. Ex: what I use, what is commonly used in class
   4. Example: How many mols of solute are required to make 1.35 L of 2.50 M solution?
      1. Example: Find the molarity of 58.6g of barium hydroxide {Ba(OH)2} that are in 5.65 L of solution.
4. Dilutions of Solutions - acids and bases are purchased in concentrated form and must be diluted to desired concentrations.
   1. Dilution Equation: McVc = MDVD
      1. M = molarity C = Concentrated V = Volume D = Diluted
   2. Example: Concentrated H3PO4 is 14.8 M. What volume of concentrate is required to make 25.0 L of 0.5 M H3PO4?