

Chemistry (Math Notes)

Module #10

TERMS

A solute is the substance that is dissolved.

A solvent is the substance that the solute is dissolved in.

A solution is the solute + the solvent.

Solubility refers to the maximum amount of solute that can be dissolved in a given amount of solvent.

A saturated solution is a solution in which the maximum amount of solute has been dissolved.

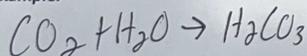
Precipitation is the process by which a solid solute leaves a solution and turns back into its solid phase.

Exothermic is a process that releases heat.

Endothermic is a process that absorbs heat.

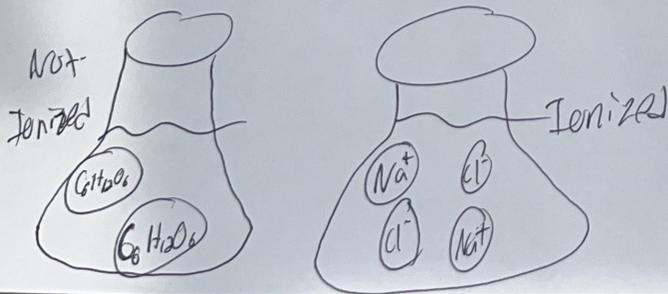
Water is a common solvent because more substances can be dissolved in it than in solids, even gases can be dissolved in water.

Example:



Why? Because all ionic compounds dissolve by splitting into ions. Covalent compounds don't break up into ions, but the water molecules surround these compounds.

Example:



RULES OF SOLUBILITY

1. The solubility of an solute depends both on the identity of the solute and the identity of the solvent. (Be sure to understand and remember the facts in Table 11.1 - p.358)
2. For solid solutes, solubility increases with increasing temperature. (Direct relationship)
3. For liquid solutes, solubility is not affected by temperature. (No relationship)
4. For gas solutes, solubility decreases with increasing temperature. (Inverse relationship)
5. Increasing pressure increases the solubility of gases. (Direct relationship)
6. Pressure does not affect the solubility of solids and liquids (No relationship)

FORMULAS:

$$\text{Molarity (M)} = \frac{\text{moles of solute}}{\text{L of solution}}$$

$$\text{Molality (m)} = \frac{\text{moles of solute}}{\text{mass of solvent (kg)}}$$

When a solute is dissolved in a solvent, the resulting change in the freezing temperature is determined by the following formula:

$$\Delta T_f = -iK_f m$$

Define Freezing Point Depression: Each solvent has its own unique value in freezing temps

Define Boiling Point Elevation: Each solvent has its own unique value in boiling temps

When a solute is dissolved in a solvent, the resulting change in the boiling point temperature is determined by the following formula:

$$\Delta T_{bp} = iK_{bp} m$$