Unit 4: Solutions, Dilutions, and Solubility

Section 1: Mass and the Mole

Molecular Weight

- **Molecular Weight** is the overall mass of **one** molecule
  - Calculated by **adding together** the **masses** of **each element** in the compound (in the correct amounts)
  - Measured in "**amu**" - *atomic mass unit*
  - **Ex: $CaCl_2$**
    - **Ca** - 40.08 x 1 = 40.08 amu
    - **Cl** - 35.45 x 2 = 70.90 amu
    - Molecular Weight of Calcium chloride: 110.98 amu
  - **Ex: $Mg_3(PO_4)_2$**
    - **Mg** - 24.31 x 3 = 72.93 amu
    - **P** - 30.97 x 2 = 61.94 amu
    - **O** - 16.00 x 8 = 128.0 amu
    - Molecular Weight of Magnesium phosphate: 262.87 amu
  - **Practice in your notes:**
    - H_2O
    - $SrCl_2$
    - $Al_2(CO_3)_3$

The Mole and Molar Mass

- A **Mole** = a **SET** of particles - 6.022×10^{23} particles
- We know that the **molecular weight** (in amu) of a substance is the **mass** of **1 molecule** of that **substance**.
- Similarly, the **molar mass** (in **grams**) of a substance is the **mass** of **1 *MOLE*** of **molecules** of that **substance**.
- **So…**
  - If the **Molecular Weight** of $CaCl_2$ is 110.98 **amu**
  - The **Molar Mass** of $CaCl_2$ is 110.98 **g**
  - Yes…. The molecular weight and the molar mass are **always the same**… **except for the unit**!
  - YAY! NO NEED TO PRACTICE THIS ONE! :-)