Factor Label/Dimensional Analysis

**Purpose**: In preparation for working with chemical reactions, we need to to think about how chemists count the number of atoms, molecules or formula units in a substance. This will be done by establish some important vocabulary and mathematical methods for calculating the count, mass and volume of that substance.

# Conversion factors

1. If you are traveling at 75 mi/hr, how many miles have you travelled after 4.3 hours?

**What information do you need to solve these problems?**

1. Convert 1 year to seconds
2. Convert 52.0 inches to cm
3. How many tires are in a parking lot with 256 cars (assuming 4 tires per car)?

# Problem solving with conversion factors

# Calculating the mass of one atom, molecule or formula unit

|  |  |  |
| --- | --- | --- |
| Representative particle | Definition | Mass units |
| Atom |  |  |
| Ion |  |  |
| Formula unit |  |  |
| Molecule |  |  |

**Representative Particle Mass**

1. Find the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mass of Cu.
2. What is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mass of Cl2?
3. What is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mass of silicon?
4. Find the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mass of copper (II) nitrate
5. What is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mass of C6H12O6?

**Molar Mass**

1. What is the mass of one mole of copper (II) nitrate?
2. What is the molar mass of C6H12O6?
3. How many moles of water are present in 42 g H2O?

**Converting between types of measurement**

1. How many atoms are present in one mole of helium, He?
2. How many molecules are present in 4.5 moles of CO2?
3. If you have 1.43 x 1024 grains of sand, how many moles of sand do you have?
4. If you weight 5.8x1019 formula units of potassium chloride, KCl, on a scale, what do you expect the reading on the scale to be? (i.e. How many grams of KCl are present?).