

# Formula (molar) Mass

- The mass of one mole of a compound
- Equal to the sum of the masses of every element that makes up the compound

example: Find the molar mass of  $\text{CaCl}_2$ .

Ca: 40.08 g

Cl:  $2 \times (35.45 \text{ g})$

110.98 g/mol  $\text{CaCl}_2$

# Percent Composition

- Use atomic mass to determine the percent of each element in a compound

$$\% \text{ by mass} = \frac{\text{Mass element}}{\text{Mass compound}} \times 100$$

Example:

Determine percent composition of water, H<sub>2</sub>O

$$\text{hydrogen: } \frac{2.02 \text{ amu}}{18.02 \text{ amu}} \times 100 = 11.2\%$$

$$\text{oxygen: } \frac{16.00 \text{ amu}}{18.02 \text{ amu}} \times 100 = 88.8\%$$

# Empirical Formula

- Empirical Formula: the *simplest* whole number ratio of the elements in a compound

## Calculation of Empirical Formulas

1. Find the moles of each element - Convert the mass to moles by dividing by the appropriate molar mass
2. To find the smallest *whole* number ratio, divide each value by the smallest number of moles in the existing ratio

## Molecular Formula

- Molecular formula : the *actual* formula of a molecular compound
- To determine the molecular formula of a compound, you must know the compound's formula mass.
  - ◆  $\frac{\text{experimental formula mass}}{\text{empirical formula mass}} = x$