Percent Composition

* When the chemical formula of a compound is known, it's percentage composition may be calculated by using the atomic masses of it's elements and the molecular mass (or formula mass) of the compound.

Law of Constant Composition

* Law of constant composition: A compound contains elements in certain fixed proportions (or ratios) regardless of how the compound is prepared or found in nature.

Steps to Calculating Percent Composition

* Step 1: Calculate Total Mass of Each Element in the Compound.
* Step 2: Calculate Molecular Mass of the Compound
* Step 3: Calculate Percentage Composition by Mass of Compound

Example

* Calculate the percentage composition by mass of alanine, $C_3H_7NO_2$.

Step 1: Calculate Total Mass of Each Element

* $C_3H_7NO_2$
    * C= 3 x 12.0 u = 36.0 u
    * H = 7 x 1.0 u = 7 u
    * N= 1 x 14.0 u = 14 u
    * O = 2 x 16.0 u = 32.0 u

Step 2: Calculate Molar Mass or Compound

* Total = 89.0 u

Step 3: Calculate Percentage Composition by Mass

* %C = (mass of C in 1 molecule / mass of 1 molecule) x 100
    * =(36 u/89 u) x 100 = 40.4 %
* %H = mass of H in 1 molecule / mass of 1 molecule x 100
    * =(7 u/89 u) x 100 = 7.9 %
* %N = mass of N in 1 molecule / mass of 1 molecule x 100
    * =(14 u/89 u) x 100 = 15.7 %
* %O = mass of O in 1 molecule / mass of 1 molecule x 100
    * =(32 u/89 u) x 100 = 36.0 %