Noteset 5A (Part 3) - In Class Noteset
The Mol and Avagadro's Number

Defining the mol

Microchemistry (small)

Individual Particles
(atoms, ions, compounds, molecules)

Mass atom

In grams: ($1\,p^+$ or $1\,n^0 = 1.67\times10^{-24}$ g)

In atomic mass units: ($1\,p^+$ or $1\,n^0 = 1$ amu)

Macrochemistry (large)

Groups of Particles
(count, mass)

Groups of Atoms

In atom count: (6.022×10^{23} atoms)

In mol: (1 mol atoms)

Counting Atoms

[Avagadro's # = 6.022×10^{23} atoms/mol]

Definition of the mol: 1 mol $^{12}_{6}C$ = # atoms in 12.00 g $^{12}_{6}C$

Calculating Avagadro's Number [N_A]

$^{12}_{6}C$ (12 amu)

$12\text{ amu} \cdot 1.67\times10^{-24}\text{ g/amu}$

$= 2.004\times10^{-23}$ g $^{12}_{6}C$

[Mass of 1 $^{12}_{6}C$]

12.00 g $^{12}_{6}C$ (for N_A)

$$\frac{12.00\text{ g/mol}}{2.004\times10^{-24}\text{ g/atom}} = 5.99\times10^{23}\left(\frac{1/\text{mol}}{1/\text{atom}}\right)$$

$= 5.99\times10^{23}$ atoms/mol