Prerequisites: Concentration: Student Review Notes

Molarity, M

$$M = \frac{\text{moles solute}}{\text{liter of solution}}$$

Again, don't forget this, you've got to keep track of how adding solute changes the total volume of the solution.

Molarity is almost always used for concentration in chemistry problems.

square brackets means molar concentration, i.e. [A] is the molarity of A.

Be able to relate moles and volume MV = n. **(molarity x volume = moles)**

Mole fraction, X_A

$$X_A = \frac{\text{moles A}}{\text{total moles solution}}$$

Molality, m

$$m = \frac{\text{moles solute}}{\text{kilograms solvent}}$$

Here it doesn't matter how much solute you add, it's always based upon the number of kilograms of solvent present.

Use molality in colligative properties problems, i.e., boiling point elev., freezing point depr., osmotic press.

Normality, N

$$N = (\text{molarity})\ (\text{No. of equivalents})$$

The number of equivalents is just the number of protons an acid/base can donate or accept. Like, HCl has 1 equivalent, H_2SO_4 has 2 equivalents, H_3PO_4 has 3 equivalents, NaOH has 1 equivalent, $Mg(OH)_2$ has 2 equivalents. Get it?

For strong acid--strong base titration problems you can use normality.

$$(NV)_{acid} = (NV)_{base} \text{ at the equivalence point}$$

Mass % Solute	**ppm**	**ppb**
$\frac{\text{mass solute}}{\text{total mass solution}}$ →	mass % x 10^4 →	mass % x 10^7

Remember that when you add something to a solution you change the total mass of the solution. You have to keep track of what you add, not just the amount of solvent that you start with.