NOTES #13 - Aq Chem I - Concentration Of Solution - AP Chemistry

I. Concentration of solution is....

a. The amount of _____ present in a given quantity of solution or solvent.

b. It is most commonly expressed in MOLARITY (M).

II. MOLARITY (M) - the # of moles in _____ of solution.

M =

*** Ex1: 1.46 M $C_6H_{12}O_6$ =

a. Molarity, like density, is an _____ property (does NOT depend on how much solute is present)

***Ex2: 1.46 moles $C_6H_{12}O_6$ in 1L..... M =

OR

0.730 moles $C_6H_{12}O_6$ in 0.5 L M =

b. Molarity takes into account amount of solute ORIGINALLY dissolved in solution. Molarity does NOT actually reflect the true composition of solution.....

***Ex3: 1 M solution of KCl.....*What would you ACTUALLY see in solution?*

[KCl] = $[K^+]$ = $[Cl^-]$ =

***Ex4: 1 M solution of $Ba(NO_3)_2$.....*What would you ACTUALLY see in solution?*

$[Ba(NO_3)_2]$ = $[Ba^{2+}]$ = $[NO_3^-]$ =

c. What do you DO with Molarity?

1. **Making STOCK SOLUTIONS:** Determine the # of moles (or grams) of solute needed to make a desired volume of a soln of known molarity (stock soln).

***Ex5: You want to make 500mL of a 1.5 M soln of NaCl. How many moles and grams of NaCl do you need?

*** How would you literally MAKE such a soln?

2. **Making DILUTIONS**: Add a certain amount of _____ to a known molarity of solution to obtain a _____ molarity

THE KEY: Moles of solute *after* dilution EQUAL the Moles of solute *before* dilution. After all, you are just adding water, not removing or adding any solute.

***Ex6: How would you prepare 500 mL of a 0.40 M solution of NaCl from this 1.5 M solution of NaCl we just made?

1. Determine the MOLES of solute (NaCl) you need.

2. What VOLUME of 1.5 M solution contains only 0.20 moles of NaCl?

3. What process would you use?

*** Notice that the MOLES OF SOLUTE are not changed by diluting. Another way of looking at it.....

$$M_1V_1 = M_2V_2$$

***Ex7: How would you prepare 200mL of a 0.866 M NaOH solution, starting with a 5.07 M stock solution?

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METHODS OF STUDY IN SOLUTIONS STOICHIOMETRY

I. General Information:

- Solution stoichiometry = QUANTITATIVE approach to rxns in aqueous solution
- Like we've seen before, it's all about balanced equations, moles, mole ratios, limiting reactants, etc...
- We're going to focus on THREE Quantitative Analysis Techniques:
  1. GRAVIMETRIC ANALYSIS
  2. ACID/BASE TITRATION
  3. REDOX TITRATION

** *ALL these techniques allow us to determine the concentration of s substance in a soln.*