Name: _____ Period: ____ Date: _____

SOLUTIONS NOTES
HONORS CHEMISTRY

Directions: This packet will serve as your notes for this chapter. Follow along with the PowerPoint presentation and fill in the missing information. Important terms / ideas are in all capitals and bolded!

- **SOLUTION**:

  -**SOLUTE**:

  -**SOLVENT**:

  -**INSOLUBLE**:

  -**SOLUBLE**:

  -What factors influence solubility?:

- **AQUEOUS SOLUTION**:

  -_____ and _____ molecules dissolved best… WHY?

  -**MISCIBLE**:

  -**IMMISCIBLE**:

  -Two Types:

    - **ELECTROLYTES**:
    - **NONELECTROLYTES**:

  -DISSOCIATION:

  -**SOLVATION**:

- Classification of Solutions

  1) **SATURATED**: contains _____ quantity of _____ that dissolves at that temperature

  2) **UNSATURATED**: contains _____than the maximum amount of _____ that can be dissolved

  3) **SUPERSATURATED**: contain _____ than is possible to be dissolved by warming or evaporating (_____ and _____)

- **COLLIGATIVE PROPERTIES**:

  -When _____ solute to a solvent the following physical properties change:

  1) **FREEZING-POINT DEPRESSION**: temperature at which the solution _____ will be _____ than that of just the pure _____ because the _____ gets in the way!

     - Examples:

  2) **BOILING-POINT ELEVATION**: temperature at which the solution _____ will be _____ than that of just the pure _____ because the _____ gets in the way!

     - Examples:

  3) **VAPOR PRESSURE LOWERING**: VP of the solution will be _____ than that of just the pure **VOLATILE** (_____) solvent because the **NONVOLATILE** (_____) solute gets in the way!

     - Examples:

- **Solubility Rules**

  -Knowing whether substances are soluble or insoluble tells us if a precipitate forms…

  1) Salts of ammonium and alkali metals are always _____

  2) All chlorides, bromides, and iodides are _____ except when combined with Ag, Hg^{2+}, and Pb which are _____

  3) Chlorates, acetates, and nitrates are _____

  4) Sulfates are _____ except with Ca, Sr, Ba, Hg, Pb, and Ag which are _____

  5) Phosphates, carbonates, and sulfides are _____ except ammonium and alkali metal compounds are _____

  6) All metallic oxides are _____ except ammonium and alkali metal compounds are _____

  7) All hydroxides are _____ except ammonium, alkali metal compounds, and group 2A from Ca down are _____

     - Ex: $Mg(NO_3)_2$ (___) + 2 NaOH (___) ➔ $Mg(OH)_2$ (___) + 2 $NaNO_3$ (___)

  -Practice: Classify each of the following as soluble or insoluble.

- **NET IONIC EQUATIONS**:

  -**SPECTATOR IONS**:

  -Steps for Writing Net Ionic Equations:

  1) Write the _____ equation

  2) Rewrite the equation showing the _____ that form in solution for each _____ compound

  3) Cancel _____ ions (ALL cancel = _____!)

  4) Rewrite the final equation

     - Example:

  -Practice: Predict the products (with solubility indicated), balance, and write the net ionic equation for each.

     - ___K_2CO_3 (aq) + _____ (aq) ➔

     - ___$Ba(NO_3)_2$ (aq) + _____ (aq) ➔

     - ___Na_2S (aq) + _____(aq) ➔

- Concentration of Solutions

  -Reactions take place when two _____ are _____

  -In order to do stoichiometric calculations, the **CONCENTRATION** (_____ _____ must be known

  -A few ways to expression concentration…

- **MOLARITY (M)**:

  M =

  -Example: Calculate the molarity of a solution when _____ g of NaOH is dissolved in enough water to make 1.5 liters of solution.

  -Practice:

  - How many liters of _____ M solution can be made using 125 grams of LiBr?

  - What mass of oxalic acid, $H_2C_2O_4$, is needed to make _____ mL of a 0.0500 M solution?

  - What is the concentration of a solution that has a volume of _____ L and contains 660 g of $Ca_3(PO_4)_2$?

- **MOLALITY (m)**:

  m =

  -Example: In lab, _____ mole of $C_2H_6O_2$ is dissolved in 250.0 g of water. Calculate the molality.

  -Practice:

  - How many grams of _____ are needed to make a 7.9 m solution?

- How many grams of H_2O are required to dissolve ____ g KNO_3 to make a 2.25 m solution?

- **MASS %**

  % by Mass =

  -Example: What is the percent concentration of _____ g of NaCl dissolved in 350.0 g of water?

- **PARTS PER MILLION (ppm)**

  ppm =

  -Example: A _____ g sample of groundwater was found to contain 5.4×10^{-6} g of Zn^{2+}. What is the concentration of Zn^{2+} in parts per million?

- **PARTS PER BILLION (ppb)**

  ppb =

  -Example: A chemical analysis shows that a water sample contains ____ mg of Cd^{2+} in 4.00×10^4 g of water. What is the concentration in parts per billion?

- Preparing Solutions

  -To make a certain concentration of solution, the _____ should be weighed out first and then placed in a _____ flask

  -Dissolve the _____ in SOME of the _____ then add the remaining solvent

  -To save space, time, and money _____ / _____ solutions are often purchased

-Water is then added to _____ the stock solutions to the desired concentration

-Moles of solute _____ = Moles of solute _____ (no solute is added during a dilution)

-How much _____ needs to be added?...

- **DILUTIONS**

  Equation:

-Example: What volume of ____ M H_2SO_4 must be used to prepare 1.5 L of 0.10 M solution?

-Practice: How many mL of stock solution should be used to prepare _____mL of 0.750 M NaBr solution using 2.00 M stock solution?

- Solution Stoichiometry

-Steps for Stoichiometry with Solution Reactions:

1) Write and balance the equation
2) Determine _____
3) Determine the _____ of each reactant and find the _____
4) Find amount of product

Depending on _____ given, some steps can be _____!!

-Examples:

- How many grams of $Ca(OH)_2$ are required to react with _____ mL of 0.40 M HCl? Show the balanced equation.

- Calculate the mass of solid formed when _____ L of 0.050 M lead (II) nitrate and 2.0 L of 0.025 M sodium sulfate are mixed.

- If 625 mL of _____ M aluminum chloride is mixed with 245 mL of _____ M sodium sulfide, how many grams of the precipitate will form AND what is the concentration of EACH ion of the excess reagent that remains in solution after the reaction?