Solutions

- Solution chemistry is very interesting to chemists as it allows us to control the rates of reactions better than if the states are solid or gaseous.

- This chapter is rife with vocabulary that is very important so we will start with a vocabulary list.

Solution Vocabulary

1.) Substance - A term to describe a pure chemical compound.

Ex. – _____

2.) Mixture – A combination of different kinds of matter that retain their own properties.

Ex. – _____

3.) Homogeneous mixture – Mixtures in which the components are uniformly distributed.

Ex. – _____

4.) Heterogeneous mixture – Mixtures in which the components are segregated when at rest.

Ex. - _____

5.) **Solution** - A combination of two or more substances that exist as a homogeneous mixture.

Ex. - _____

6.) **Solvent** - The liquid portion of a solution which is present in greater quantity.

Ex. - _____

7.) **Solute** - The substance which is dissolved in the solvent. It is usually present in lesser amount. Ex. - _____

8.) **Soluble** - Possessing the ability to dissolve.

9.) **Insoluble** - **NOT** possessing the ability to dissolve.

10.) Miscible - Unlimited ability to mix in solution.

11.) Immiscible - Describes substances which are insoluble in each other.

12.) **Solubility** - A measure of the amount of solute that is able to dissolve in a given volume of solvent at a specified temperature.

Ex. – Typical units are _____

13.) Saturated solution – A solution in which the maximum quantity of solute has been dissolved at a given temperature.

14.) Concentrated – A relatively large amount of solute dissolved in a given volume of solution.

Ex. - _____

15.) Dilute - A relatively small amount of solute dissolved in a given volume of solution.

Ex. - _____

16.) Precipitate (ppt)- An insoluble product (ex. A solid product which will cause cloudiness or may settle to the bottom of the container) which results from a chemical reaction between two solutions. Ex. - _____

17.) Filtrate - When a heterogeneous solution is poured onto filter paper, the solid precipitate which is captured on the filter paper is called the filtrate.

18.) Dissociation – the breaking apart of ionic compound into the subsequent ions that composed the compound.

- In solution chemistry we need to remember that (s) means solid, (l) means liquid, (g) means gas, (aq) means aqueous and that [ ] mean "the concentration of" whatever is inside of the brackets.

- In chemistry there are three types forms for writing chemical reactions. Up to this point you are familiar with the first only.

1.) Molecular reactions –

Ex. –

2.) Total ionic reactions (or overall reactions) –

Ex. –

3.) Net ionic reactions –

Ex. –

- Last section (stoichiometry) looked at calculations involving molarity of solutions. We are going to extend your knowledge to be able to calculate concentrations of ions in solutions.

Ex. – What is the molar concentration of the chloride ions in $0.25\ M$ $AlCl_{3\ (aq)}$?

Answer –

Ex. 2 - What is the concentration of each type of ion in a solution made by mixing $50.0\ mL$ of $0.240\ M$ $AlBr_3$ and $25.0\ mL$ of $0.300\ M$ $CaBr_2$?

Answer –

Example Problems

1.) Enough water is added to $2.62\ g$ of sodium dichromate, $Na_2Cr_2O_7$ to make $1.00\ L$ of solution.

a.) How many moles of $Na_2Cr_2O_7$ are in this solution?

b.) What is the concentration of this solution?

c.) Write a reaction representing the dissociation of $Na_2Cr_2O_7$.

2.) $100.\ mL$ of the solution in #1 above is poured into a beaker.

a.) What is the concentration of this $100.\ mL$ sample?

b.) How many moles of $Na_2Cr_2O_7$ are in this $100.\ mL$ sample?

3.) $400.0\ mL$ of water is then added to the $100.\ mL$ sample from #2 above.

a.) How many moles of $Na_2Cr_2O_7$ are in this sample?

b.) What is the concentration of this sample?

c.) How many moles of Na^+ are in this sample?