Solutions

Solutions: Basic Definitions

- _____ – substance that is being dissolved
- _____– substance that dissolves the solute
- _____– a mixture of substances that has a uniform composition; a homogeneous mixture

Solutions: Basic Definitions

- _____– when a substance will dissolve in another substance (salt & water)
- _____– when a substance will not dissolve in another substance (sand & water)

Solutions: Basic Definitions

- _____– when two liquids are soluble in each other (alcohol & water)
- _____– when two liquids are not soluble in each other (oil & water)
- _____– dissolved in water

Solutions: Basic Definitions

- **_____ solution -** If the amount of solute dissolved is less than the maximum that could be dissolved
- **_____ solution** - solution which holds the maximum amount of solute per amount of the solution under the given conditions
- **_____ solution** - solutions that contain more solute than the usual maximum amount and are unstable.

Increasing the Rate of Solution

1. Agitation
2. Increasing Temperature
3. Increasing Surface Area

Solubility of a gas

- **Two main factors that affect the solubility of a gas in a liquid**

1. _____

2. _____

Henry's Law

- The solubility of a gas is directly proportional to the pressure
- $\frac{S_1}{P_1} = \frac{S_2}{P_2}$

S = solubility (g/L)

P = pressure

Example

- If 0.85 g of a gas at 4.0 atm of pressure dissolves in 1.0 L of water at 25°C, how much will dissolve in 1.0 L of water at 1.0 atm of pressure at the same temperature?

Another Example

- The solubility of a gas is 2.0 g/L at 50.0 kPa. How much gas will dissolve in 1.5 L at 10.0 kPa?

% Composition of Hydrated Salts

- Barium Chloride is found as a hydrated salt, $BaCl_2 \cdot xH_2O$. A student carefully heats 2.50 g of the salt to a constant mass of 2.13 g. Find x.

Molarity

Molarity = moles of solute/liter of solution

M = mol/L

Molarity Examples

- Calculate the molarity of a solution made by dissolving 23.4 g of sodium sulfate in 125 ml of solution

Molarity Examples

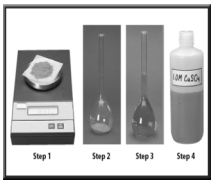
- Calculate the molarity of a solution made by dissolving 5.00 g of $C_6H_{12}O_6$ in enough water to make 100.0 ml of solution

Molarity Examples

- How many grams of Na_2SO_4 are required to make 0.350 L of a 0.500 M solution of Na_2SO_4?

Making Solutions

- Assuming you're making an aqueous solution, you need to know only three things when working quantitatively:
  1. the concentration
  2. the amount of solute
  3. the total volume of solution needed.



Preparing 1 L of an NaCl Solution

- How would you prepare 1.0 L of a 0.15*M* sodium chloride solution?

Dilution Equation

- $M_1V_1 = M_2V_2$
- M_1 = initial molarity
- V_1 = initial volume
- M_2 = final molarity
- V_2 = final volume
- The units for V_1 & V_2 do not matter as long as they are the same
- M_1 & M_2 MUST be in molarity

Dilution Problems

- Suppose we want to make 250 ml of a 0.10 M solution of CuSO4 and we have a stock solution of 1.0 M CuSO4. How would we prepare the solution?

More Dilution Problems

- How many ml of 3.0 M H_2SO_4 are required to make 450 ml of a 1.0 M solution? How would you make it?

Calculating Ion Concentrations

- 0.10 M NaOH
- What are the concentration of sodium ions and hydroxide ions?

Calculating Ion Concentrations

- 7.5×10^{-4}M $Ca(OH)_2$

  Calculate the concentrations of the ions present