**Salt Lake Community College, Chemistry Department**

**Chem 1110 Workshop 11**

**Topic: Solutions**

***Objective:***

* To be able to understand the solution process
* Ions in solution- Electrolytes
* To be able to express concentrations in appropriate units
* Calculate volume or concentration changes for dilutions of solutions
* Calculate mole and mass relationships within reactions



**Practice Problems:**

1. Determine whether the following substances dissolve in CCl4 (nonpolar)or H2O (polar)?

|  |  |
| --- | --- |
| C7H16 | **Nonpolar, CCl4** |
| Na2SO4 | **Ionic, H2O** |
| HCl | **H2O** |
| C2H5OH | **H2O** |
| I2 | **CCl4** |
| SiCl4 | **CCl4** |

1. Calculate the concentration of the following aqueous solutions in molarity (M).
2. 1.25 moles glucose in 7.40 L solution

M= number of moles of solute/ Liters of solution

 = 1.25 moles/ 7.40 L = 0.17 M

1. 4.28 g (NH4)2S in 0.300 L solution

M = number of moles of solute/ Liters of solution

Mass 🡪 moles (MM)

4.28 g (NH4)2S x 1 mol/ 68 g = 0.063 mol (NH4)2S

M= 0.063 mol (NH4)2S/ 0.300 L = 0.209 M (NH4)2S

1. Calculate the concentration of the following aqueous solution in vol %(v/v)?
2. 450 mL CH3CH2OH in 1 L solution

%v/v = volume of solute/ volume of solution x 100

1 L= 1000 mL

450 mL/ 1000 mL x 100 = 45%

0.45 L/ 1 L x 100= 45%

1. How many moles of Na+ are present in 343 mL of a 1.27 M solution of Na2SO4?

**Na2SO4 🡪 2Na+ + SO42-**

M= number of moles of solute/ Liters of solution

M= 1.27 x 0.343 L= mol 🡪 0.436 mol

2 (0.436)= 0.871 mol

1. How many milliequivalents (mEq) of chloride are contain in a sample that is determined to contain 0.725 g of chloride ion?

1 Eq = 1000 mEq

1 Eq Cl- = 35.43 g

0.725 g Cl- x 1 Eq Cl-/ 35.43 g Cl- = 0.020 Eq Cl- x1000 mEq/ 1Eq = **20.46 mEq**

1. How many mL of 0.105 M (# of moles of solute/ L of solution) NaNO3 are needed for an experiment that requires 0.005 moles of NaNO3?

0.005 mol NaNO3 x 1 L of solution/ 0.105 mole NaNO3 = 0.0476 L = **47.6 mL**

1. If 10.0 mL of 12 M HCl is diluted to 600 mL, what is the new concentration of the acid?

**M1 x V1 = M2 x V2**

M2 = M1 x V1 / V2

 = 12 x 10.0 mL / 600 mL = 0.2 M

1. How many milliliters of 0.150 M BaCl2 are needed to react completely with 35.0 mL of 0.200 M Na2SO4 according to the following equation?

**BaCl2(aq) + Na2SO4(aq) 🡪 2NaCl(aq) + BaSO4(s)**

0.035 L x 0.200 mol/ L = 0.007 mol Na2SO4

**Mole to Mole Relationship**

0.007 mol Na2SO4 x 1 mol BaCl2 / 1 mol Na2SO4

0.007 mol BaCl2 x 1 L/ 0.150 mol BaCl2 = 0.047 L or 47 mL