Molarity Practice Name KEY Date _____

Molarity = moles solute/L solution $M_1V_1 = M_2V_2$ (also useful as $M_aV_a = M_bV_b$)

1. How many grams of sodium chloride are needed to make 150.0 mL of a .75 M NaCl solution?

$$\frac{150.0\text{mL}}{1} \left| \frac{.75\text{moles}}{1000\text{mL}} \right| \frac{58.44\text{g}}{1\text{mole}} = 6.6\text{g NaCl}$$

2. What is the concentration of a solution made by dissolving 45.0 g of HCl in enough water to make 1500. mL of solution?

$$\frac{45.0\text{g HCl}}{1.500\text{L}} \left| \frac{1\text{mol HCl}}{36.46\text{g HCl}} \right. = .823\text{ M}$$

3. How many liters of .50 M $Mg(OH)_2$ can be made from 250.0 grams of solute?

$$\frac{250.0\text{g Mg(OH)}_2}{1} \left| \frac{1\text{mole}}{58.32\text{g}} \right| \frac{1\text{ L}}{.50\text{ mol}} = 8.6\text{ L}$$

4. How would you prepare 250.0 mL of 0.25 M HCl from a 12.0 M stock solution?

$M_1V_1 = M_2V_2$

$(12.0)(V_1) = (.25)(250.0)$

$V_1 = 5.2\text{ mL}$

Add 5.2 mL of Stock soln to 244.8 mL of H_2O.

2.00×10^2

* 5. If 300. mL of a 2.5 M $AlCl_3$ solution are mixed with 200. mL of a 3.5 M NaCl solution, what will be the concentration of all ions in the solution?

$$\frac{300.\text{mL}}{1} \left| \frac{2.5\text{mol AlCl}_3}{1000\text{mL}} \right| \frac{1\text{mol Al}^{3+}}{1\text{mol AlCl}_3} = .75\text{mol Al}^{3+}$$

$$\frac{200.\text{mL}}{1} \left| \frac{3.5\text{mol NaCl}}{1000\text{mL}} \right| \frac{1\text{mol Na}^{+}}{1\text{mol NaCl}} = .70\text{mol Na}^{+}$$

2.25mol Cl^-

$+ .70\text{mol Cl}^-$

2.95mol Cl^-

$.300 + .200 = .500\text{L}$

$[Al^{3+}] = \frac{.75}{.500} = 1.5\text{M}$ | $[Na^+] = \frac{.70}{.500} = 1.4\text{M}$ | $[Cl^-] = \frac{2.95\text{mol}}{.500\text{L}} = 5.9\text{M}$

6. Write a balanced chemical equation for the dissociation of each of these:

a. $Ag_2SO_{4(s)} \longrightarrow 2Ag^+_{(aq)} + SO_4^{2-}{}_{(aq)}$

b. $Ni(OH)_{2(s)} \longrightarrow Ni^{2+}_{(aq)} + 2OH^-_{(aq)}$

7. How many grams of ~~sucrose~~ glucose sugar should be added to 300.0 mL of a .50 M solution in order to increase the concentration to 1.2 M? (~~sucrose~~ glucose is $C_6H_{12}O_6$) → MM = 180.16 g

$$\frac{300.0\,mL}{1}\left|\frac{1.2\,mol}{1000\,mL}\right|\frac{180.16\,g}{1\,mol} = 65\,g \text{ in } 1.2\,M$$

$$\frac{300.0\,mL}{1}\left|\frac{.50\,mol}{1000\,mL}\right|\frac{180.16\,g}{1\,mol} = \frac{27\,g \text{ in } .50\,M}{38\,g \text{ needed}}$$

Net Ionic Equations – what really happens in the beaker when two solutions are mixed!

Ex. Sodium chloride solution and silver nitrate solution

soluble soluble

$Ag^+_{(aq)} + Cl^-_{(aq)} \rightarrow AgCl_{(s)}$

Ex. Potassium carbonate and lead (II) nitrate

ppt soluble

$Pb^{2+}_{(aq)} + CO_3^{2-}{}_{(aq)} \longrightarrow PbCO_{3(s)}$