

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?

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

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?

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

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

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

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 .

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?

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

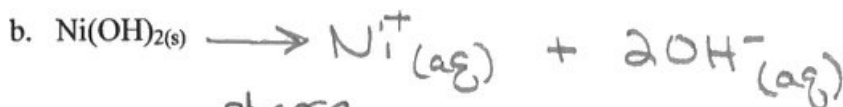
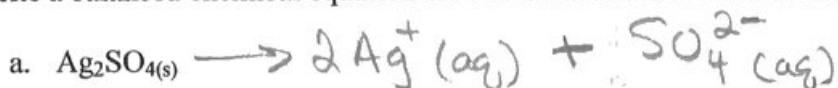
$$\frac{200. \text{ mL} \cdot 3.5 \text{ mol NaCl}}{1000 \text{ mL}} \cdot \frac{1 \text{ mol Na}^+}{1 \text{ mol NaCl}} = .70 \text{ mol Na}^+$$

$$\begin{array}{r} 2.25 \text{ mol Cl}^- \\ + .70 \text{ mol Cl}^- \\ \hline 2.95 \text{ mol Cl}^- \end{array}$$

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

$$\begin{array}{r} 300 \\ + 200 \\ \hline 500 \text{ L} \end{array}$$

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



7. How many grams of ^{glucose} ~~sucrose~~ 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 $\text{C}_6\text{H}_{12}\text{O}_6$)

→ MM = 180.16 g

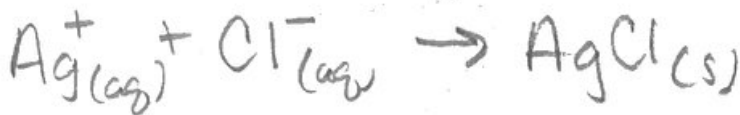
$$\frac{300.0\text{mL} \mid 1.2\text{mol} \mid 180.16\text{g}}{1 \mid 1000\text{mL} \mid 1\text{mol}} = 65\text{g in } 1.2\text{M}$$

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

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

Ex. Sodium chloride solution and silver nitrate solution

soluble ^{PPT}



Ex. Potassium carbonate and lead (II) nitrate

PPT soluble

