Solutions – Molarity –Stoichiometry Name_____

1. What is the molarity of a 225 mL aqueous solution that contains 5.00 g of KOH?

$$\frac{5\text{ g KOH}}{56.11\text{ g}} \Big| \frac{1\text{ mol}}{.225\text{ L}} = .396\text{ M}$$

2. How many grams of KCl do you need to make 250. mL of 0.125 M $KCl_{(aq)}$?

$$\frac{.25\text{ L}}{\text{L}} \Big| \frac{.125\text{ mol}}{\text{L}} \Big| \frac{74.55\text{ g}}{\text{mol}} = 2.33\text{ g}$$

3. What is the molarity of a 125 mL aqueous solution that contains 10.0 g of $CaCl_2$?

$$\frac{10\text{ g } CaCl_2}{111\text{ g}} \Big| \frac{1\text{ mol}}{.125\text{ L}} = .721\text{ M}$$

4. What is the molarity of Na^+ ions in 25.0 mL of 3.0 M $Na_3P_{(aq)}$?

$$\frac{3.0\text{ mol } Na_3P}{\text{L}} \Big| \frac{3\text{ Na}^+}{1\ Na_3P} = 9.0\text{ M}$$

5. 3.5 L of 2.0 M NaBr(aq) is added to 1.0 L of 1.0 M $CaBr_2$(aq). Assuming that the final volume is 4.5 L, what is the molarity of the Br^- ions in the final solution?

$$\frac{3.5\text{ L}}{1\text{ L}} \Big| \frac{2\text{ mol NaBr}}{1\text{ NaBr}} \Big| \frac{1\text{ Br}^-}{1\text{ NaBr}} = 7\text{ mol Br}^-$$

$$\frac{1.0\text{ L}}{\text{L}} \Big| \frac{1\text{ mol } CaBr_2}{1\ CaBr_2} \Big| \frac{2\text{ Br}^-}{1\ CaBr_2} = 2\text{ mol Br}^-$$

$$\frac{9\text{ mol Br}^-}{4.5\text{ L}} = 2.0\text{ M Br}^-$$

6. What volume of 16.0 M HNO_3(aq) is needed to make 225 mL of 1.00 M HNO_3(aq)?

$$(16\text{ M})V_c = (1\text{ M})(225\text{ mL})$$

$$V_c = 14.1\text{ mL}$$

7. What volume of 12.0 M HCl(aq) is needed to produce 750 mL of 3.0 M HCl(aq)?

$$(12\text{ M})V_c = (3\text{ M})(750\text{ mL})$$

$$V_c = 188 : 190\text{ mL}$$

8. For the rxn: $FeCl_{2(aq)} + 2\ NaOH_{(aq)} \rightarrow Fe(OH)_{2(s)} + 2\ NaCl_{(aq)}$ How many grams of $Fe(OH)_{2(s)}$ can be produced from 125 mL of 3.00 M $NaOH_{(aq)}$?

$$\frac{.125\text{ mL}}{\text{L}} \Big| \frac{3\text{ mol NaOH}}{\text{L}} \Big| \frac{1\ Fe(OH)_2}{2\ NaOH} \Big| \frac{89.87\text{ g } Fe(OH)_2}{1\text{ mol}} = 16.9 : 16.8\text{ g}$$

9. For the rxn: $FeCl_2(aq) + Na_2CO_3(aq) \rightarrow 2\ NaCl(aq) + FeCO_3(s)$
What mass of precipitate can form from 125 mL of 3.5 M $FeCl_2$(aq)?

$$\frac{.125\text{ L}}{\text{L}} \Big| \frac{3.5\text{ mol } FeCl_2}{1\ FeCl_2} \Big| \frac{1\ FeCO_3}{1\ FeCl_2} \Big| \frac{116\text{ g } FeCO_3}{\text{mol}} = 50.6$$

$$= 51\text{ g}$$