Name _____ Period _____

Roadmap Problems #3
Reactions in Solution

Perform the following conversions. Show all of your work. You must use dimensional analysis. Using units and significant figures count!

1. One of the reactions that makes photography possible is:

$$\_\_\ AgNO_3\ (aq) + \_\_\ NaCl(aq) \rightarrow \_\_\ AgCl(s) + \_\_\ NaNO_3\ (aq)$$

a. What mass of AgCl can be made by reacting 50.0 mL of 0.025 M $AgNO_3$?

b. What mass of AgCl can be made by reacting 100.0 mL of 0.025 M NaCl?

c. Who is the limiting reactant?

d. What mass of excess reactant remains after the reaction?

e. What is the percent yield of AgCl if 0.160 g are formed?

2. A very common reaction in freshman labs to make a precipitate is:

$$\_\_Pb(NO_3)_2(aq) + \_\_HCl(aq) \rightarrow \_\_\ PbCl_2(s) + \_\_HNO_3(aq)$$

a. What mass of $PbCl_2$ can be made by reacting 100.0 mL of 0.10 M $Pb(NO_3)_2$?

b. What mass of $PbCl_2$ can be made by reacting 100.0 mL of 0.10 M HCl?

c. Who is the limiting reactant?

d. If 1.05 g of $PbCl_2$ is formed what is the % yield of $PbCl_2$?

e. How much of the limiting reactant is left over?

3. Barium sulfate is used by doctors to test for the presence of ulcers since it is highly insoluble. Patients drink it even though it is higly toxic since none of it actually dissolves and gets into your blood stream. Once a patient drinks it, a radiologist x-rays the patient while it travels through the digestive system. It can be produced by the reaction:

$$\_\_BaCl_2(aq) + \_\_Na_2SO_4(aq) \rightarrow \_\_\ BaSO_4(s) + \_\_\ NaCl\ (aq)$$

a. What mass of $BaSO_4$ can be made by reacting 75.0 mL of 0.50 M $BaCl_2$?

b. What mass of $BaSO_4$ can be made by reacting 25.0 mL of 0.50 M Na_2SO_4 ?

c. Who is the limiting reactant?

d. What mass of excess reactant remains after the reaction?

e. What is the percent yield if 2.49 g of $BaSO_4$ are formed?

4. Iron (III) salts are very insoluble with hydroxide ions. You can actually precipitate them in the human body if it gets basic enough. One equation to represent the reaction is:

$$\_\_NaOH(aq) + \_\_Fe(NO_3)_3(aq) \rightarrow \_\_\ Fe(OH)_3(s) + \_\_\ NaNO_3(aq)$$

a. What mass of $Fe(OH)_3$ can be made by reacting 25.0 mL of 0.100 M $Fe(NO_3)_3$?

b. What mass of $Fe(OH)_3$ can be made by reacting 100.0 mL of 1.00 M NaOH?

c. Who is the limiting reactant?

d. If 0.216 g of $Fe(OH)_3$ are formed what is the % yield of $Fe(OH)_3$?

e. How much of the limiting reactant is left over?