Name: _____
Period: ___

Solution Stoichiometry

(1) A solution of lead (II) chromate is reacted with a solution of potassium nitrate.

(a) If 154 mL of 0.180 M lead (II) chromate is reacted with 205 mL of potassium nitrate, what concentration of the potassium nitrate solution is required? What would be the mass of each of the products?

(b) If 30.0 mL of 0.0560 M lead (II) chromate is reacted with 0.0400 M potassium nitrate, what volume of potassium nitrate solution is required? What would be the mass of each of the products?

(2) Sodium carbonate solution is reacted with iron (III) chloride solution.

(a) If 820 mL of 0.250 M iron (III) chloride is reacted with 0.450 M sodium carbonate, what volume of the sodium carbonate solution is required? If the reaction yields 18.4 g of iron (III) carbonate, determine the percent yield of the reaction. What mass of sodium chloride will actually be obtained?

(b) If 300 mL of 0.15 M sodium carbonate is reacted with 400 mL of iron (III) chloride, what concentration of the iron (III) chloride solution is required? If the reaction has a percent yield of 70.5%, what mass will actually be obtained for each of the products?

(3) Mercury (II) nitrate is reacted with sodium iodide.

(a) If 75 mL of 0.10 M mercury (II) nitrate is reacted with 110 mL of 0.080 M sodium iodide, which reactant is limiting and which is excess? What is the mass of each of the products?

(b) If 340 mL of 0.25 M mercury (II) nitrate is reacted with 500 mL 0.44 M sodium iodide, which reactant is limiting and which is excess? What is the mass of each of the products?

(4) 125 mL of 0.55 M silver nitrate is reacted with 85 mL of 0.25 M aluminum chloride.

(a) Which reactant is limiting and which is excess?

(b) What is the mass of each of the products?

(c) If the percent yield for the reaction is 65.4%, what mass would actually be obtained for each of the products?

(d) Write the formula equation, complete ionic equation, and net ionic equation for the reaction.

Answers:

(1) (a) 0.270 MKNO_3, 9.18 g $Pb(NO_3)_2$, 5.38 g K_2CrO_4

(b) 0.0840 L KNO_3, 0.556 g $Pb(NO_3)_2$, 0.326 g K_2CrO_4

(2) (a) 0. 683 L Na_2CO_3, 61.5%, 22.1 g NaCl

(b) 0.075 M $FeCl_3$, 3.7 g NaCl, 3.1 g $Fe_2(CO_3)_3$

(3) (a) lim: NaI ex: $Hg(NO_3)_2$, 2.0 g HgI_2, 0.75 g $NaNO_3$

(b) lim: $Hg(NO_3)_2$ ex: NaI, 39 g HgI_2, 14 g $NaNO_3$

(4) (a) lim: $AlCl_3$ ex: $AgNO_3$

(b) 9.1 g AgCl, 4.5 g $Al(NO_3)_3$

(c) 6.0 g AgCl, 2.9 g $Al(NO_3)_3$

(d) formula equation: $3AgNO_3\ (aq) + AlCl_3\ (aq) \rightarrow 3AgCl\ (s) + Al(NO_3)_3\ (aq)$

complete ionic equation: $3Ag^+\ (aq) + 3NO_3^-\ (aq) + Al^{3+}\ (aq) + 3Cl^-\ (aq) \rightarrow 3AgCl\ (s) + Al^{3+}\ (aq) + 3NO_3^-\ (aq)$

net ionic equation: $Ag^+\ (aq) + Cl^-\ (aq) \rightarrow AgCl\ (s)$