WORKSHEET 13

Chemistry 110

Name_____
(last) (first)

Due date: _____

Solve the following problems, giving complete set-ups, including all units, and using correct significant figures. Show all work

1. What mass, in grams, of iron (III) sulfide can be produced from the reaction of 1.75 L of a 0.300 M Iron (III) acetate solution with an excess of sodium sulfide? 1. _____
(Molar masses: $Fe(C_2H_3O_2)_3$ = 232.98 Na_2S = 78.05 $NaC_2H_3O_2$ = 83.03 Fe_2S_3 = 207.89)

$$2\ Fe(C_2H_3O_2)_{3(aq)} + 3\ Na_2S_{(aq)} \longrightarrow 6\ NaC_2H_3O_{2(aq)} + Fe_2S_{3(s)}$$

2. What volume, in mL, of 0.250 M silver nitrate solution is needed to react with 45.0 mL of 0.187 M potassium phosphate solution? 2. _____
(Molar masses: $AgNO_3$ = 169.87 K_3PO_4 = 212.27 Ag_3PO_4 = 418.58 KNO_3 = 101.10)

$$3\ AgNO_{3(aq)} + K_3PO_{4(aq)} \longrightarrow Ag_3PO_{4(s)} + 3\ KNO_{3(aq)}$$

3. 76.91 mL of a 0.556 M oxalic acid solution are required to react with 28.43 mL of a sodium hydroxide solution. What is the molar concentration of the sodium hydroxide solution? 3. _____
(Molar masses: $H_2C_2O_4$ = 90.04 NaOH = 40.00 H_2O = 18.02 $Na_2C_2O_4$ = 134.00)

$$H_2C_2O_{4(aq)} + 2\ NaOH_{(aq)} \longrightarrow 2\ H_2O_{(l)} + Na_2C_2O_{4(aq)}$$

4. 42.99 grams of Zn are added to a phosphoric acid solution containing 16.20 grams of H_3PO_4, and they react according to the equation: $3\ Zn_{(s)} + 2\ H_3PO_{4(aq)} \longrightarrow Zn_3(PO_4)_{2(s)} + 3H_{2(g)}$
(Molar masses: Zn = 65.39 H_3PO_4 = 98.00 $Zn_3(PO_4)_2$ = 386.11 H_2 = 2.02)

a. What is the limiting reactant? b. What is the excess reactant?

4a. _____

4b. _____

5. What mass, in grams, of lead (II) chromate can be produced from 12.00 mL of 10.0 M potassium chromate solution with 120.00 mL of 2.00 M lead(II) nitrate solution? 5. _____
(Molar masses: K_2CrO_4 = 194.19 $Pb(NO_3)_2$ = 331.21 KNO_3 = 101.10 $PbCrO_4$ = 323.19)

$$K_2CrO_4\ (aq) + Pb(NO_3)_{2(aq)} \longrightarrow 2\ KNO_{3(aq)} + PbCrO_{4(s)}$$

6. 52.3 g of silver nitrite is reacted with 61.8 grams of potassium carbonate which produces silver carbonate and potassium nitrite. (Molar masses: $AgNO_2$ = 152.87 K_2CO_3 = 138.21 Ag_2CO_3 = 275.75 KNO_2 = 85.10)

$$2\ AgNO_{2(s)} + K_2CO_{3(aq)} \longrightarrow Ag_2CO_{3(s)} + 2\ KNO_{2(aq)}$$

a. What mass, in grams, of silver carbonate is produced? 6a._____

b. How many grams of silver nitrite and potassium carbonate will remain at the end of the reaction? 6b._____ (g $AgNO_2$)

_____ (g K_2CO_3)

7. Bismuth reacts with oxygen as follows: $4\ Bi_{(s)} + 5\ O_{2(g)} \longrightarrow 2\ Bi_2O_{5(s)}$ When 75.0 g of Bi and an excess of oxygen are reacted, 75.0 g of Bi_2O_5 is produced. What is the percent yield for the reaction? (Molar masses: Bi = 208.98 O_2 = 32.00 Bi_2O_5 = 497.96) 7. _____

8. The percent yield for the following reaction is 35.6%. $2\ NO_{(g)} + O_{2(g)} \longrightarrow 2\ NO_{2(g)}$ (Molar masses: NO = 30.01 O_2 = 32.00 NO_2 = 46.01)

a. What will be the actual yield of NO_2 when 81.5 g of NO is reacted with excess O_2? 8a._____

b. How many grams of NO must be used in order to give an actual yield of 9.11 g NO_2? 8b._____