Unit #7 Practice Blackboard Insert

Do not assume any chemical reaction is balanced

1. (**2 pts.**) Given the reaction: **3** Ca + **2** $AlCl_3$ → **3** $CaCl_2$ + **2** Al

   How many moles of calcium chloride are produced when 0.975 moles of aluminum chloride are reacted with excess calcium?

   0.975 moles $AlCl_3$ x $\frac{\text{3 moles } CaCl_2}{\text{2 moles } AlCl_3}$ = 1.4625 ➔ 1.46 moles

2. (**3 pts.**) Given the reaction: SiO_2 + **4** HF → SiF_4 + **2** H_2O

   How many grams of silicon tetrafluoride are produced if 45.67 grams of silicon dioxide are reacted with excess hydrofluoric acid?

   Si: 1 x 28.09 = 28.09 **Si: 1 x 28.09 = 28.09**
   O: 2 x 16.00 = 32.00 **F: 4 x 19.00 = 76.00**
   Molar Mass = 60.09 **Molar Mass = 104.09**

   45.67 g SiO_2 x $\frac{\text{1 mole } SiO_2}{\text{60.09 g}}$ x $\frac{\text{1 moles } SiF_4}{\text{1 moles } SiO_2}$ x $\frac{\text{104.09 g}}{\text{mole } SiF_4}$ = 79.11 g

3. (**2 pts.**) The following reaction was carried out in the lab. The theoretical yield of aluminum hydroxide was calculated to be 15.77 grams. If 13.65 grams of $Al(OH)_3$ were actually obtained, what was the percent yield?

   $Al_2(SO_4)_3$ + 3 $Ca(OH)_2$ → 2 $Al(OH)_3$ + 3 $CaSO_4$

   13.65 g / 15.77 g x 100 = 86.5568 ➔ 86.56 %

4. (**3 pts.**) Given the reaction: $FeCl_3$ + **3** NH_4OH → $Fe(OH)_3$ + **3** NH_4Cl

   a. If 9.75 grams of $FeCl_3$ react with excess NH_4OH, what is the theoretical yield of NH_4Cl?

   b. If 8.953 grams of ammonium chloride were actually produced, what was the percent yield?

   Fe: 1 x 55.85 = 55.85 **N: 1 x 14.01 = 14.01**
   Cl: 3 x 35.45 =106.4 **H: 4 x 1.008 = 4.032**
   Molar Mass = 162.3 **Cl: 1 x 35.45 = 35.45**
   Molar Mass = 53.49

   9.75 g $FeCl_3$ x $\frac{\text{1 mole } FeCl_3}{\text{162.3 g}}$ x $\frac{\text{3 moles } NH_4Cl}{\text{1 mole } FeCl_3}$ x $\frac{\text{53.49 g}}{\text{mole } NH_4Cl}$ = 9.64 g

   8.95 / 9.64 x 100 = 92.9 %

Extra Credit (1 pt):

Convert name to formula or visa versa … from the list of names in unit 5