

Unit #7 Practice Blackboard Insert

Do not assume any chemical reaction is balanced

1. (2 pts.) Given the reaction: $3 \text{Ca} + 2 \text{AlCl}_3 \rightarrow 3 \text{CaCl}_2 + 2 \text{Al}$

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

$$0.975 \text{ moles AlCl}_3 \times \frac{3 \text{ moles CaCl}_2}{2 \text{ moles AlCl}_3} = 1.4625 \rightarrow 1.46 \text{ moles}$$

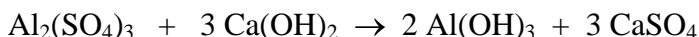
2. (3 pts.) Given the reaction: $\text{SiO}_2 + 4 \text{HF} \rightarrow \text{SiF}_4 + 2 \text{H}_2\text{O}$

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

$$\begin{array}{ll} \text{Si: } 1 \times 28.09 = 28.09 & \text{Si: } 1 \times 28.09 = 28.09 \\ \text{O: } 2 \times 16.00 = 32.00 & \text{F: } 4 \times 19.00 = 76.00 \\ \text{Molar Mass} = 60.09 & \text{Molar Mass} = 104.09 \end{array}$$

$$45.67 \text{ g SiO}_2 \times \frac{1 \text{ mole SiO}_2}{60.09 \text{ g}} \times \frac{1 \text{ moles SiF}_4}{1 \text{ moles SiO}_2} \times \frac{104.09 \text{ g}}{\text{mole SiF}_4} = 79.11 \text{ g}$$

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 $\text{Al}(\text{OH})_3$ were actually obtained, what was the percent yield?



$$13.65 \text{ g} / 15.77 \text{ g} \times 100 = 86.5568 \rightarrow 86.56 \%$$

4. (3 pts.) Given the reaction: $\text{FeCl}_3 + 3 \text{NH}_4\text{OH} \rightarrow \text{Fe}(\text{OH})_3 + 3 \text{NH}_4\text{Cl}$

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?

$$\begin{array}{ll} \text{Fe: } 1 \times 55.85 = 55.85 & \text{N: } 1 \times 14.01 = 14.01 \\ \text{Cl: } 3 \times 35.45 = 106.4 & \text{H: } 4 \times 1.008 = 4.032 \\ \text{Molar Mass} = 162.3 & \text{Cl: } 1 \times 35.45 = 35.45 \\ & \text{Molar Mass} = 53.49 \end{array}$$

$$9.75 \text{ g FeCl}_3 \times \frac{1 \text{ mole FeCl}_3}{162.3 \text{ g}} \times \frac{3 \text{ moles NH}_4\text{Cl}}{1 \text{ mole FeCl}_3} \times \frac{53.49 \text{ g}}{\text{mole NH}_4\text{Cl}} = 9.64 \text{ g}$$

$$8.95 / 9.64 \times 100 = 92.9 \%$$

Extra Credit (1 pt):

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