Chemistry Instructions

1) get out your notebook
2) Add Percent yield to your table of contents
3) add LT 7.2

Learning Target 7.2

>50% ☺

Formula for Percent Yield

$$\text{Percent yield} = \frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100\%$$

Giving the chemical reaction a grade.

Actual Yield: mass (g) of product "actually" produced while you to the Lab.

Theoretical Yield: Amount of product can be produced based on the stoichiometry

1. Chlorobenzene, C_6H_5Cl, is used in the production of chemicals such as aspirin and dyes. One way that chlorobenzene is prepared is by reacting benzene, C_6H_6, with chlorine gas according to the following BALANCED equation.

1.1 7.0 (3)

$$C_6H_6\ (l) + Cl_2\ (g) \rightarrow C_6H_5Cl\ (s) + HCl\ (g)$$

45.6 g ? g

a. What is the theoretical yield if 45.6 g of benzene react? mass–mass

$$45.6\text{ g } C_6H_6 \left| \frac{1\text{ mol } C_6H_6}{78\text{ g } C_6H_6} \right| \frac{1\text{ mol } C_6H_5Cl}{1\text{ mol } C_6H_6} \left| \frac{112.9\text{ g } C_6H_5Cl}{1\text{ mol } C_6H_5Cl} \right. = \frac{45.6(112.4)}{78}$$

$$= 65.7\text{ g } C_6H_5Cl$$

b. If the actual yield is 63.7 g of chlorobenzene, calculate the percent yield.

$$\frac{\text{Actual}}{\text{Theo}} \times 100 = \frac{63.7\text{ g}}{65.7\text{ g}} = 96.9\%\text{ Yield}$$

2. When carbon disulfide burns in the presence of oxygen, sulfur dioxide and carbon dioxide are produced according to the following equation.

mass – mass

$$CS_2\,(l) + 3\,O_2\,(g) \rightarrow CO_2\,(g) + 2\,SO_2\,(g)$$

25 g 2.5 mol ? g

a. What is the percent yield of sulfur dioxide if the burning of 25.0 g of carbon disulfide produces 40.5 g of sulfur dioxide?

$$\frac{25\text{ g } CS_2}{1} \left| \frac{1\text{ mol } CS_2}{76\text{ g } CS_2} \right| \frac{1\text{ mol } CO_2}{1\text{ mol } CS_2} \left| \frac{1\text{ mol } CO_2}{44\text{ g } CO_2} \right| = 42.1\text{ g}$$

$$\frac{40.5\text{ g}}{42.1\text{ g}} = 96\%$$

b. What is the percent yield of carbon dioxide if 2.5 mol of oxygen react and 32.4 g of carbon dioxide are produced?

mol – mass (2)

$$\frac{2.5\text{ mol } O_2}{1} \left| \frac{1\text{ mol } CO_2}{3\text{ mol } O_2} \right| \frac{44\text{ g } CO_2}{1\text{ mol } CO_2} = $$

$$\frac{32.4\text{ g}}{31.6\text{ g}} = 0.88$$

88%