CONCEPT: PERCENT YIELD

- **Percent Yield** determines how successful the scientist was in creating their desired product.
  - □ The higher the percent yield then the _____ the efficiency of a chemical reaction.
  - □ In terms of percent yield values: _____ = Excellent, _____ = Very Good, _____ = Good, & _____ = Poor

Percent Yield Formula

$$\text{Percent Yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100\%$$

- **Actual Yield**: The amount of pure product _____ created when the experiment is done in a laboratory.
  - □ The units used in the formula are based on the units of the actual yield.
  - □ No chemical reaction is 100% efficient so the actual yield is always _____ than the theoretical yield.

EXAMPLE: Consider the following balanced chemical reaction:

$$2\ C_6H_6\ (l) + 15\ O_2\ (g) \longrightarrow 12\ CO_2\ (g) + 6\ H_2O\ (l)$$

If a 2.6 g sample of C_6H_6 reacted with excess O_2 to produce 1.25 g of water, what is the percent yield of water?

STEP 1: Map out the portion of the stoichiometric chart you will use.

STEP 2: Convert the **Given** quantity into moles of **Given**.

STEP 3: Do a **Mole to Mole comparison** to convert moles of **Given** into moles of **Unknown**.

STEP 4: If necessary, convert the moles of **Unknown** into the final desired units.

STEP 5: Plug in the actual yield and theoretical yield into the formula to determine the percent yield.

CONCEPT: PERCENT YIELD

PRACTICE: What is the percent yield for a reaction in which 22.1 g Cu is isolated by reacting 45.5 g Zn with 70.1 g $CuSO_4$?

$$Zn\ (s) + CuSO_4\ (aq) \longrightarrow Cu\ (s) + ZnSO_4\ (aq)$$

PRACTICE: Ammonia, NH_3, reacts with hypochlorite ion, OCl^-, to produce hydrazine, N_2H_4. How many grams of hydrazine are produced from 115.0 g NH_3 if the reaction has a 81.5% yield?

$$2\ NH_3 + OCl^- \longrightarrow N_2H_4 + Cl^- + H_2O$$

PRACTICE: The reduction of iron (III) oxide creates the following reaction:

$$Fe_2O_3\ (s) + 3\ H_2\ (g) \longrightarrow 2\ Fe\ (s) + 3\ H_2O\ (g)$$

If the above reaction only went to 75% completion, how many moles of Fe_2O_3 were require to produce 0.850 moles of Fe?