

Key

## Percent, Actual, and Theoretical Yield

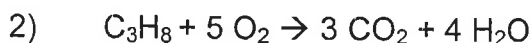


a) I began this reaction with 20 grams of lithium hydroxide. What is my theoretical yield of lithium chloride?

$$\frac{20. \text{g LiOH} \left| \begin{array}{l} 1 \text{ mol LiOH} \\ 23.95 \text{g LiOH} \end{array} \right. \left| \begin{array}{l} 1 \text{ mol LiCl} \\ 42.39 \text{g LiCl} \end{array} \right.}{1 \text{ mol LiOH} \left| \begin{array}{l} 1 \text{ mol LiCl} \\ 42.39 \text{g LiCl} \end{array} \right.} = \boxed{35 \text{g LiCl}}$$

b) I actually produced <sup>6.0</sup> grams of lithium chloride. What is my percent yield?

$$\frac{6.0 \text{g}}{35 \text{g}} = \boxed{17\% \text{ Yield}}$$



a) If I start with <sup>5.0</sup> grams of  $\text{C}_3\text{H}_8$ , what is my theoretical yield of water?

$$\frac{5.0 \text{g C}_3\text{H}_8 \left| \begin{array}{l} 1 \text{ mol C}_3\text{H}_8 \\ 44.09 \text{g C}_3\text{H}_8 \end{array} \right. \left| \begin{array}{l} 4 \text{ mol H}_2\text{O} \\ 18.02 \text{g H}_2\text{O} \end{array} \right.}{1 \text{ mol C}_3\text{H}_8 \left| \begin{array}{l} 1 \text{ mol H}_2\text{O} \\ 18.02 \text{g H}_2\text{O} \end{array} \right.} = \boxed{8.2 \text{g H}_2\text{O}}$$

b) I got a percent yield of 75%. How many grams of water did I make?

$$\frac{x \text{g H}_2\text{O}}{8.2 \text{g}} \times 100 = 75\% \quad x = \boxed{6.2 \text{g H}_2\text{O}}$$



My theoretical yield of beryllium chloride was 10.7 grams. If my actual yield was 4.5 grams, what was my percent yield?

$$\frac{4.5 \text{g}}{10.7 \text{g}} \times 100 = \boxed{42\%}$$



What is my theoretical yield of sodium oxide if I start with 20 grams of calcium oxide?

$$\frac{20. \text{g CaO} \left| \begin{array}{l} 1 \text{ mol CaO} \\ 56.08 \text{g CaO} \end{array} \right. \left| \begin{array}{l} 1 \text{ mol Na}_2\text{O} \\ 61.98 \text{g Na}_2\text{O} \end{array} \right.}{1 \text{ mol CaO} \left| \begin{array}{l} 1 \text{ mol Na}_2\text{O} \\ 61.98 \text{g Na}_2\text{O} \end{array} \right.} = \boxed{22 \text{g Na}_2\text{O}}$$

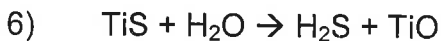


a) What is my theoretical yield of iron (II) chloride if I start with 34 grams of iron (II) bromide?

$$\frac{34 \text{g FeBr}_2}{215.65 \text{g FeBr}_2} \times \frac{1 \text{mol FeBr}_2}{1 \text{mol FeBr}_2} \times \frac{1 \text{mol FeCl}_2}{1 \text{mol FeBr}_2} \times \frac{126.75 \text{g FeCl}_2}{1 \text{mol FeCl}_2} = \boxed{20. \text{g FeCl}_2}$$

b) What is my percent yield of iron (II) chloride if my actual yield is 4.0 grams?

$$\frac{4.0 \text{g}}{20. \text{g}} \times 100 = \boxed{20\% \text{ Yield}}$$



What is my percent yield of titanium (II) oxide if I start with 20 grams of titanium (II) sulfide and my actual yield of titanium (II) oxide is 22 grams?

$$\frac{20 \text{g TiS}}{79.94 \text{g TiS}} \times \frac{1 \text{mol TiS}}{1 \text{mol TiS}} \times \frac{1 \text{mol TiO}}{1 \text{mol TiS}} \times \frac{63.87 \text{g TiO}}{1 \text{mol TiO}} = 16 \text{g TiO} = \text{Theoretical}$$

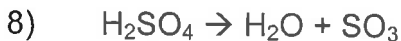
$$\frac{22 \text{g}}{16 \text{g}} \times 100 = \boxed{137.5\% \text{ Yield}} \quad * \text{Not possible!}$$



What is my actual yield of uranium hexabromide if I start with 100 grams of uranium and get a percent yield of 83%?

$$\frac{100. \text{g U}}{238 \text{g U}} \times \frac{1 \text{mol U}}{1 \text{mol U}} \times \frac{1 \text{mol UBr}_6}{1 \text{mol U}} \times \frac{717.4 \text{g UBr}_6}{1 \text{mol UBr}_6} = 301.4 \text{g UBr}_6 = \text{Theoretical}$$

$$\frac{X \text{g UBr}_6}{301.4 \text{g UBr}_6} \times 100 = 83\% \quad X = \boxed{250. \text{g UBr}_6}$$



If I start with 89 grams of sulfuric acid and produce 7.1 grams of water, what is my percent yield?

$$\frac{89 \text{g H}_2\text{SO}_4}{98.09 \text{g H}_2\text{SO}_4} \times \frac{1 \text{mol H}_2\text{SO}_4}{1 \text{mol H}_2\text{SO}_4} \times \frac{1 \text{mol H}_2\text{O}}{1 \text{mol H}_2\text{SO}_4} \times \frac{18.02 \text{g H}_2\text{O}}{1 \text{mol H}_2\text{O}} = 16.35 \text{g H}_2\text{O} = \text{Theoretical}$$

$$\frac{7.1 \text{g H}_2\text{O}}{16.35 \text{g H}_2\text{O}} \times 100 = \boxed{43\% \text{ Yield}}$$

1 pt = work w/ units  
 1 pt = correct theoretical yield  
 1 pt = correct actual yield based on their theoretical yield  
 1 pt = correct sig. figs.  
 4 pts total