Stoichiometry - Percent Yield Worksheet

SHOW ALL WORK!!!!

NOTE: % Yield = \( \frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100 \)

Theoretical Yield = answer to your stoich problem. Actual Yield = given in the problem or the experimental yield.

1) Balance the equation for the reaction of iron (III) phosphate with sodium sulfate to make iron (III) sulfate and sodium phosphate.

\[ 2 \text{FePO}_4 + 3\text{Na}_2\text{SO}_4 \rightarrow \text{Fe}_2(\text{SO}_4)_3 + 2\text{Na}_3\text{PO}_4 \]

a) If I perform this reaction with 25 grams of iron (III) phosphate and an excess of sodium sulfate, how many grams of iron (III) sulfate can I make?

\[
\begin{align*}
25 \text{g FePO}_4 & \rightarrow 1 \text{ mole Fe}_2(\text{SO}_4)_3 & 39.8 \text{g} \\
150.82 \text{g FePO}_4 & \rightarrow 2 \text{ mole Fe}_2(\text{SO}_4)_3 & 119.6 \text{g}
\end{align*}
\]

b) If 18.5 grams of iron (III) sulfate are actually made when I do this reaction, what is my percent yield?

\[
\frac{18.5}{33.18} \times 100 = 55.9\%
\]

c) Is the answer from problem #3 reasonable? Explain.

Yes, less than 100%

d) If I do this reaction with 15 grams of sodium sulfate and get a 65.0% yield, how many grams of sodium phosphate will I make?

\[
\begin{align*}
15.0 \text{g Na}_2\text{SO}_4 & \rightarrow 1 \text{ mole Na}_2\text{SO}_4 & 142.05 \text{g} \\
 & \rightarrow 3 \text{ mole Na}_3\text{PO}_4 & 163.94 \text{g}
\end{align*}
\]

\[
65.0 = 100 \times \frac{\text{Actual}}{\text{Theoretical}} = \frac{65.0}{100} \times 163.94 = 115.77
\]
2) \( \text{LiOH} + \text{KCl} \rightarrow \text{LiCl} + \text{KOH} \)

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

\[
\begin{array}{c|c|c}
\text{20.0g} & \text{LiCl} & 42.39g \\
\text{23.98g} & \text{LiOH} & 1\text{mle}
\end{array}
\]

b) I actually produced 6 grams of lithium chloride. What is my percent yield?

\[
\frac{6}{35.4} \times 100 = 16.9\%
\]

3) \( \text{C}_3\text{H}_8 + 5 \text{O}_2 \rightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O} \)

a) If I start with 5 grams of \( \text{C}_3\text{H}_8 \), what is my theoretical yield of water?

\[
\begin{array}{c|c|c|c|c}
\text{5g} & \text{1mle} & \text{44.01} & 18.02 & 8.19 & 16.0
\end{array}
\]

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

\[
\frac{75\%}{100\%} \times 8.19 = 6.14g
\]

4) \( \text{Be} + 2 \text{HCl} \rightarrow \text{BeCl}_2 + \text{H}_2 \)

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

\[
\frac{4.5g}{10.7g} = 42.06\%
\]