Practice Problems (Chapter 5): Stoichiometry

CHEM 30A

Part I: Using the conversion factors in your tool box

<table>
<thead>
<tr>
<th>TOOL BOX: To convert between</th>
<th>Use</th>
<th>From</th>
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<tbody>
<tr>
<td>g A ↔ mol A</td>
<td>molar mass</td>
<td>periodic table</td>
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<tr>
<td>mol A ↔ particles A</td>
<td>Avogadro’s #</td>
<td>memory</td>
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<tr>
<td>mol A ↔ mol B</td>
<td>molar ratio</td>
<td>coeff. in bal. eqn.</td>
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1. How many moles CH$_3$OH are in 14.8 g CH$_3$OH?

2. What is the mass in grams of 1.5 x $10^{16}$ atoms S?

3. How many molecules of CO$_2$ are in 12.0 g CO$_2$?

4. What is the mass in grams of 1 atom of Au?
Part II: Stoichiometry problems

5. If 54.7 grams of propane (C\textsubscript{3}H\textsubscript{8}) and 89.6 grams of oxygen (O\textsubscript{2}) are available in the balanced combustion reaction to the right:

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

a) Determine which reactant is the limiting reactant.
b) Calculate the theoretical yield of CO\textsubscript{2} in grams.

Limiting Reactant: ________________

Theoretical Yield: ________________

6. A reaction has a theoretical yield of 124.3 g SF\textsubscript{6}, but only 113.7 g SF\textsubscript{6} are obtained in the lab, what is the percent yield of SF\textsubscript{6} for this reaction?

Answer: ________________
7. If 23.2 grams of butane (C₄H₁₀) and 93.7 grams of oxygen (O₂) are available in the following reaction:

\[
\begin{align*}
\quad \text{C}_4\text{H}_{10} + \quad \text{O}_2 & \rightarrow \quad \text{CO}_2 + \quad \text{H}_2\text{O} \\
23.2 \text{ g} & \quad 93.7 \text{ g}
\end{align*}
\]

a) Balance the equation for the reaction.

b) Determine which reactant is the limiting reactant.

c) Calculate the theoretical yield of CO₂ in grams.

Limiting Reactant: _______________

Theoretical Yield: _______________

d) If the actual yield of CO₂ is 69.2 g CO₂, what is the percent yield?

Answer: ________________