QUANTITATIVE ANALYSIS OF SYNTHESIS REACTIONS

**theoretical yield**

mass of product expected from a certain mass of reactant assuming a perfect, complete reaction

**limiting reactant**  (mass method)

reactant that will be completely used up in the reaction

or

reactant that gives the smallest theoretical yield given certain masses of all reactants

**percent yield**

percentage of the theoretical yield that is actually obtained

**EXAMPLE**

heptanol  +  hydrogen bromide  \( \xrightarrow{120 \, ^\circ\mathrm{C}} \)  bromoheptane  +  water

<table>
<thead>
<tr>
<th>REACTANTS</th>
<th>PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>116.2</td>
<td>179.1</td>
</tr>
<tr>
<td>80.91</td>
<td>MW (g/mol)</td>
</tr>
</tbody>
</table>

reacted  20.0 g  and  15.0 g  

27.1 g obtained

**Determine the limiting reactant and theoretical yield, and calculate percent yield.**

\{heptanol  30.8 g  88.0\%\}