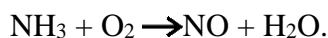


Practice Problems: Limiting Reagents

1. Take the reaction:



In an experiment, 3.25 g of NH_3 are allowed to react with 3.50 g of O_2 .

- Which reactant is the limiting reagent?
 - How many grams of NO are formed?
 - How much of the excess reactant remains after the reaction?
2. If 4.95 g of ethylene (C_2H_4) are combusted with 3.25 g of oxygen.

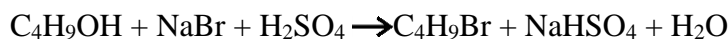
- What is the limiting reagent?
- How many grams of CO_2 are formed?

3. Consider the reaction of



- What is the theoretical yield of $\text{C}_6\text{H}_5\text{Br}$ if 42.1 g of C_6H_6 react with 73.0 g of Br_2 ?
- If the actual yield of $\text{C}_6\text{H}_5\text{Br}$ is 63.6 g, what is the percentage yield?

4. Use the following reaction:



If 15.0 g of $\text{C}_4\text{H}_9\text{OH}$ reacts with 22.4 g of NaBr and 32.7 g of H_2SO_4 to give a yield of 17.1 g of $\text{C}_4\text{H}_9\text{Br}$, what is the percentage yield of this reaction?

5. Silicon nitride (Si_3N_4) is made by combining Si and nitrogen gas (N_2) at a high temperature. How much (in g) of Si is needed to react with an excess of nitrogen gas to prepare 125 g of silicon nitride if the percentage yield of the reaction is 95.0%?
6. The souring of wine occurs when ethanol is converted to ethanoic acid by oxygen by the following reaction:



A 1.00 dm^3 bottle of wine, labelled as 8.5% (by volume) ethanol, is found to have a defective seal. Analysis of 1.00 cm^3 showed that there were 0.0274 grams of ethanoic acid in that 1.00 cm^3 . The density of ethanol is 0.816 g/cm^3 and the density of water is 1.00 g/cm^3 .

- a. What mass of oxygen must have leaked into the bottle?
- b. What is the percentage yield for the conversion of ethanol to ethanoic acid if O_2 is in excess?
7. A reaction container holds 5.77 g of P_4 and 5.77 g of O_2 . The following reaction occurs:
- $$\text{P}_4 + \text{O}_2 \rightarrow \text{P}_4\text{O}_6.$$
- If enough oxygen is available, then the P_4O_6 reacts further:
- $$\text{P}_4\text{O}_6 + \text{O}_2 \rightarrow \text{P}_4\text{O}_{10}.$$
- a. What is the limiting reagent for the formation of P_4O_{10} ?
- b. What mass of P_4O_{10} is produced?
- c. What mass of excess reactant is left in the reaction container?