

Questions 7-8 Use the following information and equation:

$\text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3$ A student reacts 0.450 g of H_2 in an experiment and collects 2.10 g of NH_3 .

7. What is the theoretical yield of NH_3 ?

$$\frac{0.450 \text{ g H}_2}{2.018 \text{ g}} \times \frac{1 \text{ mol H}_2}{3 \text{ H}_2} \times \frac{2 \text{ NH}_3}{1 \text{ mol}} \times 17.03 \text{ g NH}_3 = \boxed{2.53 \text{ g}}$$

8. What was the student's percent yield?

$$\frac{2.10 \text{ g}}{2.53 \text{ g}} \times 100 = \boxed{83.0 \%}$$

Questions 9-10 Use the following information and equation:

$2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$ 22.0 g of O_2 is reacted with 5.00 g of H_2 .

9. What is the limiting reactant, and what mass of H_2O is actually produced?

$$\frac{22 \text{ g O}_2}{32 \text{ g}} \times \frac{1 \text{ mol O}_2}{1 \text{ mol O}_2} \times \frac{2 \text{ mol H}_2\text{O}}{1 \text{ mol O}_2} \times 18.02 \text{ g} = \boxed{24.8 \text{ g H}_2\text{O}}$$

$$\frac{5 \text{ g H}_2}{2.018 \text{ g}} \times \frac{1 \text{ mol H}_2}{2 \text{ mol H}_2} \times \frac{2 \text{ mol H}_2\text{O}}{1 \text{ mol}} \times 18.02 \text{ g} = 44.7 \text{ g H}_2\text{O}$$

10. What is the excess reactant, and what mass of the excess reactant is left over after the reaction?

$$\frac{22 \text{ g O}_2}{32 \text{ g O}_2} \times \frac{1 \text{ mol O}_2}{1 \text{ mol O}_2} \times \frac{2 \text{ mol H}_2}{1 \text{ mol O}_2} \times 2.018 \text{ g H}_2 = \boxed{2.77 \text{ g}}$$

$$\text{Excess} = 5.00 \text{ g} - 2.77 \text{ g} = \boxed{2.23}$$