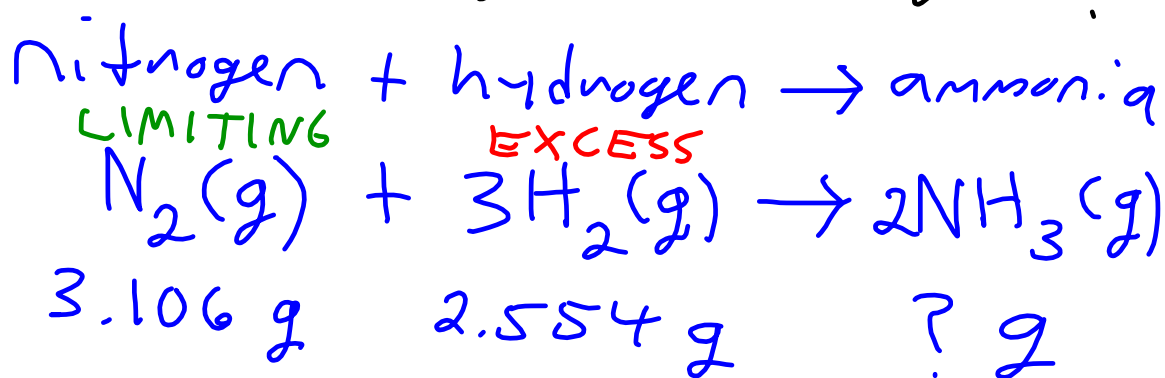


Nitrogen combines with hydrogen to form ammonia.

What mass of ammonia can be formed from a gas mixture containing 3.106 g of nitrogen and 2.554 g of hydrogen?



$$\begin{aligned} \text{g N}_2 &\rightarrow \text{mol N}_2 \rightarrow \text{mol NH}_3 \rightarrow \text{g NH}_3 \\ \frac{3.106 \cancel{\text{g N}_2}}{1} &\left(\frac{1 \cancel{\text{mol N}_2}}{28.02 \cancel{\text{g N}_2}} \right) \left(\frac{2 \cancel{\text{mol NH}_3}}{1 \cancel{\text{mol N}_2}} \right) \left(\frac{17.034 \cancel{\text{g NH}_3}}{1 \cancel{\text{mol NH}_3}} \right) \\ &= 3.776 \text{ g NH}_3 \quad \checkmark \end{aligned}$$

$$\begin{aligned} \text{g H}_2 &\rightarrow \text{mol H}_2 \rightarrow \text{mol NH}_3 \rightarrow \text{g NH}_3 \\ \frac{2.554 \cancel{\text{g H}_2}}{1} &\left(\frac{1 \cancel{\text{mol H}_2}}{2.016 \cancel{\text{g H}_2}} \right) \left(\frac{2 \cancel{\text{mol NH}_3}}{3 \cancel{\text{mol H}_2}} \right) \left(\frac{17.034 \cancel{\text{g NH}_3}}{1 \cancel{\text{mol NH}_3}} \right) \\ &= 14.39 \text{ g NH}_3 \quad \times \end{aligned}$$



$$1 \times 14.01 = 14.01$$

$$3 \times 1.008 = 3.024$$

$$\hline 17.034$$

What mass of hydrogen will be left over at the end of the reaction?

CONSERVATION OF MASS:

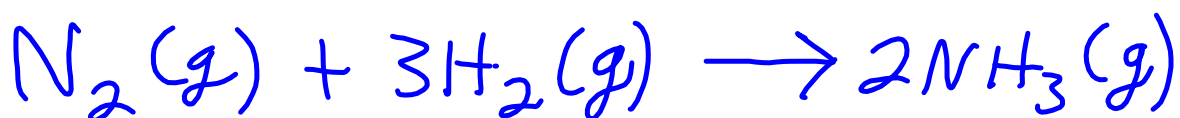
	N_2	H_2	NH_3	TOTAL
BEFORE	3.106 g	2.554 g	0.000 g	5.660 g
AFTER	0.000 g	X	3.776 g	5.660 g

$$X + 3.776 \text{ g} = 5.660 \text{ g}$$

$$X = 5.660 \text{ g} - 3.776 \text{ g}$$

$$X = 1.884 \text{ g}$$

STOICHIOMETRY



$$3.106 \text{ g} \quad ? \text{ g (used)}$$

$$\begin{aligned} \text{g N}_2 &\longrightarrow \text{mol N}_2 \longrightarrow \text{mol H}_2 \longrightarrow \text{g H}_2 \\ \frac{3.106 \text{ g N}_2}{1} &\left(\frac{1 \text{ mol N}_2}{28.02 \text{ g N}_2} \right) \left(\frac{3 \text{ mol H}_2}{1 \text{ mol N}_2} \right) \left(\frac{2.016 \text{ g H}_2}{1 \text{ mol H}_2} \right) \\ &= 0.670 \text{ g H}_2 \text{ (used)} \end{aligned}$$

$$\begin{array}{r} 2.554 \text{ g H}_2 \text{ (available)} \\ - 0.670 \text{ g H}_2 \text{ (used)} \\ \hline 1.884 \text{ g H}_2 \text{ (remaining)} \end{array}$$

If the reaction produced 2.763 g of NH_3 what is the theoretical yield of the reaction?

$$100\% \left(\frac{2.763 \text{ g}}{3.776 \text{ g}} \right) = 73.17\%$$