Stoichiometry/Limiting Reactant & Percent Yield

1. Use the equation below to answer the following questions:

\[ \text{Na}_2\text{SiO}_3 (s) + 8 \text{HF(aq)} \rightarrow \text{H}_2\text{SiF}_6 (aq) + 2 \text{NaF(aq)} + 3 \text{H}_2\text{O (l)} \]

a) How many moles of HF are needed to react with 0.300 mol of Na\textsubscript{2}SiO\textsubscript{3}?

b) How many grams of NaF form when 0.500 mol of HF reacts with excess Na\textsubscript{2}SiO\textsubscript{3}?

c) How many grams of Na\textsubscript{2}SiO\textsubscript{3} can react with 0.800 g of HF?

2. Use the equation below to answer the following questions:

\[ \text{C}_6\text{H}_{12}\text{O}_6 \text{ (aq)} \rightarrow 2 \text{C}_2\text{H}_5\text{OH (aq)} + 2 \text{CO}_2 \text{ (g)} \]

a) How many grams of CO\textsubscript{2} are produced when 0.400 mol of C\textsubscript{6}H\textsubscript{12}O\textsubscript{6} reacts in this fashion?

b) How many grams of C\textsubscript{6}H\textsubscript{12}O\textsubscript{6} are needed to form 7.50 g of C\textsubscript{2}H\textsubscript{5}OH?
3. Use the equation below to answer the following questions:

\[ 2 \text{NaOH (s)} + \text{CO}_2 (g) \rightarrow \text{Na}_2\text{CO}_3 (s) + \text{H}_2\text{O (l)} \]

a) How many moles of Na$_2$CO$_3$ form when 1.85 mol NaOH and 1.00 mol CO$_2$ are allowed to react?

b) How many moles of excess reagent remain after all reaction has been completed?

4. Use the equation below to answer the following questions:

\[ \text{C}_6\text{H}_6 + \text{Br}_2 \rightarrow \text{C}_6\text{H}_5\text{Br} + \text{HBr} \]

a) What is the theoretical yield of C$_6$H$_5$Br in this reaction when 30.0 g of C$_6$H$_6$ reacts with 65.0 g of Br$_2$?

b) How many grams of excess reagent remain after all reaction has been completed.

c) If the actual yield of C$_6$H$_5$Br was 56.7 g, what is the percent yield for this reaction?