Clearly show your work on all numerical problems to receive full credit.

(5) 1. Balance the following equations

\[ \text{C}_5\text{H}_12\text{O}_2 (l) + \text{O}_2 (g) \rightarrow \text{CO}_2 (g) + \text{H}_2\text{O} (g) \]

\[ \text{Al}_2(\text{SO}_4)_3 (aq) + \text{Ba(NO}_3)_2 (aq) \rightarrow \text{Al(NO}_3)_3 (aq) + \text{BaSO}_4 (s) \]

\[ \text{P}_2\text{O}_3 (g) + \text{H}_2\text{O} (l) \rightarrow \text{H}_3\text{PO}_3 (aq) \]

\[ \text{B}_10\text{H}_18 + \text{O}_2 \rightarrow \text{B}_2\text{O}_3 + \text{H}_2\text{O} \]

\[ \text{N}_2(g) + \text{H}_2 (g) \rightarrow \text{NH}_3 (g) \]

(10) 2. a. How many grams of C are required to make 2.05-mol of \text{C}_2\text{H}_4? \\

b. How many moles of \text{NH}_3 are contained in 175.0-g of \text{NH}_3? \\

c. How many moles of \text{CaBr}_2 are required to obtain \(8.2 \times 10^{21}\) atoms of Br? \\

d. How many grams of Cl are in 113.5-g of \text{C}_2\text{Cl}_6? \\

e. How many atoms of O are in 145.0-g of \text{C}_{12}\text{H}_{22}\text{O}_{11}? \\

3. Consider the following chemical equation.
\[
\text{AlI}_3 (aq) + \text{Na}_2\text{CO}_3 (aq) \rightarrow \text{Al}_2(\text{CO}_3)_3 (s) + \text{NaI} (aq)
\]

40.0-g of AlI$_3$ are reacted with 25.0-g of Na$_2$CO$_3$.

a. Balance the equation.

b. Which of the reactants is the limiting reactant?

c. How many grams of Al$_2$(CO$_3$)$_3$ can be formed?

d. Suppose the reaction is carried out and 9.5-g of Al$_2$(CO$_3$)$_3$ are formed. What is the percent yield?

e. How much of the excess reactant remains after the reaction if all of the limiting reactant is consumed?