1. $2C_8H_{18} + 25O_2 \rightarrow 16CO_2 + 18H_2O$

$$\frac{100.0\text{ g } C_8H_{18}}{} \left| \frac{1\text{ mol } C_8H_{18}}{114.0\text{ g}} \right| \frac{16\text{ mol } CO_2}{2\text{ mol } H_2O} \left| \frac{44.0\text{ g } CO_2}{1\text{ mol } CO_2} \right.$$

$$= 309\text{ g } CO_2$$

$$\frac{100.0\text{ g } C_8H_{18}}{} \left| \frac{1\text{ mol } C_8H_{18}}{114.0\text{ g } C_8H_{18}} \right| \frac{18\text{ mol } H_2O}{2\text{ mol } C_8H_1} \left| \frac{18.0\text{ g } H_2O}{1\text{ mol } H_2O} \right.$$

$$= 142\text{ g } H_2O$$

$309 \times .975 = 301\text{ g } CO_2$

$142 \times .975 = 138\text{ g } H_2O$

2. $4Fe + 3O_2 \rightarrow 2Fe_2O_3$

$$\frac{300.0\text{ g } Fe_2O_3}{} \left| \frac{1\text{ mol}}{159.6\text{ g } Fe_2O_3} \right| \frac{4\text{ mol Fe}}{2\text{ mol } Fe_2O_3} \left| \frac{55.8\text{ g}}{1\text{ mol}} \right.$$

$$\boxed{2.10 \times 10^2\text{ g Fe}}$$

3. $3/8 = .375 \qquad 9/23 = .391$

$$\frac{.391}{.375} \times 100\% = 104.2\overline{6}$$

$\therefore$ error = $\underline{4.27\%}$

4. $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$

$$116.0\text{ g } C_4H_{10} \left| \frac{1\text{ mol } C_4H_{10}}{58.0\text{ g } C_4H_{10}} \right| \frac{8\text{ mol } CO_2}{2\text{ mol } C_4H_{10}} \left| \frac{44.0\text{ g } CO_2}{1\text{ mol } CO_2} \right.$$

$$= 352\text{ g}$$

$$100\% \times \frac{330.0}{352\text{ g}} = \underline{93.8\%}$$

5. $4Al + 3O_2 \rightarrow 2Al_2O_3$

$$10.8\text{ g Al} \left| \frac{1\text{ mol Al}}{26.98\text{ g Al}} \right| \frac{2\text{ mol } Al_2O_3}{4\text{ mol Al}} = .200\text{ mol } Al_2O_3$$

$$9.20\text{ g } O_2 \left| \frac{1\text{ mol } O_2}{32.0\text{ g } O_2} \right| \frac{2\text{ mol } Al_2O_3}{3\text{ mol } O_2} = .192\text{ mol } Al_2O_3$$

$\therefore$ $O_2$ is limiting

~~$.192\text{ mol } Al_2O_3 \left| \frac{3\text{ mol } O_2}{2\text{ mol } Al_2O_3} \right| \frac{32.0\text{ g } O_2}{1\text{ mol}}$~~

$=$

$$.192\text{ mol } Al_2O_3 \left| \frac{4\text{ mol Al}}{2\text{ mol } Al_2O_3} \right| \frac{26.98\text{ g Al}}{1\text{ mol Al}}$$

$= 10.4\text{ g Al needed}$

$10.8 - 10.4 = .4\text{ g remain}$

6. $2\,C_6H_{14} + 19\,O_2 \rightarrow 12\,CO_2 + 14\,H_2O$

$$19.2\text{ g } C_6H_{14} \left| \frac{1\text{ mol } C_6H_{14}}{86.0\text{ g } C_6H_{14}} \right| \frac{14\text{ mol } H_2O}{2\text{ mol } C_6H_4} \left| \frac{18.0\text{ g } H_2O}{1\text{ mol}} \right.$$

$= 28.1\text{ g } H_2O$

7. $C_5H_{12} + 8\,O_2 \longrightarrow 5\,CO_2 + 6\,H_2O$

$1\text{ mol } C_5H_{12} = 72\text{ g}$ $\quad 8\text{ mol } O_2 = 256\text{ g}$ $\quad 5\text{ mol } CO_2 = 220\text{ g}$ $\quad 6\text{ mol } H_2O = 108\text{ g}$

$72\text{ g} + 256\text{ g} = 328\text{ g}$ $\quad 220\text{ g} + 108\text{ g} = 328\text{ g}$

$328\text{ g} = 328\text{ g}$

8. $\frac{246\text{ g}}{255\text{ g}} \times 100\% = \underline{96.5\%}$

9. $C_3H_8 + 5\,O_2 \rightarrow 3\,CO_2 + 4\,H_2O$

$$5.50\text{ g } C_3H_8 \left| \frac{1\text{ mol } C_3H_8}{44.0\text{ g } C_3H_8} \right| \frac{4\text{ mol } H_2O}{1\text{ mol } C_3H_8} \left| \frac{18.0\text{ g } H_2O}{1\text{ mol } H_2O} \right.$$

$9.00\text{ g } H_2O$

$\frac{8.50\text{ g}}{9.00\text{ g}} \times 100\% = \underline{94.4\%}$

0. $C + H_2 \rightarrow C_x H_y$

3.60 g  .80 g  4.40 g

$$\frac{3.60\text{g C} \mid 1\text{ mol C}}{12.0\text{ g C}} = .300\text{ mol C}$$

$$\frac{.80\text{g } H_2 \mid 1\text{ mol } H_2}{2\text{ g } H_2} = .400\text{ mol } H_2$$

$$3\ C + 4\ H_2 \rightarrow C_x H_y$$

$$\boxed{C_3H_8}$$