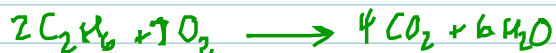


$$3.137 \quad x = \# \text{ g CH}_4 \quad (13.43 - x) = \# \text{ g C}_2\text{H}_6$$



$$x \text{ g CH}_4 \times \frac{1 \text{ mol}}{16.05 \text{ g}} \times \frac{1 \text{ mol CO}_2}{1 \text{ mol CH}_4} \times \frac{44.01 \text{ g}}{1 \text{ mol}} = 2.742x \text{ g CO}_2$$

$$x \text{ g CH}_4 \times \frac{1 \text{ mol}}{16.05 \text{ g}} \times \frac{2 \text{ mol H}_2\text{O}}{1 \text{ mol CH}_4} \times \frac{18.02 \text{ g}}{1 \text{ mol}} = 2.247x \text{ g H}_2\text{O}$$



$$(13.43 - x) \text{ g C}_2\text{H}_6 \times \frac{1 \text{ mol}}{30.07 \text{ g}} \times \frac{4 \text{ mol CO}_2}{2 \text{ mol C}_2\text{H}_6} \times \frac{44.01 \text{ g}}{1 \text{ mol}} = 2.927(13.43 - x) \text{ g CO}_2$$

$$(13.43 - x) \text{ g C}_2\text{H}_6 \times \frac{1 \text{ mol}}{30.07 \text{ g}} \times \frac{6 \text{ mol H}_2\text{O}}{2 \text{ mol C}_2\text{H}_6} \times \frac{18.02 \text{ g}}{1 \text{ mol}} = 1.798(13.43 - x) \text{ g H}_2\text{O}$$

$$64.84 \text{ g} = 2.742x + 2.247x + 2.927(13.43 - x) + 1.798(13.43 - x)$$

$$x = 5.20 \text{ g CH}_4$$

$$\frac{5.20 \text{ g}}{13.43} = 0.387$$

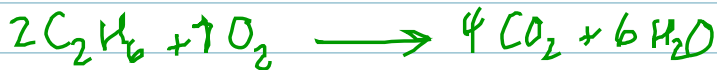
3,137

$$x = \# \text{g CH}_4 \quad (13.43 - x) = \# \text{g C}_2\text{H}_6$$



$$x \text{ g CH}_4 \times \frac{1 \text{ mol}}{16.05 \text{ g}} \times \frac{1 \text{ mol CO}_2}{1 \text{ mol CH}_4} \times \frac{44.01 \text{ g}}{1 \text{ mol}} = 2.742x \text{ g CO}_2$$

$$x \text{ g CH}_4 \times \frac{1 \text{ mol}}{16.05 \text{ g}} \times \frac{2 \text{ mol H}_2\text{O}}{1 \text{ mol CH}_4} \times \frac{18.02 \text{ g}}{1 \text{ mol}} = 2.247x \text{ g H}_2\text{O}$$



$$(13.43 - x) \text{ g C}_2\text{H}_6 \times \frac{1 \text{ mol}}{30.07 \text{ g}} \times \frac{4 \text{ mol CO}_2}{2 \text{ mol C}_2\text{H}_6} \times \frac{44.01 \text{ g}}{1 \text{ mol}} = 2.927(13.43 - x) \text{ g CO}_2$$

$$(13.43 - x) \text{ g C}_2\text{H}_6 \times \frac{1 \text{ mol}}{30.07 \text{ g}} \times \frac{6 \text{ mol H}_2\text{O}}{2 \text{ mol C}_2\text{H}_6} \times \frac{18.02 \text{ g}}{1 \text{ mol}} = 1.798(13.43 - x) \text{ g H}_2\text{O}$$

$$64.84 \text{ g} = 2.742x + 2.247x + 2.927(13.43 - x) + 1.798(13.43 - x)$$

$$x = 5.20 \text{ g CH}_4$$

$$\frac{5.20 \text{ g}}{13.43} = 0.387$$

3.97

$$1 \text{ ton HNO}_3 \times \frac{2000 \text{ lbs}}{1 \text{ ton}} \times \frac{453.6 \text{ g}}{1 \text{ lb}} \times \frac{1 \text{ mol HNO}_3}{63.02 \text{ g}} = 1.44 \times 10^4 \text{ mol HNO}_3$$

only 80% yield $\left(\frac{100}{80}\right)$

$$\text{eqn 3 } 1.44 \times 10^4 \text{ mol HNO}_3 \times \frac{2 \text{ mol NO}_2}{1 \text{ mol HNO}_3} \times \frac{100}{80} = 3.60 \times 10^4 \text{ mol NO}_2$$

$$\text{eqn 2 } 3.60 \times 10^4 \text{ mol NO}_2 \times \frac{1 \text{ mol NO}}{1 \text{ mol NO}_2} \times \frac{100}{80} = 4.50 \times 10^4 \text{ mol NO}$$

$$\text{eqn 1 } 4.50 \times 10^4 \text{ mol NO} \times \frac{4 \text{ mol NH}_3}{4 \text{ mol NO}} \times \frac{100}{80} = 5.63 \times 10^4 \text{ mol NH}_3$$

$$5.63 \times 10^4 \text{ mol NH}_3 \times \frac{17.04 \text{ g}}{1 \text{ mol}} = 9.59 \times 10^5 \text{ g NH}_3$$

3.102

$$\frac{53.96 \text{ g}}{342.2 \text{ g} + x \left(\frac{18.02 \text{ g}}{1 \text{ mol}}\right)} = 0.081$$

$x \Rightarrow 18$

