

40-519 515472

46 HW5

~~$$C. \frac{(.8158 \text{ ATM})(V)}{.8158 \text{ ATM}} = \frac{(.2052 \text{ mol})(.0821 \frac{\text{L} \cdot \text{ATM}}{\text{mol} \cdot \text{K}})(293 \text{ K})}{.8158 \text{ ATM}}$$~~

~~$$V = 6.07 \text{ L}$$~~



~~$$\frac{(.8 \text{ ATM})(.45 \text{ L})}{(.0821 \frac{\text{L} \cdot \text{ATM}}{\text{mol} \cdot \text{K}})(293 \text{ K})} = n$$~~

~~$$\frac{(.0821 \frac{\text{L} \cdot \text{ATM}}{\text{mol} \cdot \text{K}})(293 \text{ K})}{(.0821 \frac{\text{L} \cdot \text{ATM}}{\text{mol} \cdot \text{K}})(293 \text{ K})}$$~~

$$.0147 \text{ mol } O_2 = n$$

$$\frac{(.0147 \text{ mol } O_2)(1 \text{ mol } CO_2)}{3 \text{ mol } O_2} = .0049 \text{ mol } CO_2$$

$$\frac{(.0147 \text{ mol } O_2)(2 \text{ mol } SO_2)}{3 \text{ mol } O_2} = .0098 \text{ mol } SO_2$$

~~$$\frac{(.8 \text{ ATM})(V)}{.8 \text{ ATM}} = \frac{(.0049 \text{ mol } CO_2)(.0821 \frac{\text{L} \cdot \text{ATM}}{\text{mol} \cdot \text{K}})(293 \text{ K})}{.8 \text{ ATM}}$$~~

~~$$V_{CO_2} = .15 \text{ L}$$~~

~~$$\frac{(.8 \text{ ATM})(V)}{.8 \text{ ATM}} = \frac{(.0098 \text{ mol } SO_2)(.0821 \frac{\text{L} \cdot \text{ATM}}{\text{mol} \cdot \text{K}})(293 \text{ K})}{.8 \text{ ATM}}$$~~

~~$$V_{SO_2} = .3 \text{ L}$$~~



$$a. (5 \text{ mol H}_2\text{O}) \left(\frac{2 \text{ mol H}_2}{2 \text{ mol H}_2\text{O}} \right) = \boxed{5 \text{ mol H}_2}$$

$$b. (5 \text{ mol H}_2\text{O}) \left(\frac{1 \text{ mol O}_2}{2 \text{ mol H}_2\text{O}} \right) = \boxed{2.5 \text{ mol O}_2}$$

$$c. (700 \text{ mol H}_2) \left(\frac{1 \text{ ATM}}{700 \text{ mol H}_2} \right) = .921 \text{ ATM}$$

$$PV = nRT$$

$$\frac{(.921 \text{ ATM})(V)}{(.921 \text{ ATM})} = \frac{(2.5 \text{ mol}) \left(.0821 \frac{\text{L} \cdot \text{ATM}}{\text{mol} \cdot \text{K}} \right) (293 \text{ K})}{.921 \text{ ATM}}$$

$$\boxed{V = 65.29 \text{ L}}$$



$$a. (4.5 \text{ mol C}_2\text{H}_6) \left(\frac{7 \text{ mol O}_2}{2 \text{ mol C}_2\text{H}_6} \right) = \boxed{15.75 \text{ mol O}_2 \text{ REQUIRED}}$$

$$b. (4.5 \text{ mol C}_2\text{H}_6) \left(\frac{4 \text{ mol CO}_2}{2 \text{ mol C}_2\text{H}_6} \right) = \boxed{9 \text{ mol CO}_2 \text{ PRODUCED}}$$

$$c. (4.5 \text{ mol C}_2\text{H}_6) \left(\frac{6 \text{ mol H}_2\text{O}}{2 \text{ mol C}_2\text{H}_6} \right) = \boxed{13.5 \text{ mol H}_2\text{O PRODUCED}}$$

$$c. \frac{(1.8 \text{ ATM})(V)}{.8 \text{ ATM}} = \frac{(9 \text{ mol}) \left(.0821 \frac{\text{L} \cdot \text{ATM}}{\text{mol} \cdot \text{K}} \right) (773 \text{ K})}{.8 \text{ ATM}} \Rightarrow \boxed{V_{\text{CO}_2} = 713.96 \text{ L}}$$



$$b. (25 \text{ mol NaCl}) \left(\frac{2 \text{ mol Na}}{2 \text{ mol NaCl}} \right) = 25 \text{ mol Na}$$

$$(25 \text{ mol Na}) \left(\frac{22.99 \text{ g}}{\text{mol}} \right) = \boxed{574.75 \text{ g Na}} \text{ REQUIRED}$$

$$(25 \text{ mol NaCl}) \left(\frac{1 \text{ mol Cl}_2}{2 \text{ mol NaCl}} \right) = 12.5 \text{ mol Cl}_2$$

$$(12.5 \text{ mol Cl}_2) \left(\frac{70.9 \text{ g}}{\text{mol}} \right) = \boxed{886.25 \text{ g Cl}_2} \text{ REQUIRED}$$

$$c. (12.5 \text{ mol}) \left(\frac{22.4 \text{ L}}{\text{mol}} \right) = \boxed{280 \text{ L Cl}_2 @ STP} \text{ REQUIRED}$$



$$a. (4000 \text{ g Fe}_2\text{O}_3) \left(\frac{1 \text{ mol}}{159.70 \text{ g}} \right) = 25.05 \text{ mol Fe}_2\text{O}_3 \left\{ \begin{array}{l} (2 \cdot 55.85 \text{ g}) \\ + (3 \cdot 16.00 \text{ g}) \\ \hline 159.70 \text{ g} \end{array} \right.$$

$$(25.05 \text{ mol Fe}_2\text{O}_3) \left(\frac{3 \text{ mol CO}}{1 \text{ mol Fe}_2\text{O}_3} \right) = \boxed{75.15 \text{ mol CO}}$$

$$b. (25.05 \text{ mol Fe}_2\text{O}_3) \left(\frac{2 \text{ mol Fe}}{1 \text{ mol Fe}_2\text{O}_3} \right) = \boxed{50.10 \text{ mol Fe}}$$

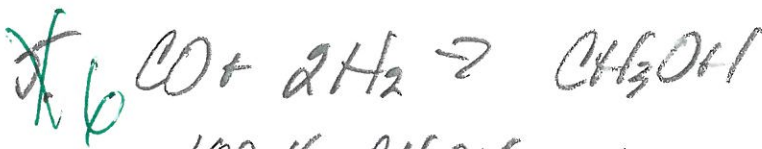
$$(25.05 \text{ mol Fe}_2\text{O}_3) \left(\frac{3 \text{ mol CO}_2}{1 \text{ mol Fe}_2\text{O}_3} \right) = \boxed{75.15 \text{ mol CO}_2}$$

U6 HW 3

*c. $PV = nRT$

$$\frac{(1.5 \text{ ATM})(V)}{(1.5 \text{ ATM})} = \frac{(75.15 \text{ mol CO}_2)(.0821 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}})(1273 \text{ K})}{(1.5 \text{ ATM})}$$

$$\left(V_{\text{CO}_2} = 5236.12 \text{ L} \right)$$



100 kg $\text{CH}_3\text{OH} = 100000 \text{ g CH}_3\text{OH}$

$$\begin{array}{r} (12.01 \text{ g}) \\ + (4.101 \text{ g}) \\ + (16.00 \text{ g}) \\ \hline 32.05 \text{ g} \end{array}$$

$$\left(100,000 \text{ g CH}_3\text{OH} \right) \left(\frac{1 \text{ mol}}{32.05 \text{ g}} \right) = 3120.12 \text{ mol CH}_3\text{OH}$$

$$\left(3120.12 \text{ mol CH}_3\text{OH} \right) \left(\frac{1 \text{ mol CO}}{1 \text{ mol CH}_3\text{OH}} \right) = 3120.12 \text{ mol CO}$$

$$\left(3120.12 \text{ mol CO} \right) \left(\frac{28.01 \text{ g}}{1 \text{ mol}} \right) = \boxed{87394.70 \text{ g CO}} \text{ REQUIRED}$$

$$\left(3120.12 \text{ mol CH}_3\text{OH} \right) \left(\frac{2 \text{ mol H}_2}{1 \text{ mol CH}_3\text{OH}} \right) = 6240.24 \text{ mol H}_2$$

$$\left(6240.24 \text{ mol H}_2 \right) \left(\frac{2.02 \text{ g}}{1 \text{ mol}} \right) = \boxed{12605.28 \text{ g H}_2} \text{ REQUIRED}$$

$$\left(6240.24 \text{ mol H}_2 \right) \left(\frac{22.4 \text{ L}}{1 \text{ mol}} \right) = \boxed{139781.38 \text{ L H}_2 @ \text{STP}}$$



a. 5000 L $\text{CO}_2 = ?$ g NaOH @ 303 K + 1 ATM

$$\frac{(1 \text{ ATM})(5000 \text{ L})}{\left(\frac{0.0821 \text{ L}\cdot\text{atm}}{\text{mol}\cdot\text{K}}\right)(303 \text{ K})} = n \frac{\left(\frac{0.0821 \text{ L}\cdot\text{atm}}{\text{mol}\cdot\text{K}}\right)(303 \text{ K})}{\left(\frac{0.0821 \text{ L}\cdot\text{atm}}{\text{mol}\cdot\text{K}}\right)(303 \text{ K})}$$

$200.9945 \text{ mol } \text{CO}_2 = n$

$$\left(\frac{200.99 \text{ mol } \text{CO}_2 \times 2 \text{ mol } \text{NaOH}}{1 \text{ mol } \text{CO}_2} \right) = 401.989 \text{ mol } \text{NaOH}$$

$$\left(401.989 \text{ mol } \text{NaOH} \right) \left(\frac{40.00 \text{ g}}{\text{mol}} \right) = \boxed{16079.56 \text{ g } \text{NaOH}}$$

(1.22.99g)
(1.16.00g)
+ (1.1.01g)
<hr/>
40.00g

b. $\left(\frac{200.9945 \text{ mol } \text{CO}_2 \times 1 \text{ mol } \text{Na}_2\text{CO}_3}{1 \text{ mol } \text{CO}_2} \right) = 200.9945 \text{ mol } \text{Na}_2\text{CO}_3$

$$\left(200.9945 \text{ mol} \right) \left(\frac{105.99 \text{ g}}{\text{mol}} \right) = \boxed{21303.41 \text{ g } \text{Na}_2\text{CO}_3 \text{ FORMED}}$$

(2.22.99g)
+ (1.12.01g)
+ (3.16.00g)
<hr/>
105.99g

$$\left(\frac{200.9945 \text{ mol } \text{CO}_2 \times 1 \text{ mol } \text{H}_2\text{O}}{1 \text{ mol } \text{CO}_2} \right) = 200.9945 \text{ mol } \text{H}_2\text{O}$$

$$\left(200.9945 \text{ mol } \text{H}_2\text{O} \right) \left(\frac{18.02 \text{ g}}{\text{mol}} \right) = \boxed{3621.92 \text{ g } \text{H}_2\text{O} \text{ FORMED}}$$

U6 HW5

2



8 (.95g NaHCO₃) = V_{H₂O} @ 1 ATM & 450 K?

(1.2299g) +
(1.101g) +
(1.1201g) +
(3.1600g)

$$(.95 \text{g NaHCO}_3) \left(\frac{1 \text{ mol}}{84.01 \text{g}} \right) = .01131 \text{ mol NaHCO}_3$$

$$(.01131 \text{ mol NaHCO}_3) \left(\frac{1 \text{ mol H}_2\text{O}}{2 \text{ mol NaHCO}_3} \right) = .00565 \text{ mol H}_2\text{O}$$

$$PV = nRT$$

$$\frac{(1 \text{ ATM}) V}{1 \text{ ATM}} = \frac{(.00565 \text{ mol}) \left(.0821 \frac{\text{L} \cdot \text{ATM}}{\text{mol} \cdot \text{K}} \right) (450 \text{ K})}{1 \text{ ATM}}$$

$$V = .21 \text{ L H}_2\text{O}$$

$$(.01131 \text{ mol NaHCO}_3) \left(\frac{1 \text{ mol CO}_2}{2 \text{ mol NaHCO}_3} \right) = .00565 \text{ mol CO}_2$$

$$\frac{(1 \text{ ATM}) V}{1 \text{ ATM}} = \frac{(.00565 \text{ mol CO}_2) \left(.0821 \frac{\text{L} \cdot \text{ATM}}{\text{mol} \cdot \text{K}} \right) (450 \text{ K})}{1 \text{ ATM}}$$

$$V = .21 \text{ L CO}_2$$