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1a) $8.00\text{g } O_2 \left(\frac{1\text{ mol } O_2}{32.00\text{g}}\right)\left(\frac{22.4\text{L}}{1\text{ mol } O_2}\right) = \boxed{5.60\text{L } O_2}$

1b) $8.00\text{g } O_2 \left(\frac{1\text{ mol } O_2}{32.00\text{g}}\right) = 0.250\text{ mol } O_2$ $\quad V = \frac{nRT}{P}$

$$V = \frac{(0.250\text{mol})\left(0.0821\ \frac{\text{L·atm}}{\text{mol·K}}\right)(450.\text{K})}{1.5\text{ atm}}$$

$$\boxed{V = 6.16\text{L}}$$

2) $P = \frac{nRT}{V} = \frac{(1.35\text{mol})\left(0.0821\ \frac{\text{L·atm}}{\text{mol·K}}\right)(320.\text{K})}{2.50\text{L}}$

$$\boxed{P = 14.2\text{ atm}}$$

3) $2CO_{(g)} + O_{2(g)} \rightarrow 2CO_{2(g)}$

a) $10.0\text{mol CO}\left(\frac{2\text{ mol } CO_2}{2\text{ mol CO}}\right)\left(\frac{22.4\text{L}}{1\text{mol } CO_2}\right) = \boxed{224\text{ L } CO_2}$

b) $10.0\text{mol CO}\left(\frac{2\text{ mol } CO_2}{2\text{ mol CO}}\right) = 10.0\text{mol } CO_2$ $\quad V = \frac{nRT}{P} = \frac{(10.0\text{mol})\left(0.0821\ \frac{\text{L·atm}}{\text{mol·K}}\right)(298\text{K})}{1.3\text{atm}}$

$$\boxed{V = 188\text{ L } CO_2}$$

4) $\frac{70.90\text{ g}}{1\text{ mol } Cl_2}\left(\frac{1\text{mol } Cl_2}{22.4\text{L}}\right) = \boxed{3.17\ \text{g/L}}$ Cl_2 density at STP

5) Charles' Law

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$ $\quad \frac{0.750\,L}{298\,K} = \frac{0.500\,L}{T_2}$ $\quad \boxed{T_2 = 199\,K}$

6) Gay Lussac

$\frac{P_1}{T_1} = \frac{P_2}{T_2}$ $\quad \frac{4.50\,atm}{293\,K} = \frac{4.80\,atm}{T_2}$ $\quad \boxed{T_2 = 313\,K}$

7) Boyle's Law

$P_1V_1 = P_2V_2$ $\quad (0.974\,atm)(125\,mL) = (1.00\,atm)(V_2)$

$\boxed{V_2 = 122\,mL}$

8) Combo

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ $\quad \frac{(1.00\,atm)(75\,mL)}{273\,K} = \frac{(0.97\,atm)(V_2)}{290\,K}$

$\boxed{V_2 = 82\,mL}$

9) (a) $n = \frac{PV}{RT} = \frac{(4.40\,atm)(15.0\,L)}{(0.0821\frac{L\cdot atm}{mol\cdot K})(305\,K)} = 2.64\,mol\,C_2H_4\left(\frac{28.06\,g}{1\,mol\,C_2H_4}\right) = \boxed{74.1\,g\ C_2H_4}$

(b) $D = g/L = \frac{74.1\,g}{15.0\,L} = \boxed{4.94\,g/L}$

10a) $4.00\,L\,H_2\left(\frac{2\,L\,H_2O}{2\,L\,H_2}\right) = 4.00\,L\,H_2O$ vapor at STP

b) $5.00\,g\,H_2\left(\frac{1\,mol\,H_2}{2.02\,g}\right)\left(\frac{2\,mol\,H_2O}{2\,mol\,H_2}\right) = 2.48\,mol\,H_2O$ $\quad V = \frac{nRT}{P}$

$V = \frac{(2.48\,mol)(0.0821\frac{L\cdot atm}{mol\cdot K})(310\,K)}{1.50\,atm}$

$\boxed{V = 42.1\,L\,H_2}$