Chemistry 230
Problem Set #2

1. $M = 30.1\ g/mol$ — C_2H_6

2. $0.9345\ g/L$ C_2H_2

3. N_2 - 0.133 mol ; H_2 - 0.400 mol ; NH_3 - 1.33_3 mol

4. $411\ K$ - 0.421 mol $(0.421\ g)$
   $299\ K$ - 0.579 mol $(0.579\ g)$
   Note: P is the same in both bulbs.

5. For (b) it may be easier to calculate $\left(\frac{\partial T}{\partial P}\right)_{V_m}$ & show that it equals κ/α.

6. $\left.\begin{array}{l}\alpha \approx 2.6 \times 10^{-4}\ K^{-1} \\ \kappa \approx 4.8 \times 10^{-5}\ atm^{-1}\end{array}\right\} \left(\frac{\partial P}{\partial T}\right)_{V_m} \approx 5.5\ \frac{atm}{K}$

7. $(\Delta P)_V \approx 22\ atm \rightarrow P_{20°C} \approx 23\ atm$

8. $\lim_{P \to 0}\left(\frac{P}{\rho}\right) = 2.858\ \frac{g}{L \cdot atm} \Rightarrow M = 64.06\ \frac{g}{mol}$

   $\boxed{SO_2}$

9. $T_{app} = 273.16 \cdot \left(\frac{P_{100°C}}{P_{ref}}\right) =$ $374.77\ K\ \left(\frac{n}{V} = 0.1000\right)$
   $373.63\ \ (0.030000)$
   $373.32\ \ (0.010000)$