HW1 Addendum / Corrections

Conversion problem:

$$R = \frac{8.314\ \text{cm}^3\ 10^6\ \text{Pa}}{\text{mol K}} \left| \frac{1\ \text{mL}}{\text{cm}^3} \right| \frac{2.6\times10^{-4}\ \text{gal}}{1\ \text{mL}} \left| \frac{1\ \text{psi}}{6890\ \text{Pa}} \right| = \frac{0.314\ \text{gal psi}}{\text{mol}\cdot\text{K}}$$

Problem 4..

Should have found V_m by dividing by $n = 2$, not 22.4. Sorry.

Problem N1.23 2 masses, same V of gas

chemical N: 2.2990 g

atmospheric N: $2.3102\ \text{g} = n_{Ar} M_{Ar} + n_N M_N = n\left[x_{Ar} M_{Ar} + (1 - x_{Ar}) M_N\right]$

Ratio: $\frac{2.3102\ \text{g}}{2.2990\ \text{g}} = \frac{x_{Ar} M_{Ar}}{M_N} + (1 - x_{Ar})$

$$x_{Ar} = x_{Ar}\left(\frac{M_{Ar}}{M_N} - 1\right) = \frac{2.3102}{2.2990} - 1$$

$$x_{Ar} = \frac{(2.3102/2.2990) - 1}{(40\ \text{g mol}^{-1}/28\ \text{g mol}^{-1}) - 1} = 0.011$$

Problem 3 Irreversible case:

Step 2 (missing from key): $P_F = 10$ bar $P_I = 100$ bar

$$w_2 = -nRT\left(1 - \frac{P_F}{P_i}\right) = (2\ \text{mol})\left(\frac{8.314\ \text{J}}{\text{K mol}}\right) 300\ \text{K}\left(1 - \frac{10}{100}\right)$$

$$w_2 = -4489\ \text{J} = -q_2$$