Equilibrio inicial: **P. 1.3**

$$T_{A0} = \frac{p_{A0} V_0}{n_A R} \qquad p_{A0} = p_{B0} \quad \text{(Equilibrio del émbolo adiabático)}$$

$$T_{B0} = T_0 = \frac{p_{B0} V_0}{n_B R} \qquad p_{B0} = \frac{n_B R T_0}{V_0}$$

$$p_{B0} = p_{A0} = \frac{T_{A0} n_A \cancel{R}}{\cancel{V_0}} = \frac{n_B \cancel{R} T_0}{\cancel{V_0}} \qquad T_{A0} = T_0 \frac{n_B}{n_A}$$

Compresión adiabática del gas en A:

$$T_{Af} V_{Af}^{(\gamma-1)} = T_{A0} V_0^{(\gamma-1)} \qquad T_{Af} \left(\frac{V_0}{2}\right)^{(\gamma-1)} = T_{A0} V_0^{(\gamma-1)}$$

$$T_{Af} = T_{A0}\, 2^{(\gamma-1)} = T_0 \frac{n_B}{n_A} 2^{(\gamma-1)}$$

para las presiones en la compresión adiabática

$$p_{Af} V_{Af}^{\gamma} = p_{A0} V_0^{\gamma} \qquad p_{Af} \left(\frac{V_0}{2}\right)^{\gamma} = p_{A0} V_0^{\gamma}$$

$$p_{Af} = p_{A0}\, 2^{\gamma} = \frac{n_A R T_{A0}}{V_0} 2^{\gamma} = \frac{n_A R T_0}{V_0} \frac{n_B}{n_A} 2^{\gamma}$$

$$p_{Af} = \frac{n_A R T_{A0}}{V_0} 2^{\gamma} = \frac{n_B R T_0}{V_0} 2^{\gamma}$$

$$p_{A0} = p_{B0}$$

El volumen $V_{Bf} = \dfrac{n_B R T_0}{P_{Bf}}$ $\quad P_{Bf} = P_{Af}$

$$V_{Bf} = \frac{n_B R T_0}{P_{B0}\, 2^{\gamma}} = \frac{n_B R T_0}{P_{B0}}\, 2^{-\gamma} = V_0\, 2^{-\gamma}$$

$\dfrac{n_B R T_0}{P_{B0}} = V_0$

Para el gas en A $\quad Q_A = 0 \quad \Delta U_A = W_A$

$$W_A = \frac{n_A R}{\gamma - 1}\left(T_{Af} - T_{A0}\right) = \frac{n_A R}{\gamma - 1}\left(T_0 \frac{n_B}{n_A} 2^{(\gamma-1)} - T_0 \frac{n_B}{n_A}\right)$$

$$W_A = \frac{n_B R}{\gamma - 1} T_0 \left(2^{(\gamma-1)} - 1\right)$$

El calor intercambiado por el gas en B con el foco es $\quad \Delta U_B = 0 = Q_B + W_B \quad Q_B = -W_B$

$$Q_B = \int_{V_0}^{V_{Bf}} p\, dv = \int_{V_0}^{V_{Bf}} \frac{n_B R T_0}{V}\, dv$$

$$Q_B = n_B R T_0 \ln\left(\frac{V_{Bf}}{V_0}\right) = n_B R T_0 \ln\left(\frac{V_0 2^{-\gamma}}{V_0}\right)$$

$$Q_B = -n_B R T_0\, \gamma \ln 2 < 0$$