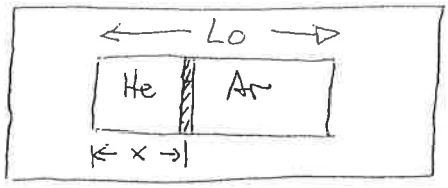
$L_0 = 80$ cm



Equilibrio inicial: $T_{agua} = T_{He} = T_{Ar} = T_0 = 25$

$L_{He} = L_1 = 30$ cm

$$V_{He} = A L_1 = \frac{n_{He} R T_0}{P_{He}} \quad ; \quad V_{Ar} = A(L_0 - L_1) = \frac{n_{Ar} R}{P_{Ar}}$$

Dividiendo:

$$n_{Ar} = n_{He} \frac{P_{Ar}}{P_{He}} \frac{L_0 - L_1}{L_1} = 1\,\text{mol} \times \frac{1\,\text{atm}}{5\,\text{atm}} \times \frac{50\,\text{cm}}{30\,\text{cm}} = \frac{1}{3}\,\text{mol}$$

— En la evolución $\cancel{Q}^{\,0} + W^{\,0} = (\Delta E_i)_{He} + (\Delta E_i)_{Ar} + (\Delta E_i)_{Agua}$

$$0 = \frac{n_{He} R}{\gamma - 1}(T_f - T_0) + \frac{n_{Ar} R}{\gamma - 1}(T_f - T_0) + m_{agua}\, c (T_f - T_0)$$

es decir $T_f = T_0 = 25°C$

— Equilibrio final: Equilibrio implica $P'_{He} = P'_{Ar}$

$$V'_{He} = x A = \frac{n_{He} R T_f}{P'_{He}} \quad , \quad V'_{Ar} = (L_0 - x) A = \frac{n_{Ar} R T_f}{P'_{Ar}}$$

Dividiendo

$$x = \frac{n_{He}/n_{Ar}}{1 + n_{He}/n_{Ar}} L_0 = \frac{3}{4} L_0 = 60\,\text{cm}$$

$$\rightarrow \Delta S = n_{He} R \ln \frac{x}{L_1} + n_{Ar} R \ln \frac{L_0 - x}{L_0 - L_1} + m_{agua} c \ln \frac{T_f}{T_0}^{\,0} =$$

$$= 0.032\ \text{atm} \times \ell / {}^{\circ}K.$$