(Ejercicio 9, semana 2, práctico 2)

calor ganado

$$\begin{aligned}\int_\alpha \Lambda dV + KdT &= \int_\alpha (-\frac{KdT}{dV}dV + KdT) \\ &= \int_\alpha (-KdT + KdT) = 0\end{aligned}$$

T en función de V

$$\frac{dT}{dV} = -\frac{\Lambda}{K} = -\frac{RT}{JK(V-b)}$$
$$\frac{dT}{T} = \left(-\frac{R}{JK}\right)\frac{dV}{V-b}$$

integrando

$$\int_{T_0}^{T} \frac{dT}{T} = \int_{V_0}^{V} \left(-\frac{R}{JK}\right)\frac{dV}{V-b}$$
$$\log T - \log T_0 = \left(-\frac{R}{JK}\right)(\log(V-b) - \log(V_0-b))$$
$$T = T_0\left(\frac{V_0-b}{V-b}\right)^{R/JK}$$

trabajo realizado

$$\begin{aligned}\int_\alpha PdV &= \int_{V_0}^{2V_0} \left(\frac{RT_0(V_0-b)^{R/JK}}{(V-b)^{R/JK+1}} - \frac{a}{V^2}\right)dV \\ &= -\frac{T_0JK(V_0-b)^{R/JK}}{(V-b)^{R/JK}} + \frac{a}{V}\Big|_{V_0}^{2V_0} \\ &= -\frac{T_0JK(V_0-b)^{R/JK}}{(2V_0-b)^{R/JK}} + T_0JK - \frac{a}{V_0}\end{aligned}$$

volumen final: $2V_0$
temperatura final:

$$\frac{RT_0(V_0-b)^{R/JK}}{(2V_0-b)^{R/JK}}$$

presión final:

$$\frac{RT_0(V_0-b)^{R/JK}}{(2V_0-b)}^{R/JK+1} - \frac{a}{4V_0^2}$$