

$$a) \left( \frac{dp}{dT} \right)_{12} = \frac{l_{12}}{T(v_2 - v_1)} = \frac{3.34 \cdot 10^5 \text{ J kg}^{-1}}{273.16 \text{ K} \times -9.05 \cdot 10^{-5} \text{ m}^3 \text{ kg}^{-1}} = -13.5 \times 10^6 \text{ J K}^{-1} \text{ m}^3$$

$$b) dp = \frac{l_{12}}{(v_2 - v_1)} \frac{dT}{T}$$

$$p - p_0 = \frac{l_{12}}{(v_2 - v_1)} \int \frac{dT}{T}$$

$$= \frac{l_{12}}{(v_2 - v_1)} \ln \left( \frac{T}{T_0} \right), \text{ where } T = 271.15 \text{ K} \\ \text{and } T_0 = 273.15 \text{ K}$$

$$p = 1 \text{ atm} + \frac{3.34 \cdot 10^5 \text{ J kg}^{-1}}{-9.05 \cdot 10^{-5} \text{ m}^3 \text{ kg}^{-1}} \ln \left( \frac{271.15}{273.15} \right)$$

$$= 1 \text{ atm} + 27 \times 10^6 \text{ Pa}$$

$$\approx 268.7 \text{ atm}$$