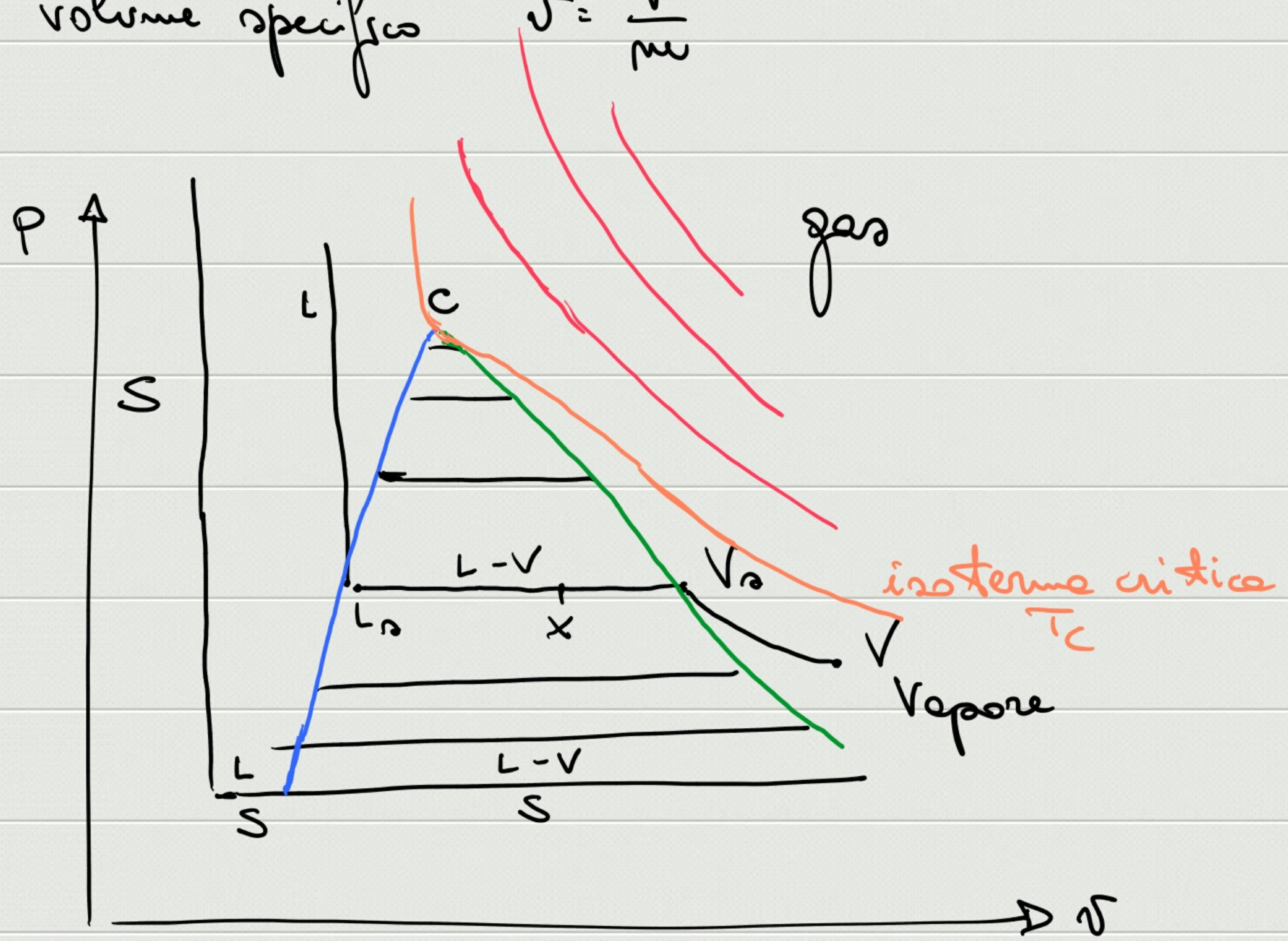
$$pV = c_0 + c_1 p + c_2 p^2 + c_3 p^3 + \dots$$

$$\overset{!}{=} d_0 + \frac{d_1}{V} + \frac{d_2}{V^2} + \frac{d_3}{V^3} + \dots$$

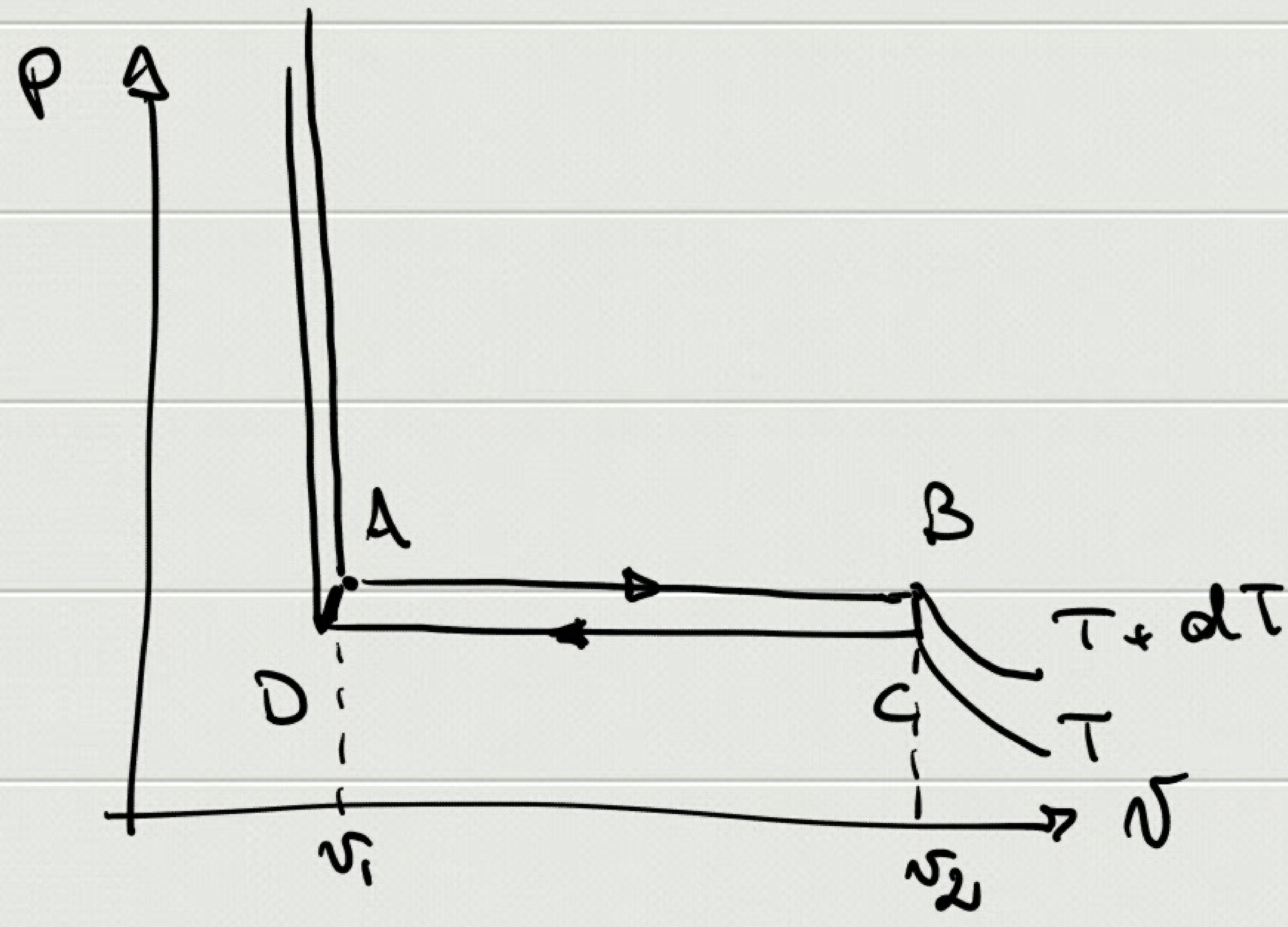
$$pV \xrightarrow[p \to 0]{} c_0 \qquad pV \xrightarrow[V \to \infty]{} d_0 \quad \Rightarrow \quad c_0 = d_0 \; (= nRT)$$

gas ideale $U = U(T)$ gas reale $U = U(T, p)$

volume specifico $v = \frac{V}{m}$



$$\delta Q_{BC} = \delta Q_{DA} \simeq 0$$



$$\eta = 1 - \frac{T}{T+dT} = \frac{dT}{T+dT} \simeq \frac{dT}{T}$$

$$= \frac{W_{TOT,m}}{Q_{ASS,m}} \Longrightarrow \frac{\delta W_m}{Q_{ASS,m}} = \frac{(v_2 - v_1)\,dp}{(m\lambda)/m}$$

$$\Longrightarrow \frac{dT}{T} = \frac{(v_2 - v_1)\,dp}{\lambda} \Longrightarrow \begin{cases} \dfrac{dT}{dp} = \dfrac{(v_2 - v_1)\,T}{\lambda} \\[2ex] \dfrac{dp}{dT} = \dfrac{\lambda}{(v_2 - v_1)\,T} \end{cases}$$

Formula di Clapeyron

H_2O $\quad T = 373.15\ K \quad \lambda_{eb} = 2.26 \cdot 10^5\ J/kg$

$v_2 = 1.72\ m^3/kg$ (vapore)

$v_1 = 10^{-3}\ m^3/kg$ (liquido)

$$\Rightarrow \frac{dp}{dT} = 3500\ Pa/K \Rightarrow \underset{(K)}{dT} = \frac{dp\ (Pa)}{3500}$$

$T = 273.15\ K \quad \lambda_{fu} = 3.3 \cdot 10^5\ J/kg$

$v_2 = 10^{-3}\ m^3/kg \quad v_1 = 1.09 \cdot 10^{-3}\ m^3/kg$

$$\frac{dp}{dT} = -1.34 \cdot 10^7\ Pa/K$$