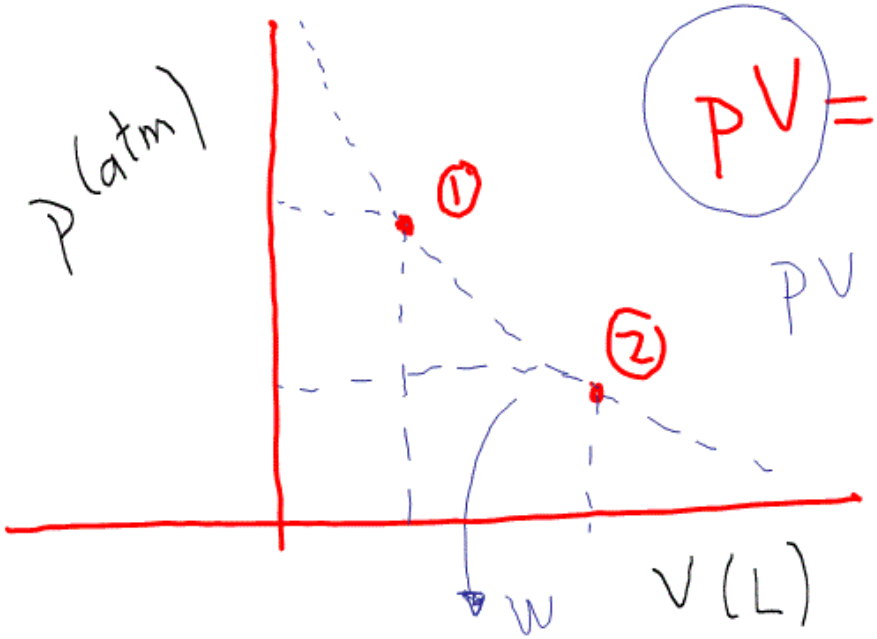
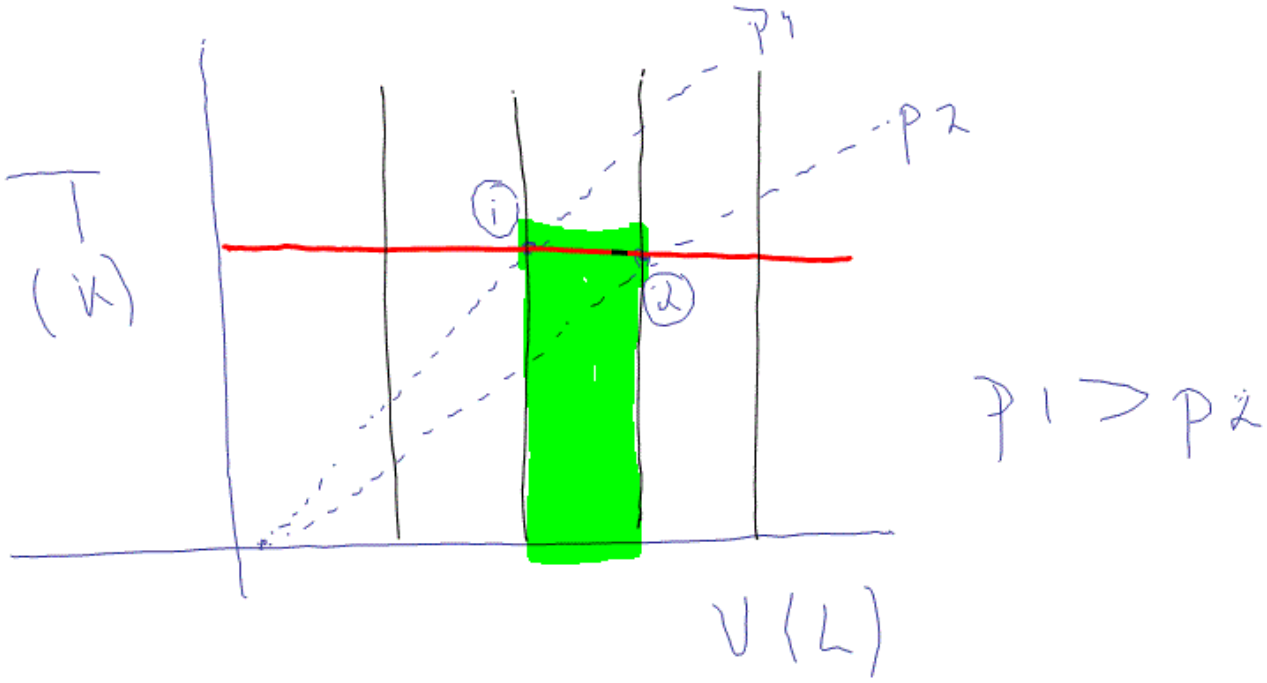
Clase 11 5 Octubre 2020

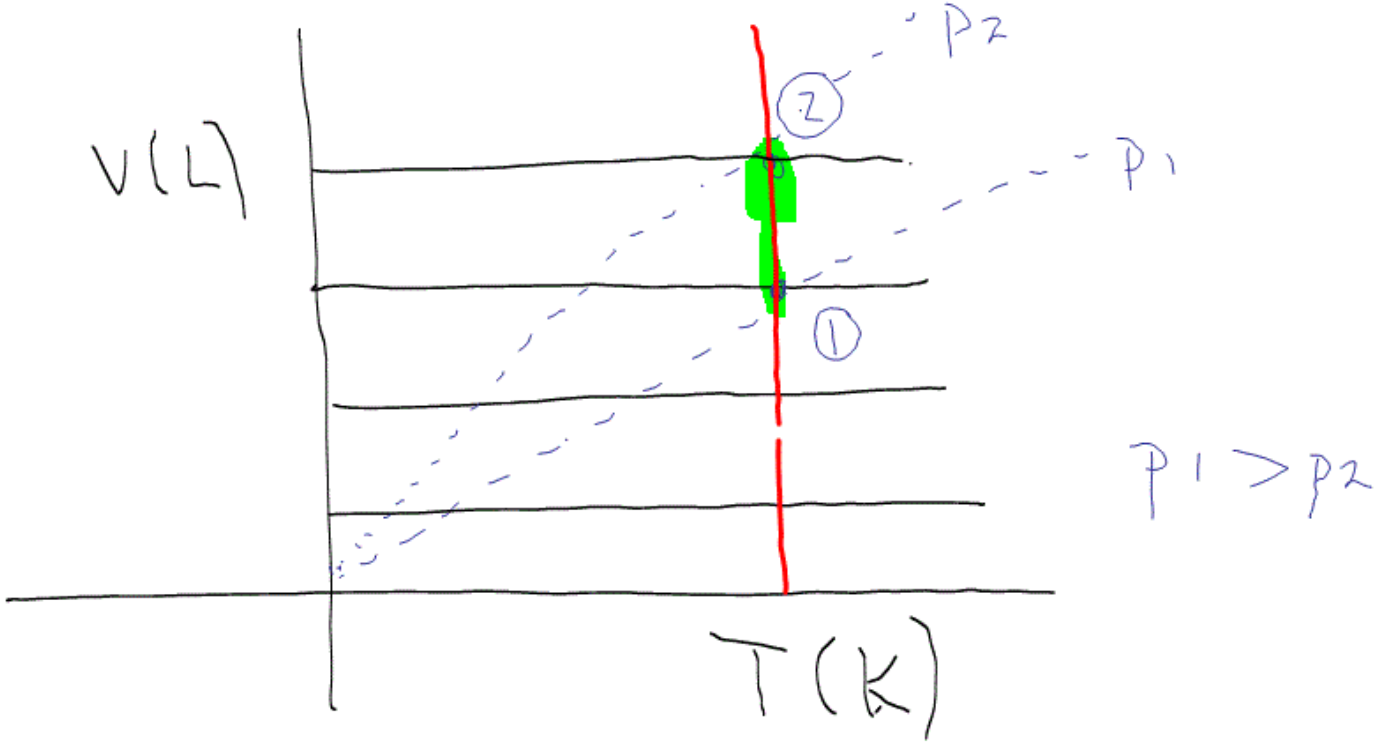
Título de la nota 05/10/2020

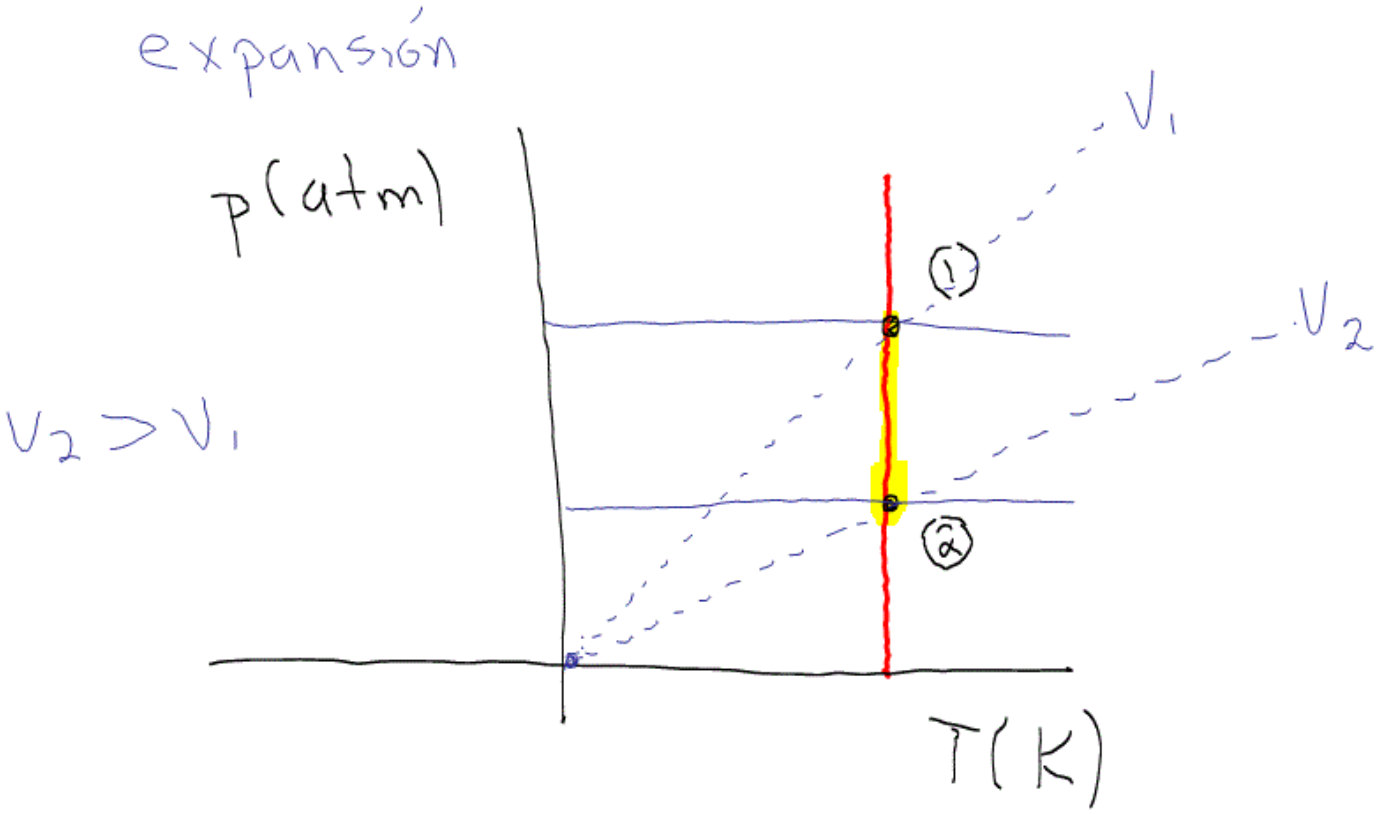


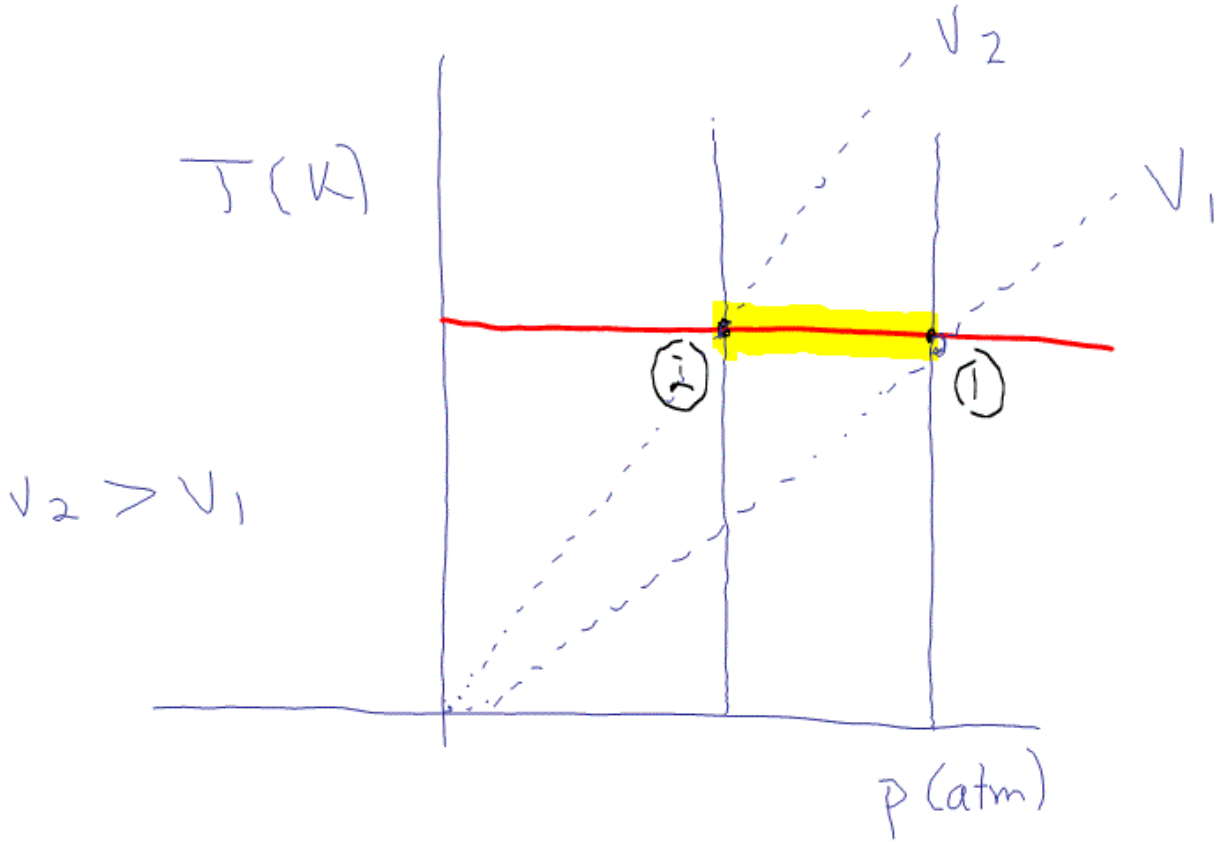
$$pV = nRT = cte$$

$$pV = \frac{N}{m^2}\, m^3 = J$$


P1
P2
T
(K)
1
2
V (L)
P1 > P2


V(L)
T(K)
P2
P1
2
1
P1 > P2


expansión
p(atm)
$V_2 > V_1$
V_1
V_2
(1)
(2)
T(K)

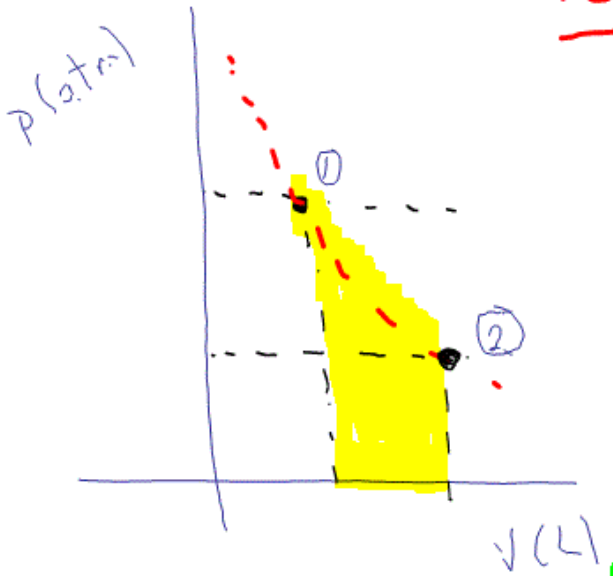

V2
T(K)
V1
2
1
V2 > V1
p (atm)

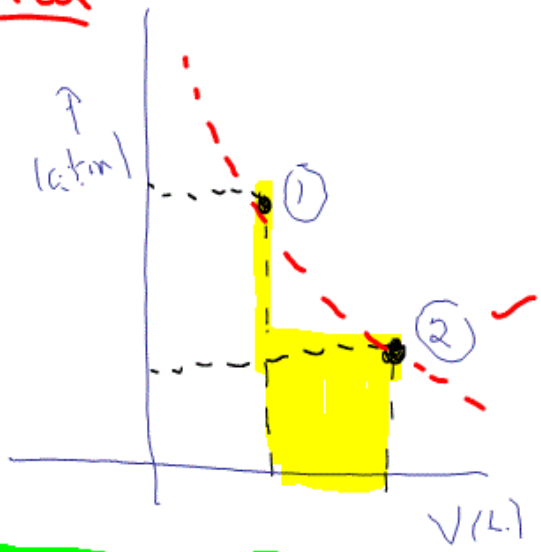
Rev

exp.

Isotérmica

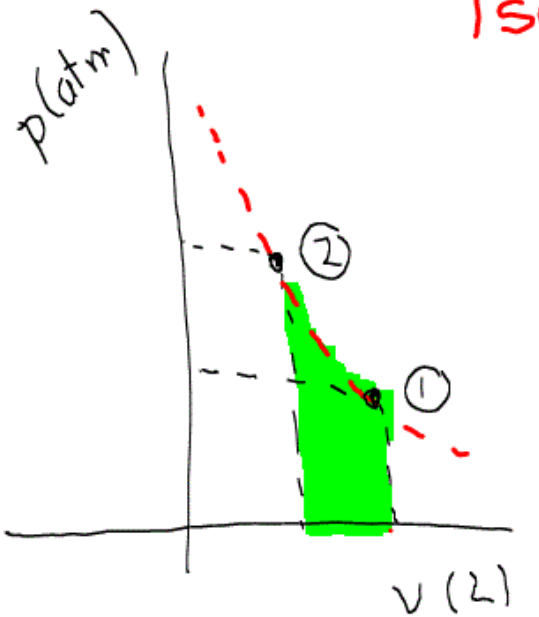
Irrev



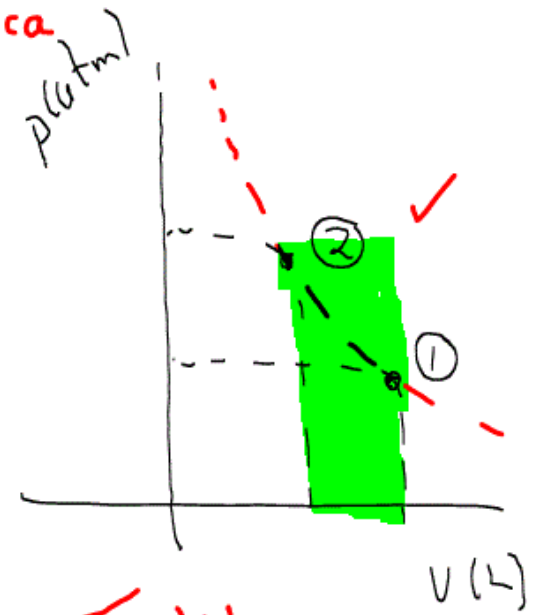


$W_{Rev} > W_{Irrev}$ = + exp.

Rev comp. Isotermica



Irrev.



$W_{Rev} < W_{Irrev} = -$

Ley I Termodinámica

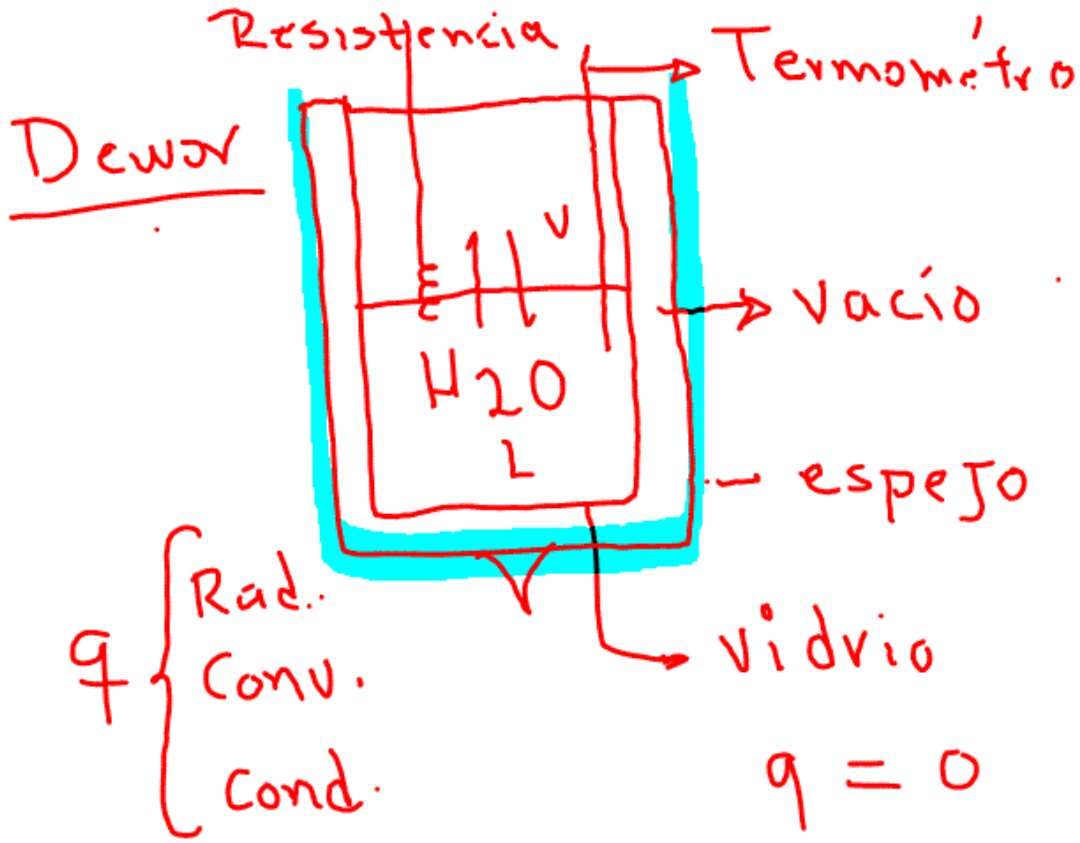
$$\Delta U \begin{cases} \sum_{i=1}^{n} \Delta \varepsilon_i \\ \varepsilon_c, \varepsilon_p, \varepsilon_R, \varepsilon_T, \varepsilon_v \\ \varepsilon_q \cdot W, q \end{cases}$$

Sistema cerrado y estático

$$\Delta U = \Delta \varepsilon_c + \Delta \varepsilon_p + \Delta \varepsilon_v + \Delta \varepsilon_R + \Delta \varepsilon_T + q - W$$

micro micro macro micro

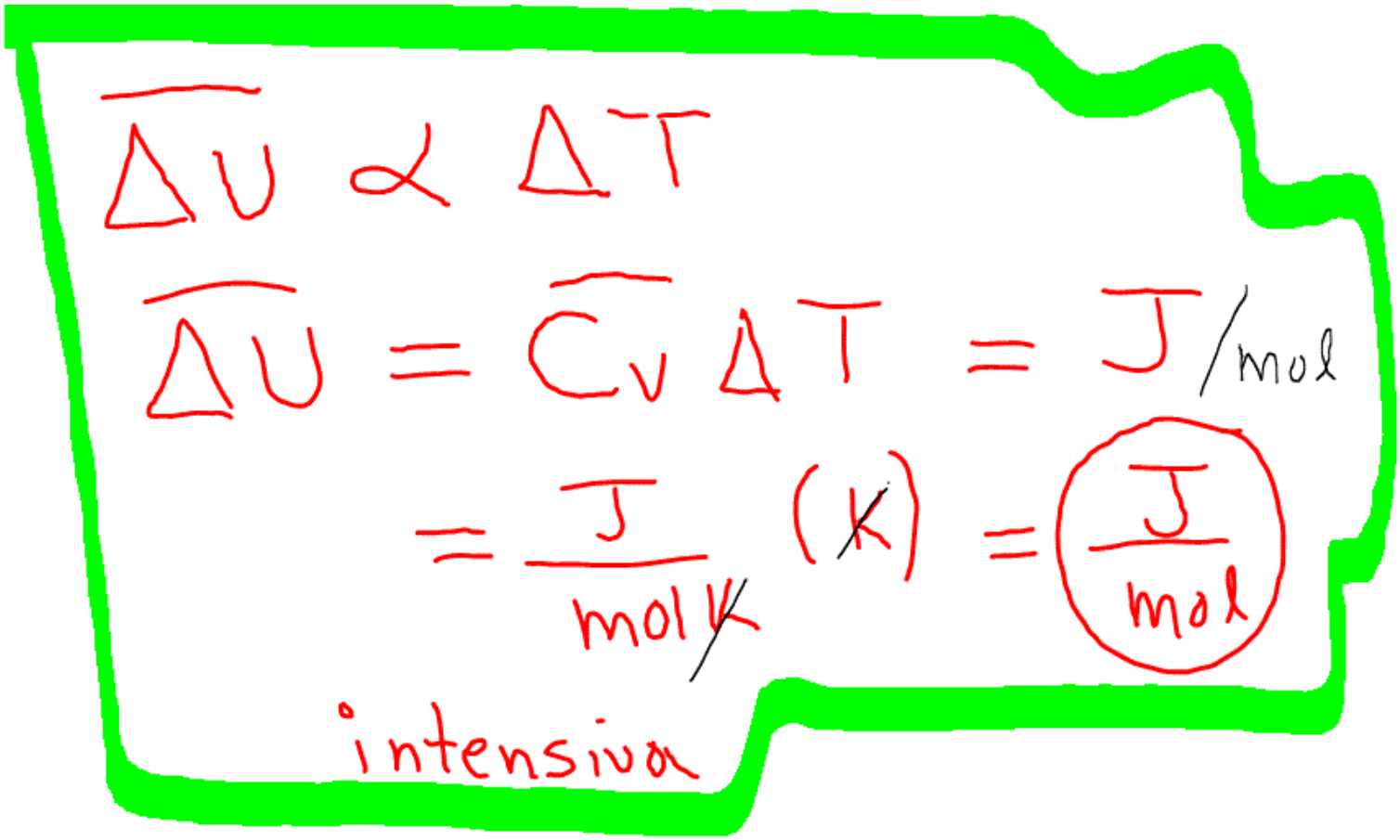
Calorimetro $\begin{cases} P = cte \\ V = cte \end{cases}$



sistema aislado

V = cte (rígido)

(adiabático)


$\overline{\Delta U} \propto \Delta T$
$\overline{\Delta U} = \overline{C_V}\,\Delta T = J/mol$
$= \frac{J}{mol\,K}\,(K) = \frac{J}{mol}$
intensiva

$$\Delta U = n \bar{C}_v \Delta T$$

$$= (\cancel{mol}) \left(\frac{J}{\cancel{mol} \cancel{K}} \right) (\cancel{K})$$

$$= J$$

extensivo

$$\Delta U = q - w$$

Sist. cerrados y estáticos

Isotérmico

$$\Delta U = nC_v \Delta T = 0$$

$$\Delta T = 0$$

$$\Delta U = q - w = 0$$

$$q = w$$

Ley 2 Termodinámica

ΔS

$(U\,ES) = \frac{J}{K}$

probabilidad de choque

$ds \geq \frac{đq}{T}$ Clausius

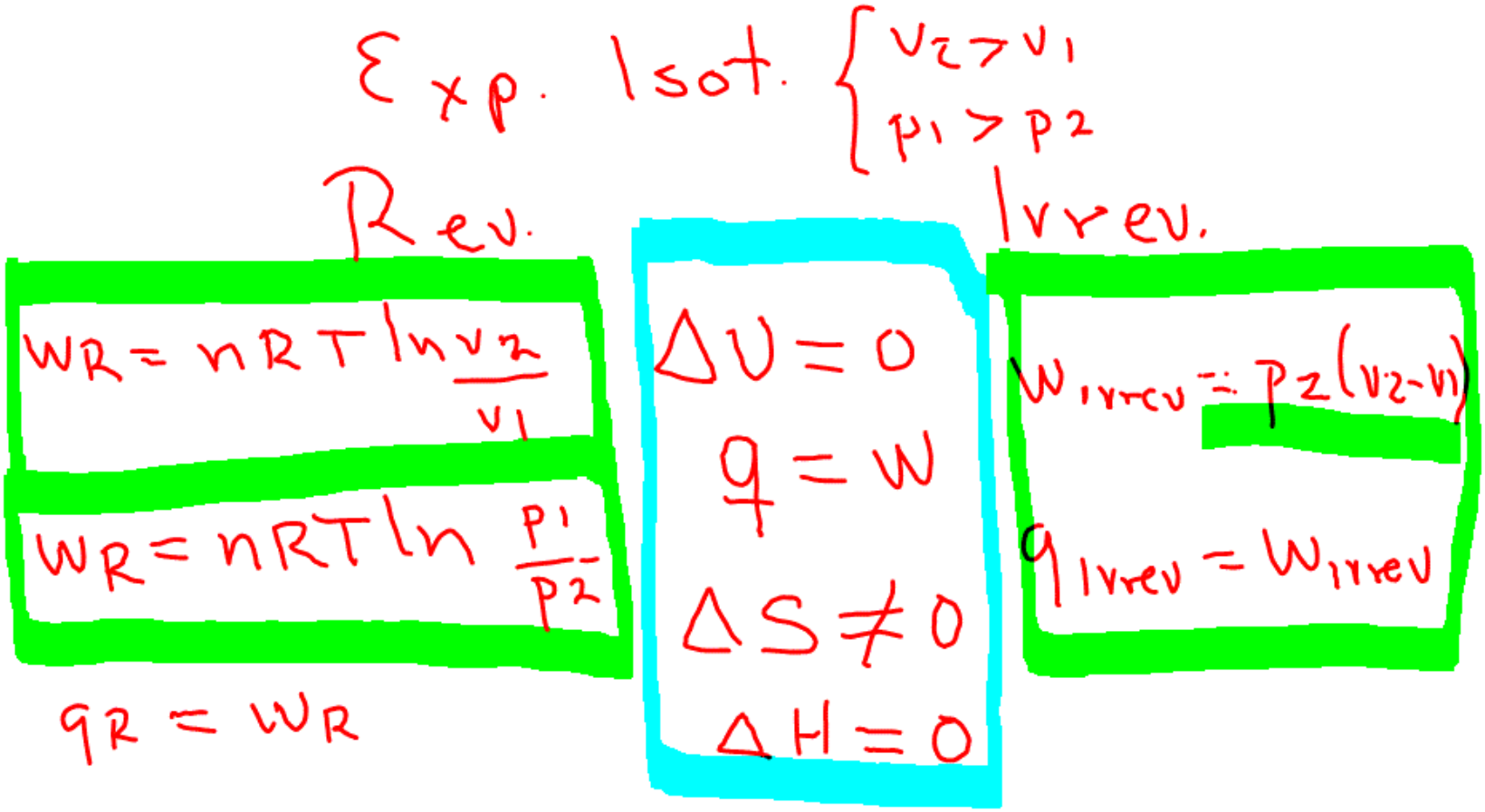
$ds >$ aislado Irrev.

$0 = ds = \frac{đq}{T}$ Reversible aislado

$$\Delta S_U = \Delta S_{SIS} + \Delta S_{Alr}$$

Naturaleza

$$\Delta S_U > 0$$


Exp. Isot. $V_2 > V_1$, $P_1 > P_2$
Rev.
Irrev.
$W_R = nRT \ln \frac{V_2}{V_1}$
$W_R = nRT \ln \frac{P_1}{P_2}$
$q_R = W_R$
$\Delta U = 0$
$q = W$
$\Delta S \neq 0$
$\Delta H = 0$
$W_{irrev} = P_2(V_2 - V_1)$
$q_{irrev} = W_{irrev}$

$$\Delta U = n \bar{C}_v \Delta T = 0 = q_v$$

$$\Delta H = n \bar{C}_p \Delta T = 0 = q_p$$

Isotérmico

$$\Delta T = 0$$

$$\Delta U = q - w$$

$$w = 0 \qquad \Delta U = 0$$

$$\Delta U = q_v \qquad v = cte$$

$$\Delta pV = \Delta n RT$$

$$\Delta H = \Delta U + \Delta pV$$

$$\Delta U = \Delta H - \Delta pV$$

$$\bar{C}_V < \bar{C}_p$$

$$\frac{J}{molK} \qquad \frac{J}{molK}$$

$$R = \frac{J}{molK}$$

Teorema Mayer

$$\overline{C}_p - \overline{C}_v = R$$

gases

$$\overline{C}_v = \overline{C}_p - R$$

$$\int_1^2 dW = p\int_{V_1}^{V_2} dV \qquad \text{trabajo mecánico}$$

$$W = p\,\Delta V \qquad W = \int p\,dV$$

$$p = \frac{nRT}{V}$$

$$\int_1^2 dW = nRT\int_{V_1}^{V_2}\frac{dV}{V}$$

$$\Delta U = q - w$$

$$W_{Rev} = nRT\ln\frac{V_2}{V_1} = + \quad V_2 > V_1$$

$$\int_1^2 dw = p_2 \int_{V_1}^{V_2} dV \qquad \text{Irrev.}$$

$$W_{irrev} = p_2 (V_2 - V_1)$$