Clase 9 8 Septiembre 2021

Título de la nota 08/09/2021

$PV = nRT$ } Ley conservación energía y materia

$PV = nRT$

sistema cerrado

$n = cte$

$R =$ proporcionalidad

$$pV = nRT$$

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

$V \to 0 \quad p \to 0$

perfecto
- gases monoatómicos
- $\overline{C_p} = cte$

$PV = nRT$

ideal
- Otros gases
- $\overline{C_p} = f(T)$

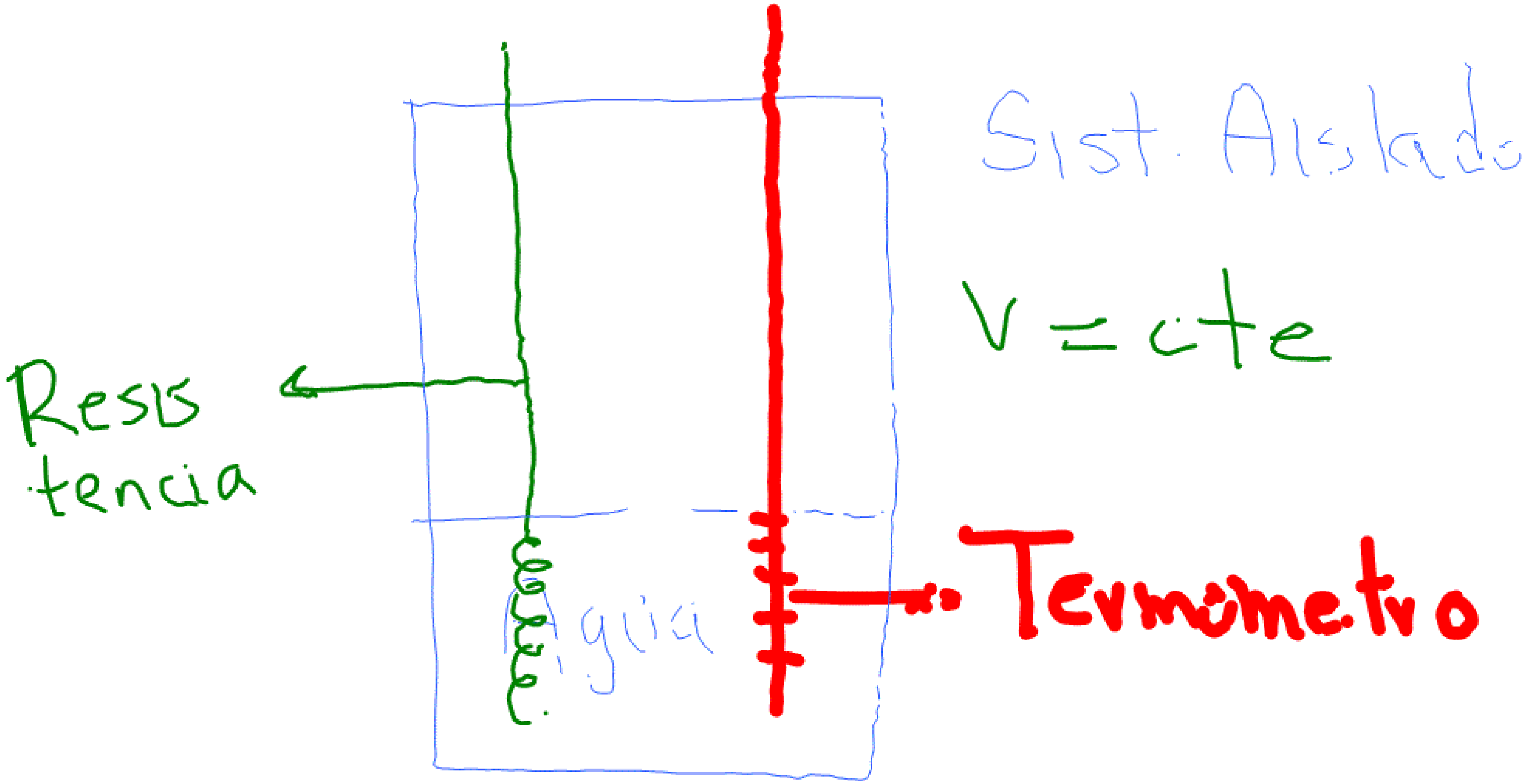
Capacidad Calorífica

$$\left\{ \begin{array}{l} \dfrac{cal}{mol\,K} \\[2ex] \dfrac{J}{mol\,K} \end{array} \right.$$

Teorema de Mayer

$$\overline{C_p} - \overline{C_v} = R$$

$$PV = nRT$$



Funciones de estado $\{ H, U, S, G, A$

$$\Delta U \propto \Delta \bar{T}$$

$$U_2 - U_1 = \Delta U \propto \Delta \bar{T}$$

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

$$\overline{\Delta U} = \overline{C_v}\,\Delta T$$

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

$$\overline{\Delta U} = \frac{J}{mol}$$ intensiva

$$\Delta U = J$$ extensiva

$\overline{\Delta H} = \frac{\bar{J}}{mol}$ intensiva

$\Delta H = J$ extensiva

$$\Delta U = n\bar{C_v}\Delta T$$

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

$$\Delta U = J$$

$\bar{C}_p \simeq \bar{C}_v$ { sólidos
líquidos

no tengan
pvapor alta

$$R = \frac{PV}{nT}$$

Condiciones normales

$P = 1\,atm \quad n = 1\,mol$

$T = 273.15\,K \quad V = 22.4\,L$

$$R = \frac{(1\,atm)(22.4\,L)}{(1\,mol)(273.15\,K)}$$

$$= \frac{0.082\,atm\,L}{mol\,K}$$

Obtención de variables termodinámicas de acuerdo al modelo ideal

Instrucción: Insertar los valores correspondientes en las celdas de color amarillo, dejando en blanco la variable a calcular

p (atm)	n (mol)	R (atmL/molK)	T(K)	V (L)
1		0.082	273.15	22.4

presión	0.000 atm	0.00 kPa	0.0000e+0 N/m^2	0.0000 bar

moles	1.000 mol

modelo ideal	pV=nRT

Temperatura	0.00 K	0.00 °C	0.00 °F

Volumen	0.0000 L	0.0000 m^3	0.00 mL

FES ZARAGOZA

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Resetear Imprimir

$$R = \left(\frac{0.082\ \text{atm L}}{\text{mol K}}\right)\left(\frac{1.01325 \times 10^{5}\ N/m^{2}}{\text{atm}}\right)\left(\frac{1\ m^{3}}{10^{3}\ L}\right)$$

$$= \frac{(N/m^{2})(m^{3})}{\text{mol K}} = \frac{J}{\text{mol K}}$$

$$= (8.2 \times 10^{-2})(1.01325 \times 10^{2})$$

$$= 8.314\ J/\text{mol K}$$

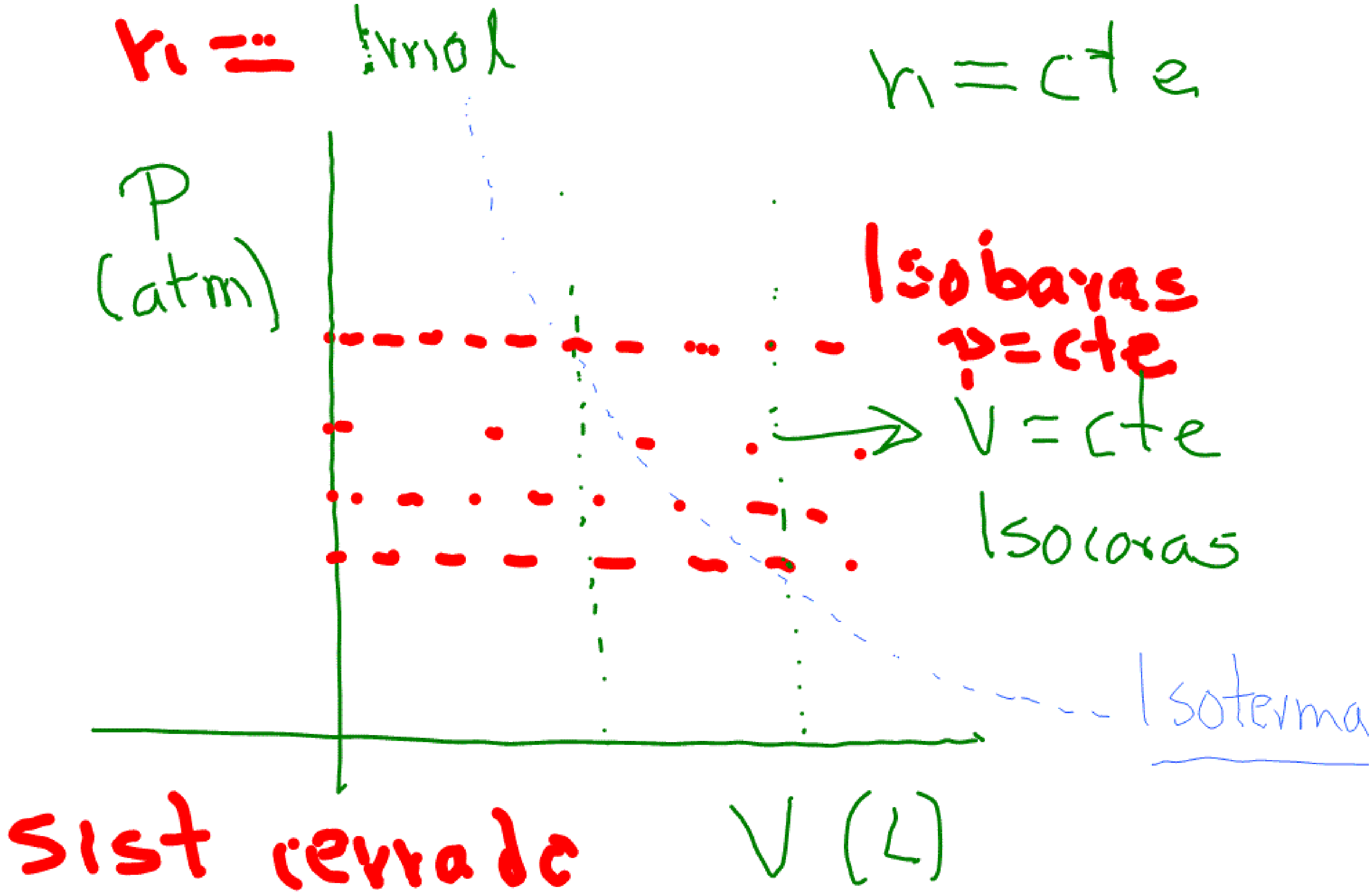
equivalente mecánico del calor

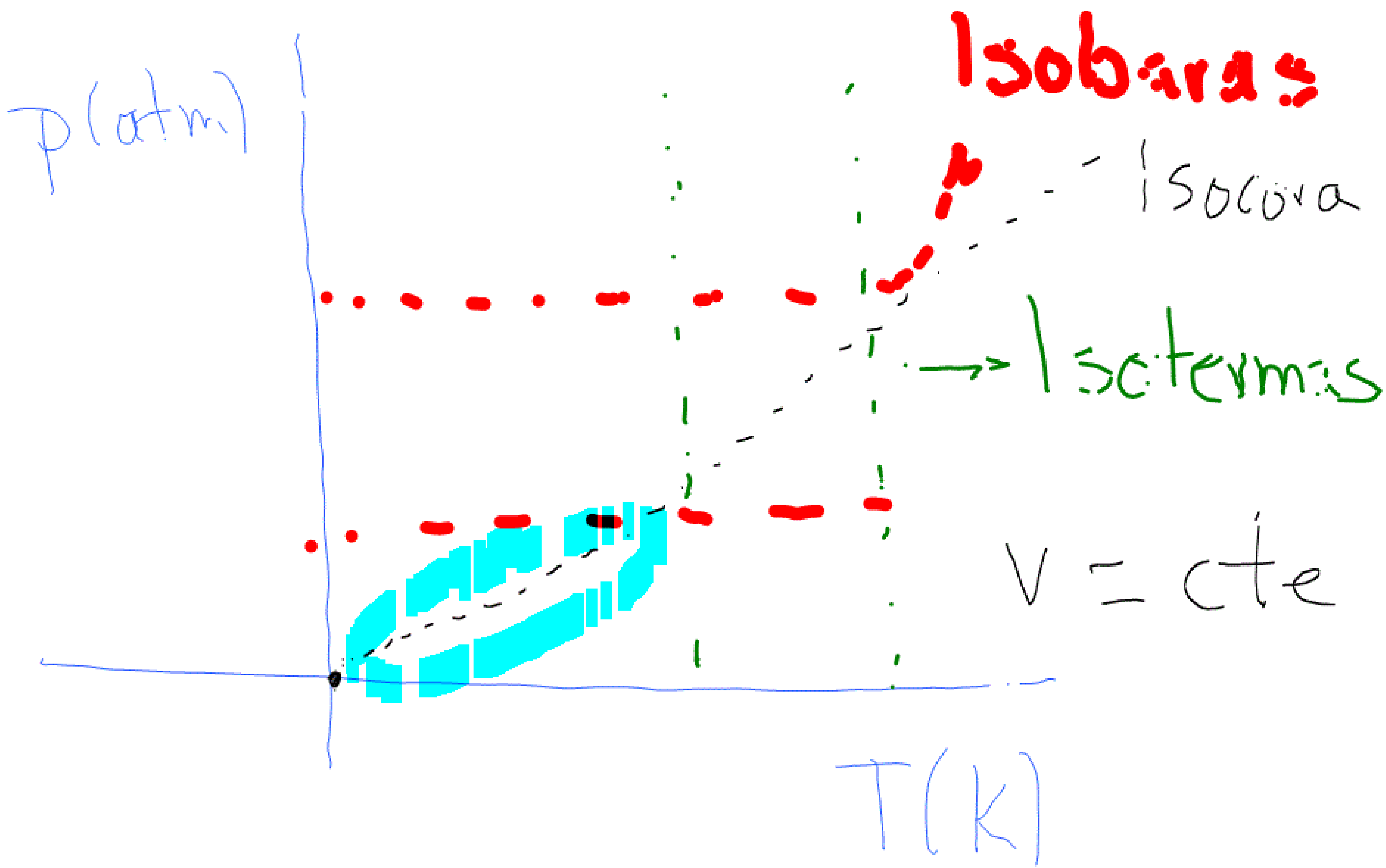
$$1\ cal = 4.186\ J$$

$$\left(\frac{8.314\ J}{mol\ K}\right)\left(\frac{1\ cal}{4.186\ J}\right) = \frac{1.9861\ cal}{mol\ K}$$

Helmholtz ΔA

ecuaciones Fundamentales de la Termodinámica

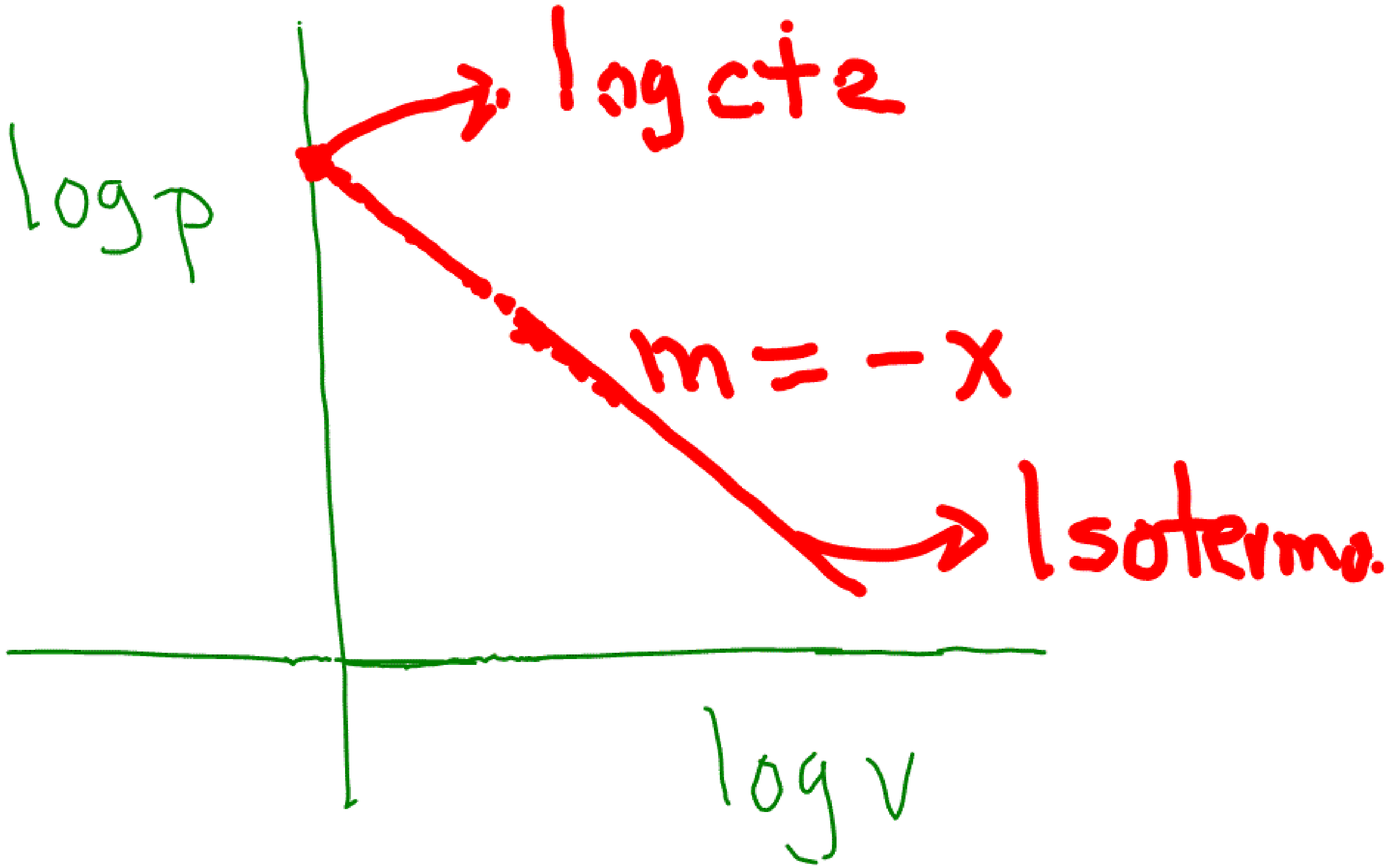

n = 1 mol
n = cte
P (atm)
Isobaras
p = cte
V = cte
Isocoras
Isoterma
sist cerrado
V (L)


Isobaras
isocora
Isotermas
V = cte
p (atm)
T (K)

$$\left(pV^{x} = cte\right) \log$$

$$\log p + x \ln v = \log cte$$

$$\boxed{\log p = \log cte - x \ln v}$$


log cte
log p
m = -x
Isotermo.
log v

$PV^{x} = cte$

$x = 1$ Isotérmico

$PV = cte \rightarrow T$