Clase 28 4 octubre 2021

Título de la nota 04/10/2021

ideal

H (J)	-6721.244
U (J)	-5391.004
S (J/K)	-18.720
(J)	-6721.244
v (J)	-1329.384
v (J)	-1330.240

perfecto Tablas

ΔH (J)	-6281.600
ΔU (J)	-3627.200
ΔS (J/K)	-17.521
q (J)	-6281.600
w (J)	-1329.384
w (J)	-2654.400

[redacted]

perfecto referencia

ΔH (J)	-5986.080
ΔU (J)	-4655.840
ΔS (J/K)	-16.697
q (J)	-5986.080
w (J)	-1329.384
w (J)	-1330.240

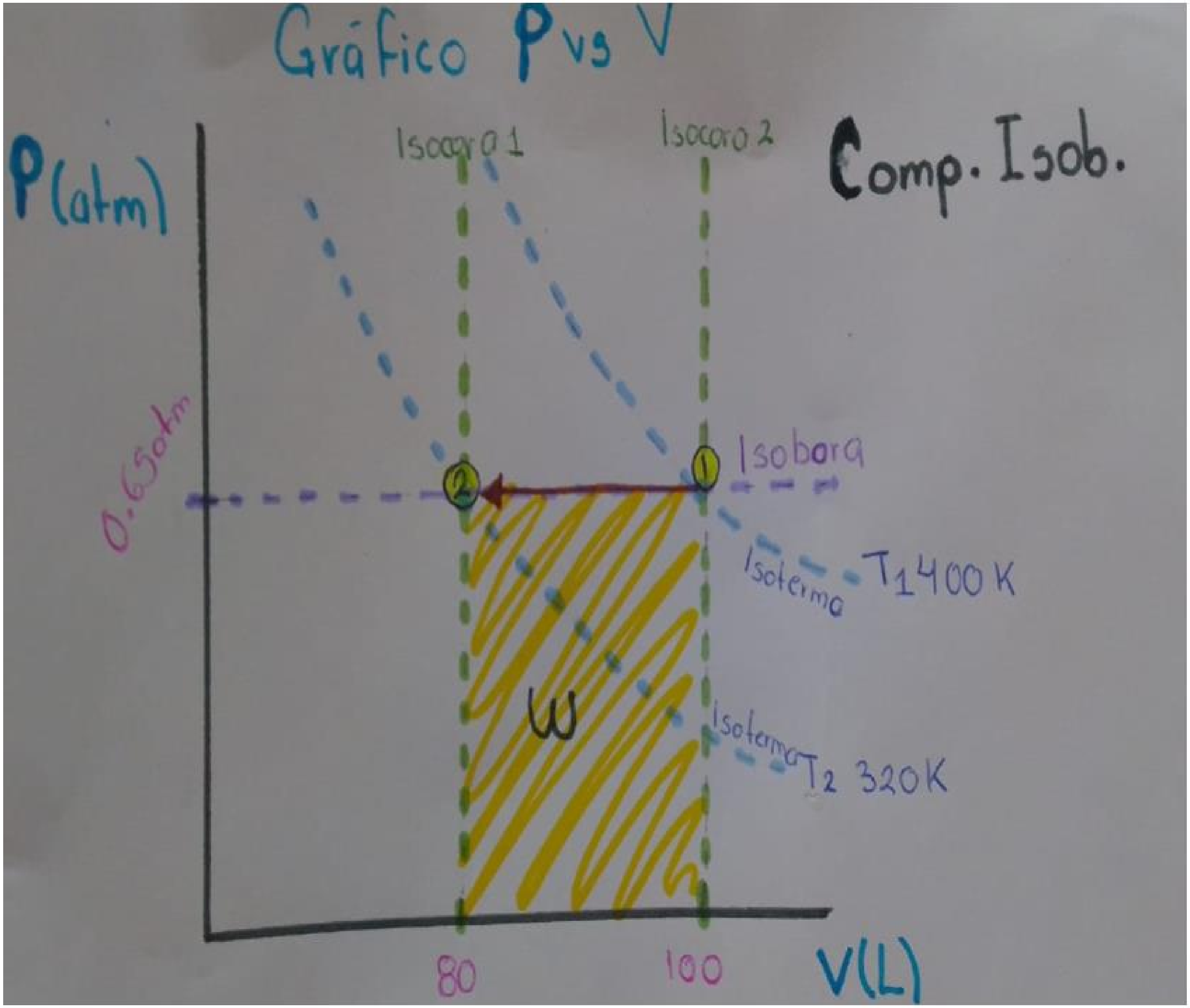
Gráfico P vs V
P(atm)
Isocoro 1
Isocoro 2
Comp. Isob.
0.65atm
Isobara
Isoterma T1 400 K
Isoterma T2 320K
W
80
100
V(L)

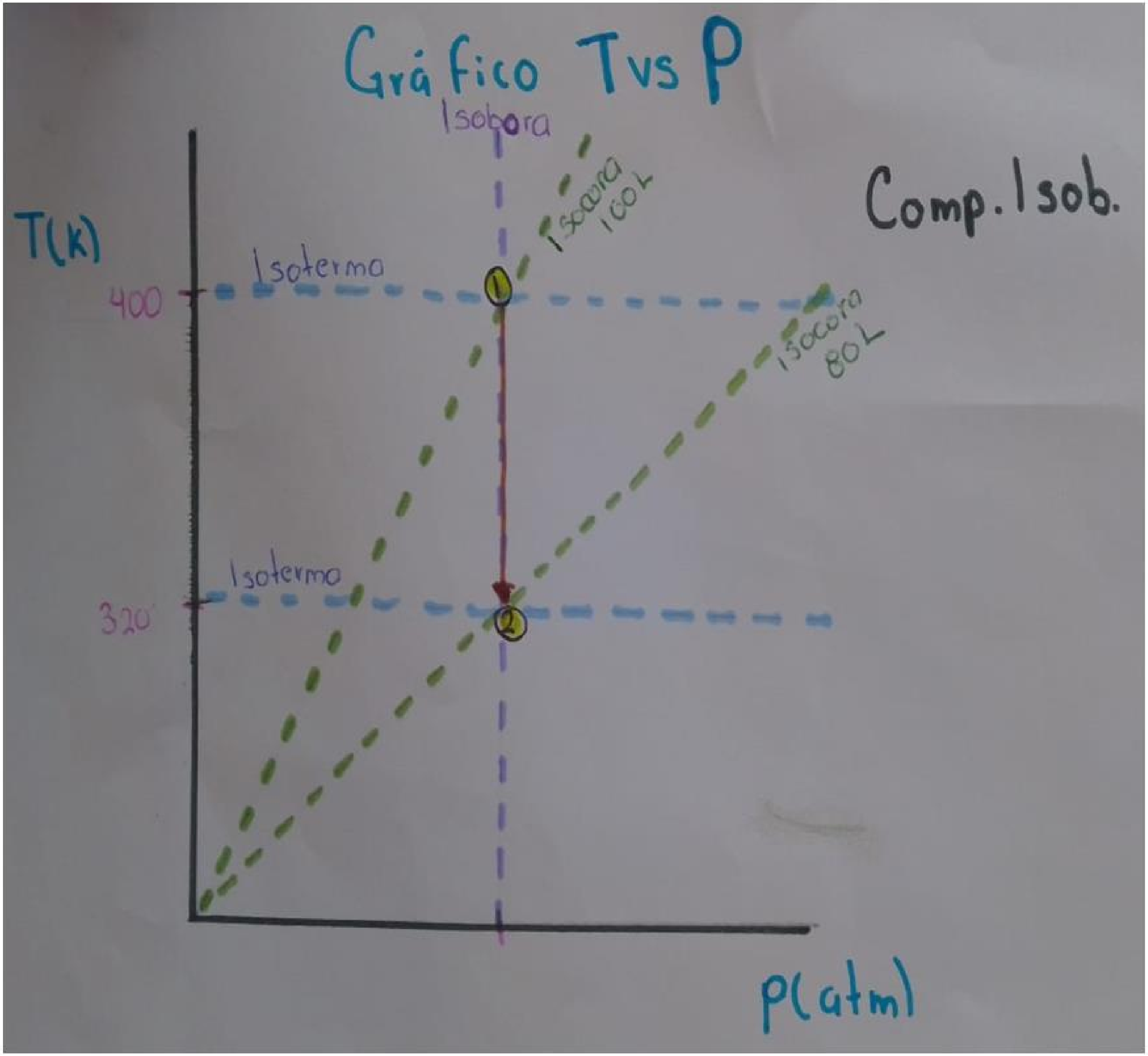
Gráfico T vs P
Isobara
Isocora 100L
Comp. Isob.
T(K)
Isotermo
400
1
Isocora 80L
Isotermo
320
2
P(atm)

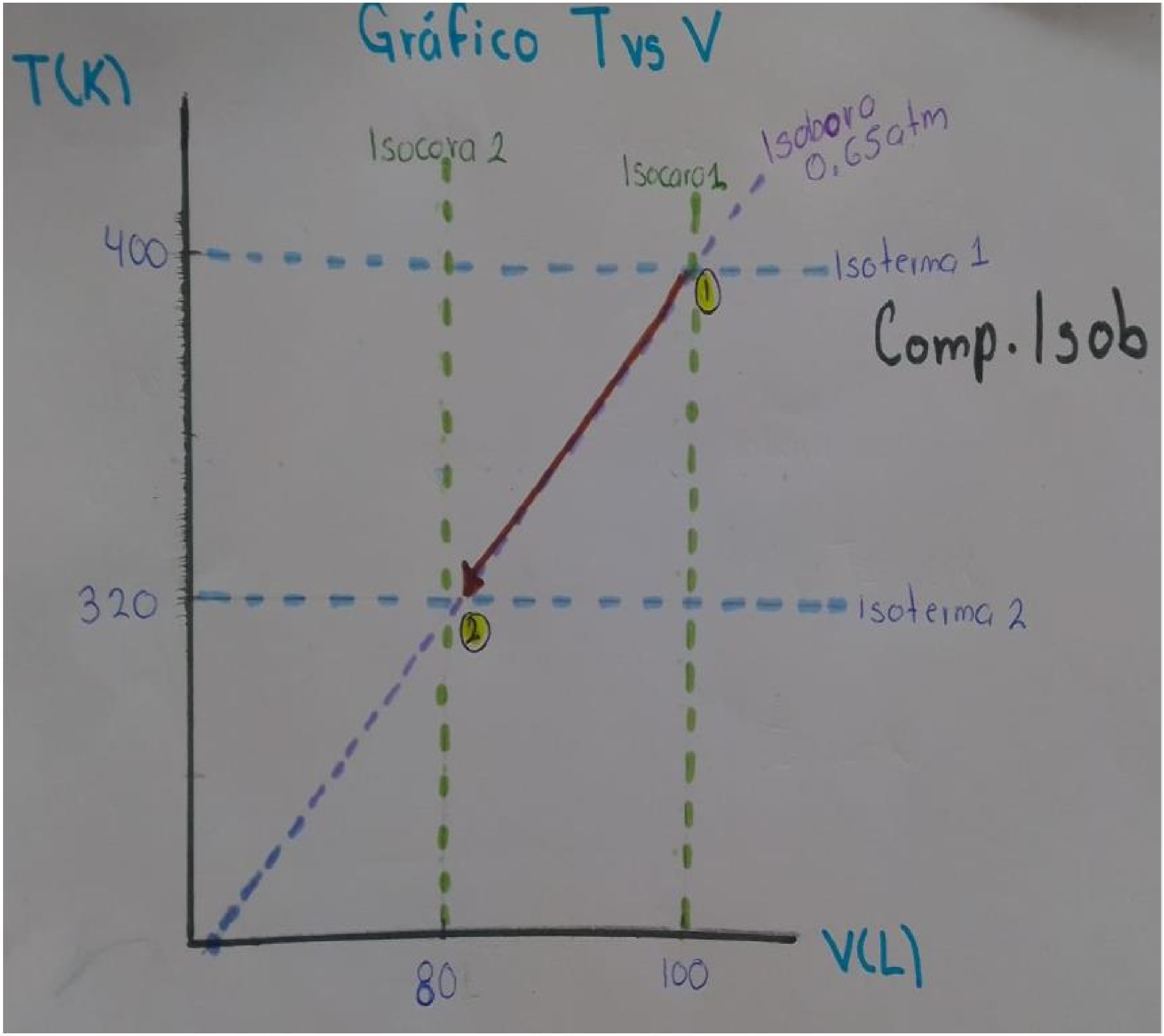
Gráfico T vs V
T(K)
Isocora 2
Isocaro1
Isobara
0.65atm
400
Isoterma 1
Comp. Isob
320
Isoterma 2
80
100
V(L)


Gráfico S vs T
Isoterma 2
Isoterma 1
Isobora 0.65atm
Isoentrópica 1
Isoentrópico 2
Comp. Isob.
S (J/K)
ΔS
ΔS
q (−)
320
400
T(K)

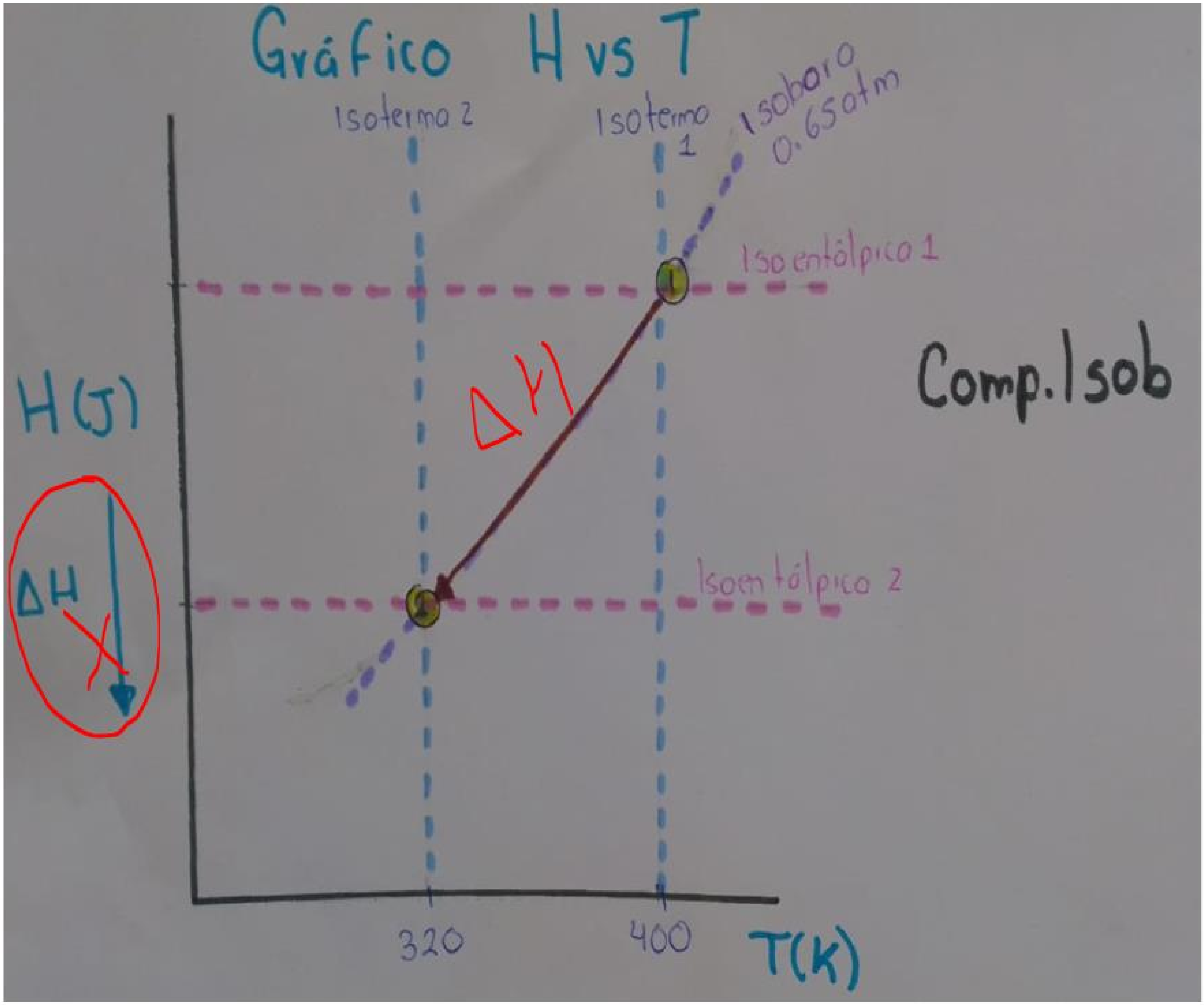
Gráfico H vs T
Isoterma 2
Isoterma 1
Isobara 0.65atm
Isoentálpico 1
Isoentálpico 2
H(J)
ΔH
ΔH
Comp.Isob
320
400
T(K)

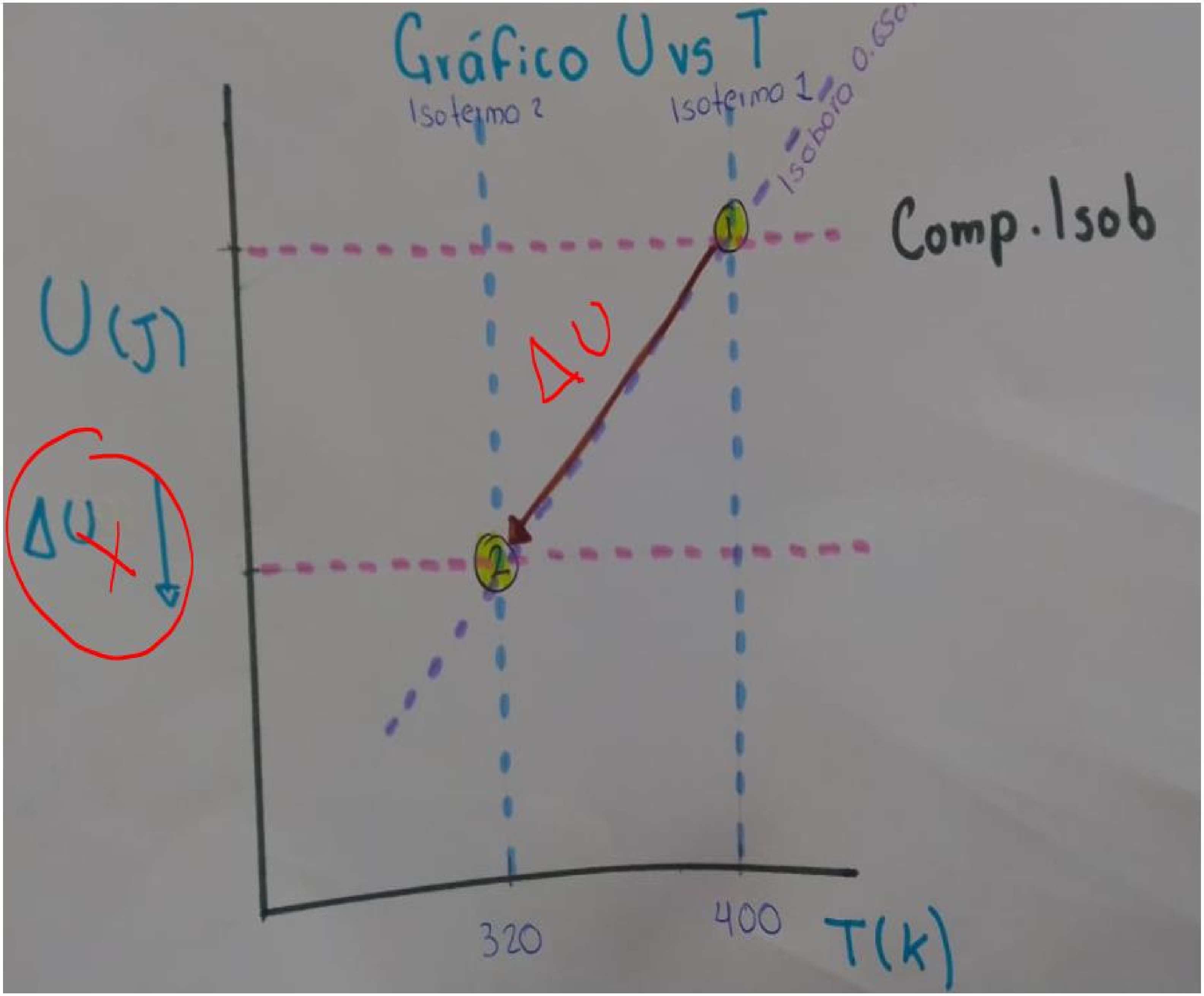
Gráfico U vs T
Isotermo 2
Isotermo 1
Isobara 0.650
Comp. Isob
U (J)
ΔU
ΔU
1
2
320
400
T(k)

Proceso Isocórico

sist. cerrado, rígido

$V = cte$

$n_1 \to n_2 = cte$

$V_1 \to V_2 = cte$

$T_1 \to T_2 \begin{cases} T_2 > T_1 & \text{calentamiento} \\ T_2 < T_1 & \text{enfriamiento} \end{cases}$

$p_1 \to p_2 \begin{cases} p_2 > p_1 & \text{calentamiento} \\ p_2 < p_1 & \text{enfriamiento} \end{cases}$

$$V_1 = V_2$$

$$V_1 = \frac{n_1 R T_1}{p_1} \qquad V_2 = \frac{n_2 R T_2}{p_2}$$

$$\frac{\cancel{n_1} R T_1}{p_1} = \frac{\cancel{n_2} R T_2}{p_2}$$

$$\boxed{T_2 = \frac{T_1 p_2}{p_1}} \quad \boxed{p_2 = \frac{T_2 p_1}{T_1}}$$

Calentamiento isocórico

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

$\Delta H > \Delta U$

ΔH depende de $\overline{C_p}$

ΔU depende de $\overline{C_V}$

$\overline{C_p} > \overline{C_V}$

$\Delta S = +$

$$q = \Delta U$$

$$q = +$$ endotérmico

$$w = 0$$

$$\Delta U = q - \cancel{w}^{\,0}$$

$$\Delta U = q$$

Enfriamiento isocórico

$\Delta U = -$ $\qquad \Delta H = -$

$|\Delta H| > |\Delta U|$

$\Delta S = -$

	$\bar{C}_p$	$\bar{C}_v$
Diatómico	$7/2R$	$5/2R$
Triatómico	$9/2R$	$7/2R$

Isobárico $q = \Delta H = n\bar{C}_p\Delta T$

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

Modelo perfecto

$\bar{C}_p$ y $\bar{C}_v$ = ctes

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

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

$$\int_1^2 dS = \frac{đq}{T} = \int_{T_1}^{T_2} \frac{n\bar{C}_v\,dT}{T}$$

$$\Delta S = n\bar{C}_v \int_{T_1}^{T_2} \frac{dT}{T}$$

$$\boxed{\Delta S = n\bar{C}_v \ln \frac{T_2}{T_1}}$$

si $T_2 > T_1$ $\Delta S = +$ calentamiento

si $T_2 < T_1$ $\Delta S = -$ enfriamiento

$$q = \Delta U$$

$$w = 0$$

$$\Delta U = q - \cancelto{0}{w}$$

Modelo ideal.

$$dH = n\bar{C}_p\,dT$$

$$\bar{C}_p = f(T)$$

$$\bar{C}_p = a + bT + cT^2 + dT^3$$

$$\int_1^2 dH = n\int_{T_1}^{T_2}\left[a + bT + cT^2 + dT^3\right] dT$$

$$\Delta H = n\left[a\int_{T_1}^{T_2} dT + b\int_{T_1}^{T_2} T\,dT + c\int_{T_1}^{T_2} T^2\,dT + d\int_{T_1}^{T_2} T^3\,dT\right]$$

$$\Delta H = n\left[a(T_2 - T_1) + \frac{b}{2}(T_2^2 - T_1^2) + \frac{c}{3}(T_2^3 - T_1^3) + \frac{d}{4}(T_2^4 - T_1^4)\right]$$

$$\Delta U = n\left[(a-R)(T_2-T_1)+\frac{b}{2}(T_2^2-T_1^2)+\frac{c}{3}(T_2^3-T_1^3)+\frac{d}{4}(T_2^4-T_1^4)\right]$$

$$\Delta S = n\left[(a-R)\ln\frac{T_2}{T_1} + b(T_2-T_1) + \frac{c}{2}(T_2^2-T_1^2) + \frac{d}{3}(T_2^3-T_1^3)\right]$$

a y R = mismas unidades

$a = \frac{cal}{mol\,K}$ $\quad$ $R = \frac{cal}{mol\,K}$