Título de la nota 10/11/2021

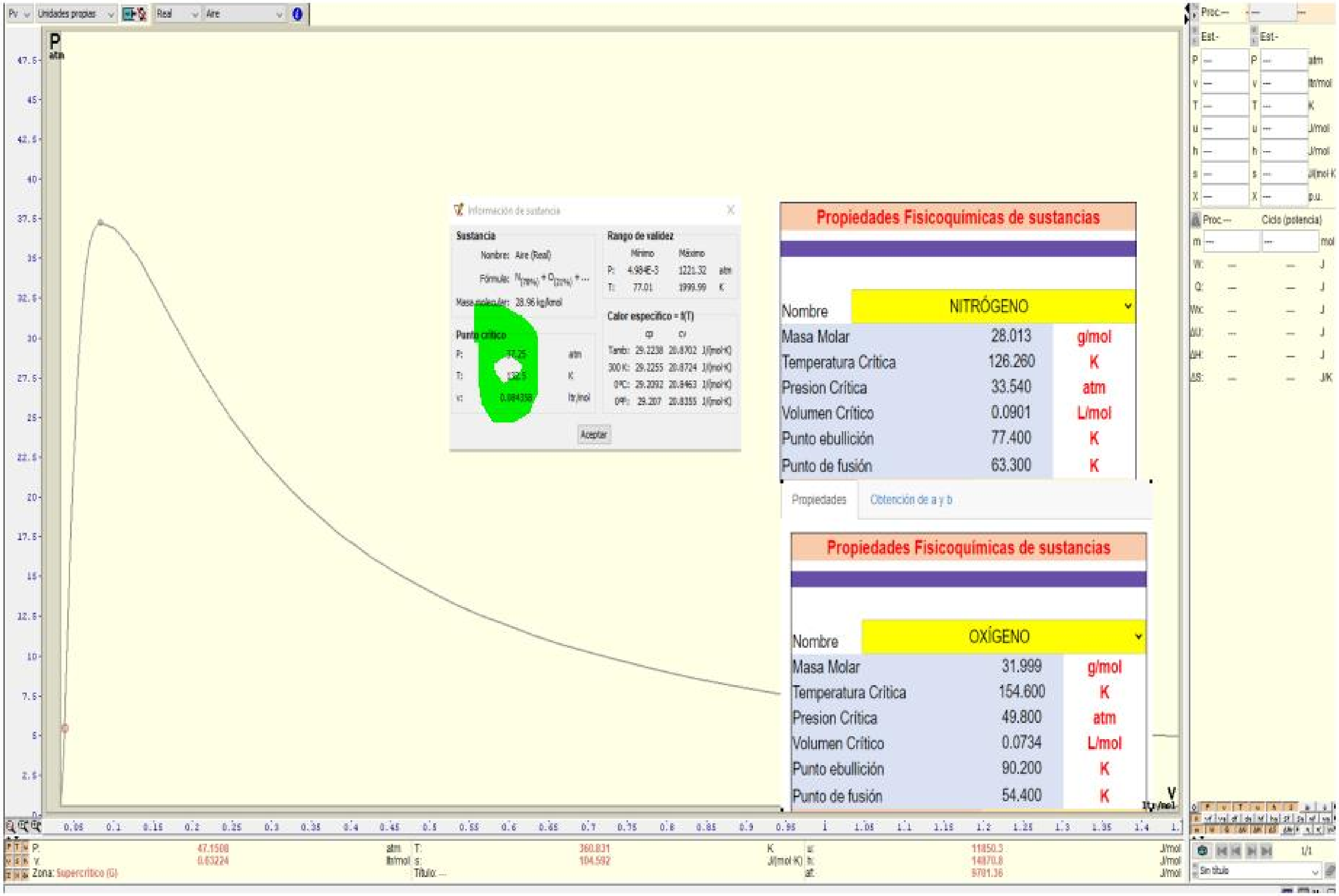
Clase 52 10 Noviembre 2021

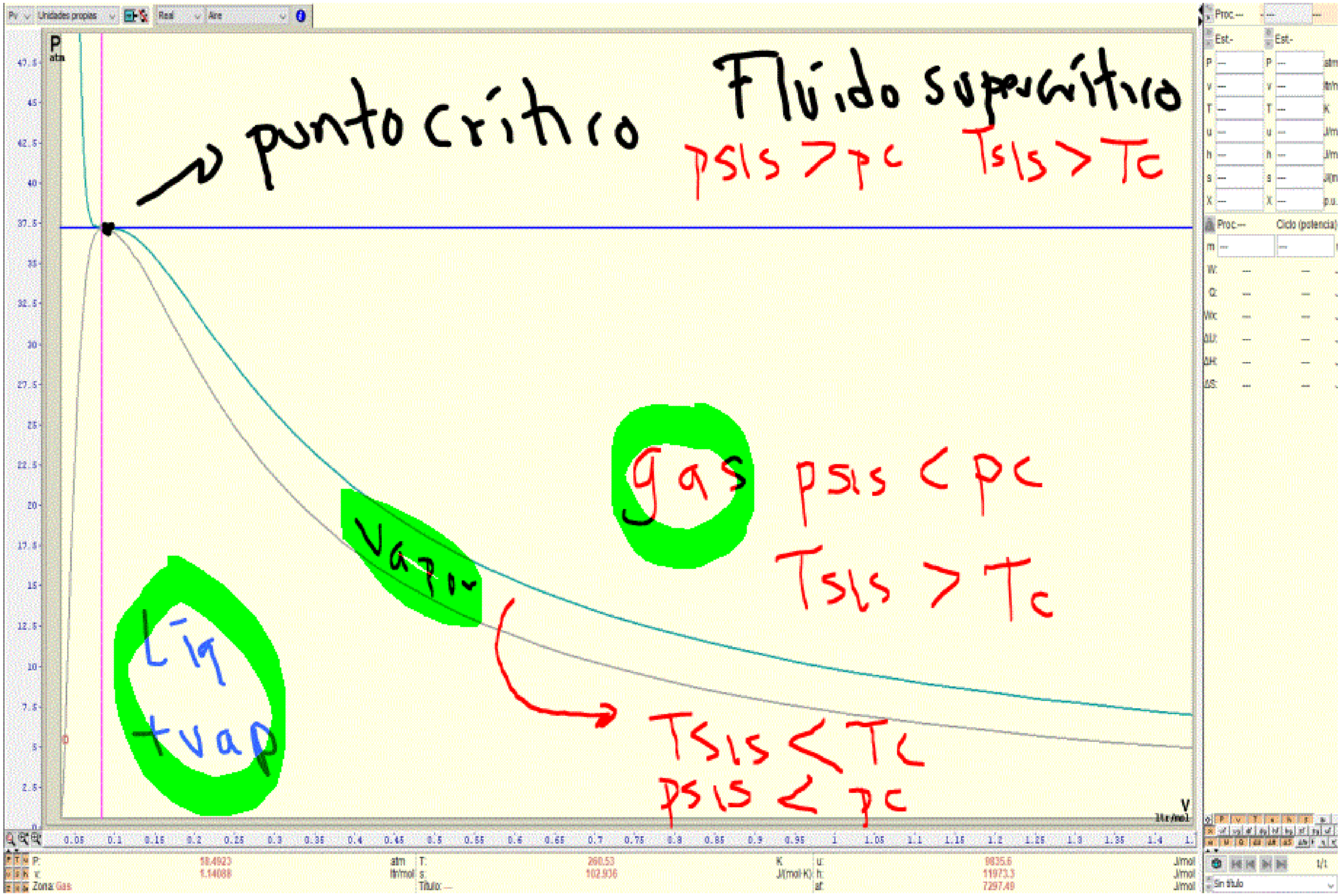
y_i

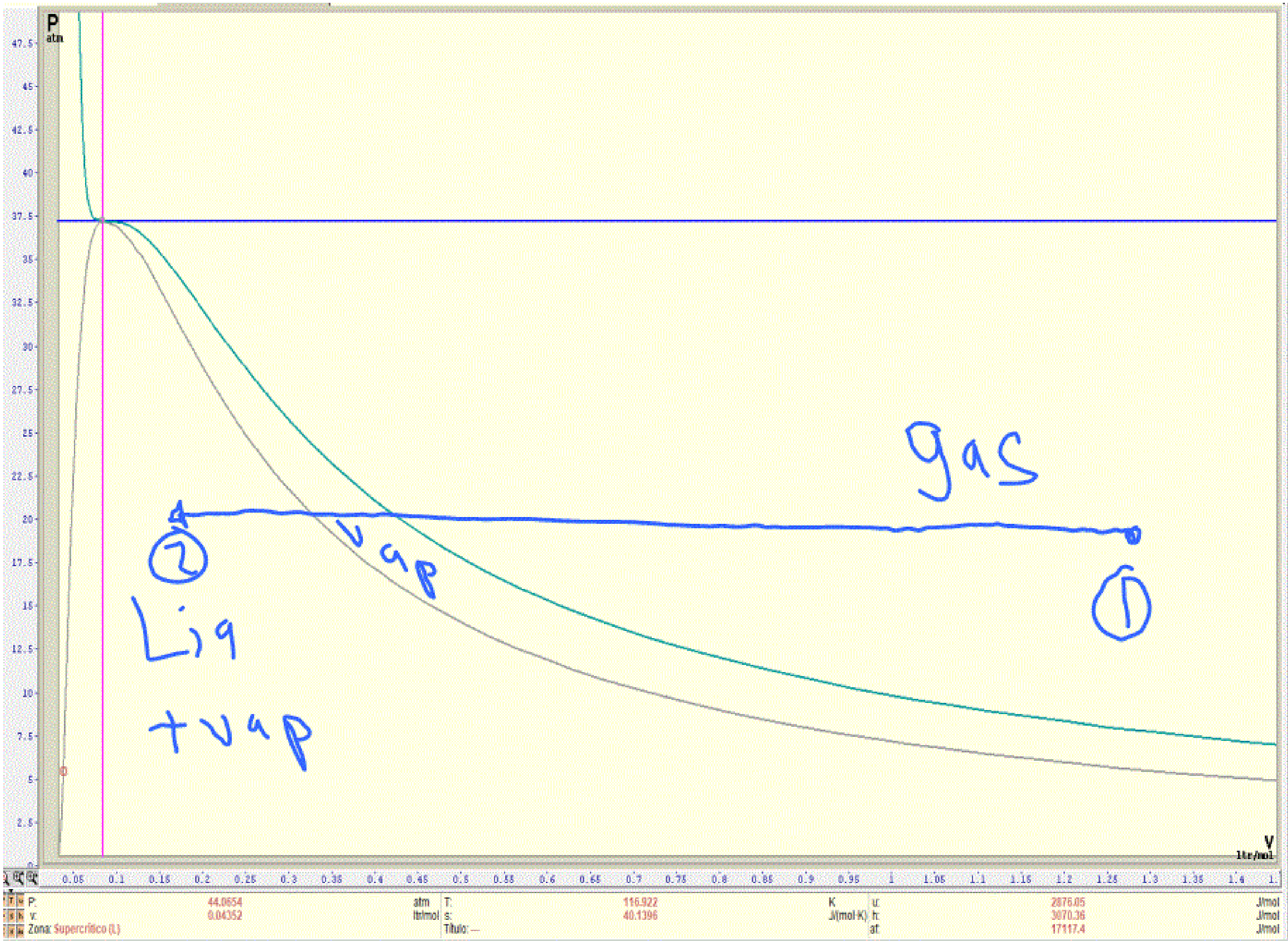
Aire $\begin{cases} N_2 = 0.80 \\ O_2 = 0.19 \end{cases}$ Binario

$$P_{cM} = \sum_{i=1}^{n} p_{ci} = [(0.8)(33.54\,atm)] + [0.19\,(49.8\,atm)]$$

$$= 36.29\,atm$$


Información de sustancia
Sustancia
Nombre: Aire (Real)
Masa molecular: 28.96 kg/kmol
Punto crítico
Rango de validez
Calor específico = f(T)
Aceptar
Propiedades Fisicoquímicas de sustancias
Nombre NITRÓGENO
Masa Molar 28.013 g/mol
Temperatura Critica 126.260 K
Presion Crítica 33.540 atm
Volumen Crítico 0.0901 L/mol
Punto ebullición 77.400 K
Punto de fusión 63.300 K
Propiedades
Obtención de a y b
Propiedades Fisicoquímicas de sustancias
Nombre OXÍGENO
Masa Molar 31.999 g/mol
Temperatura Critica 154.600 K
Presion Crítica 49.800 atm
Volumen Crítico 0.0734 L/mol
Punto ebullición 90.200 K
Punto de fusión 54.400 K
P
atm
V
ltr/mol
Zona: Supercrítico (G)


punto crítico
Flúido supercrítico
psis > pc Tsis > Tc
gas psis < pc
Tsis > Tc
vapor
Liq + vap
Tsis < Tc
psis < pc


P
atm
gas
vap
2
1
Liq
+vap
V
ltr/mol
P: 44.0654 atm
v: 0.04352 ltr/mol
Zona: Supercrítico (L)
T: 116.922 K
s: 40.1396 J/(mol·K)
Título: —
u: 2876.05 J/mol
h: 3070.36 J/mol
af: 17117.4 J/mol

$$T_{CM} = \sum_{i=1}^{n} T_{ci}$$

Aire Binario

$$T_{CM} = y_{N_2} T_{CN_2} + y_{O_2} T_{CO_2}$$

$$\bar{V}_{CM} = y_{N_2} \bar{V}_{CN_2} + y_{O_2} \bar{V}_{CO_2}$$

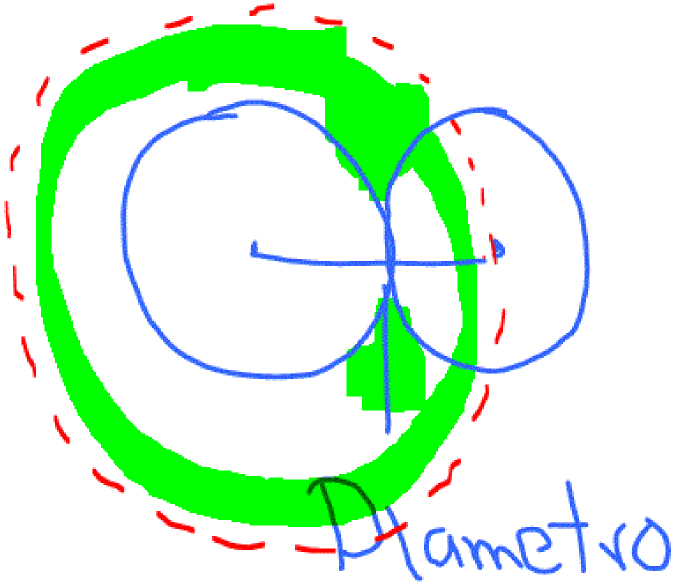
Comportamiento real

Ecuación de Van der Waals

$$pV = nRT$$ Clausius

$$p\bar{V} = RT$$ Si $T \to 0$ $p \to 0$

$$T = \frac{p\bar{V}}{R}$$



$$V_{esfera} = \frac{4}{3}\pi r^3$$ es para 2 moléculas

$$= \frac{2}{3}\pi r^3$$ 1 molécula

$$V_{exclusión} = \frac{2}{3}\tilde{\pi} r^3 N = b$$

L/mol.

Van der Waals

$$P\bar{V} = RT$$

$$P = \frac{RT}{\bar{V}}$$

ideal

$$P = \frac{RT}{\bar{V} - b}$$

Real.

P no ejercida.

lim $V \to 0$ presión

$T \to 0$

$P \propto F \propto C_1 C_2$

$F \propto C^2$ $C_1 = C_2$

$$F \propto \left(\frac{n}{V}\right)^2 \qquad p = \frac{F}{A}$$

$$F = \frac{a' n^2}{V^2} \qquad F =$$

$$atm = P = \frac{a' n^2}{V^2 A} = \frac{a n^2}{V^2} \qquad \frac{mol^2}{L^2}$$

$$a = \frac{atm\, L^2}{mol^2}$$

$$P = \frac{RT}{\bar{V}-b} - \frac{a}{\bar{V}^2} \quad \text{(I)}$$

$$P = \frac{nRT}{V-nb} - \frac{a n^2}{V^2} \quad \text{(II)}$$

$$P = \frac{(mol)(atm\,L/mol\,K)(K)}{L - mol\left(\frac{L}{mol}\right)} - \frac{atm\,L^2}{mol^2}\,\frac{mol^2}{L^2}$$

$$P = atm - atm$$

Mezcla Binaria

$$P = \frac{nRT}{V - nb_M} - \frac{a_M n^2}{V^2}$$

$$b_M = \sum_{i=1}^{n} b_i = y_{N_2} b_{N_2} + y_{O_2} b_{O_2}$$

$$a = \frac{atm\,L^3}{mol^2}$$

$$a_M = \sum_{i=1}^{n} (a_i)$$

$$= \left(y_{N_2}\, a_{N_2}^{1/2} + y_{O_2}\, a_{O_2}^{1/2}\right)^2$$

$$= \left(0.5 \left(\frac{atm\,L^2}{mol^2}\right)^{1/2} + 0.5 \left(\frac{atm\,L^3}{mol^2}\right)^{1/2}\right)^2$$

$$\frac{atm\,L^2}{mol^2} = \left(\frac{atm^{1/2}\,L}{mol}\right)^2$$

$CH_4 = 16 g/mol$

$CH_3CH_3 = 30 g/mol$

$$a_{Metano} = 3 p_c \bar{V}_c^2$$

$$= 3(45.4 atm)(0.099 L/mol)^2$$

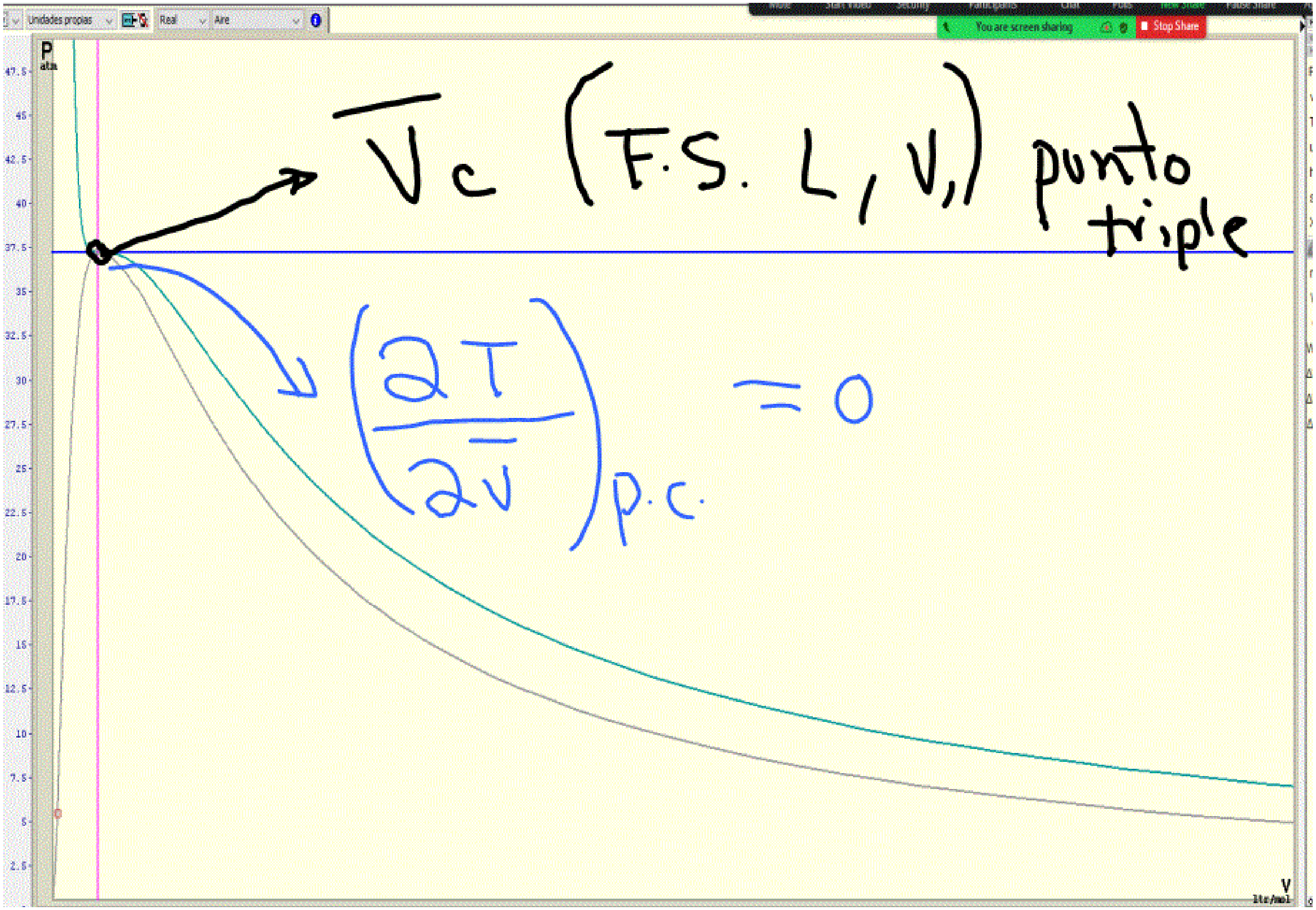
$$= 1.3348 \frac{atm L^2}{mol^2}$$

Independiente de $\bar{V}c$

$$a = \frac{27}{64}\frac{R^2 Tc^2}{Pc}$$

$$= \frac{27}{64}\frac{(0.082\ atm L/mol\ K)^2 (190.6\ K)^2}{45.4\ atm}$$

$$= 2.2699\ \frac{atm\ L^2}{mol^2}$$


Unidades propias
Real
Aire
You are screen sharing
Stop Share
P
atm
V
ltr/mol
$\bar{V}_c$ (F.S. L, V,) punto triple
$\left(\frac{\partial T}{\partial \bar{V}}\right)_{p.c.} = 0$

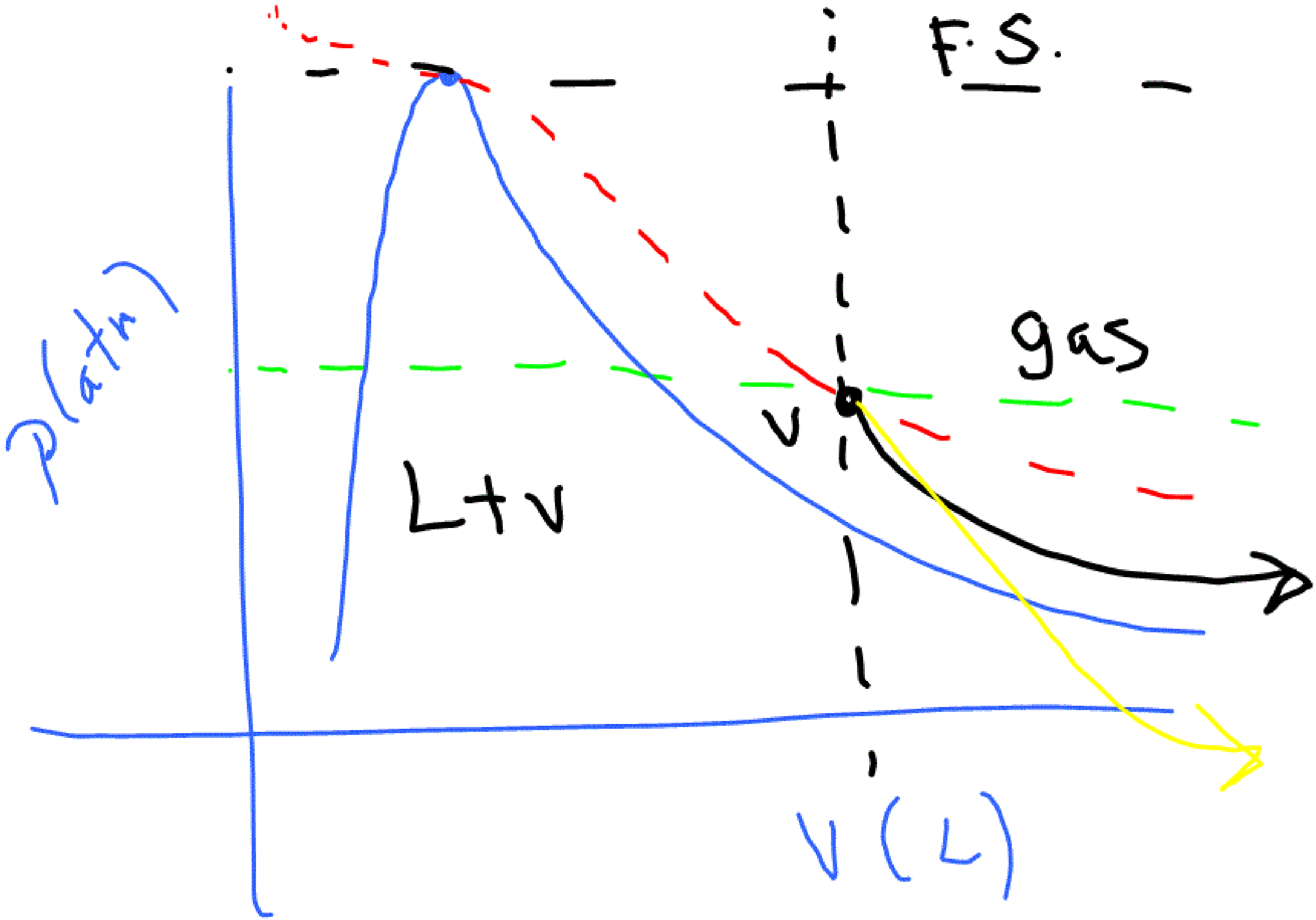
Independiente de $\bar{V}c$

$$b = \frac{RTc}{8Pc} \frac{(atm\,L/mol\,K)(K)}{atm}$$

$$b = L/mol$$ ✓

$$P = \frac{nRT}{V - nb} - \frac{an^2}{V^2}$$ Real

$$P = \frac{nRT}{V}$$ ideal.


F.S.
p(atm)
L+v
v
gas
V(L)