

linear interpolation

Example: C.L. H₂O

at 205°C 5000 Pa

Asked v $q = 205^\circ\text{C}$ not in table

$q_1 = 200^\circ\text{C}$ $q_2 = 220^\circ\text{C}$

\downarrow surrounding \downarrow on table

want $v = d$ (desired)

$d_1 = 0.001153 \text{ m}^3/\text{kg}$ $d_2 = 0.001187 \text{ m}^3/\text{kg}$

magical formulae

$$d = d_1 + \frac{\rho - \rho_1}{\rho_2 - \rho_1} (d_2 - d_1)$$

$$d = 0.0017615 \frac{\text{m}^3}{\text{kg}}$$

specific volume given?

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Quality x Only exist in
2 phase region 2P



$$x = \frac{m_{\text{vapor}}}{m_{\text{total}}} \quad x=0$$

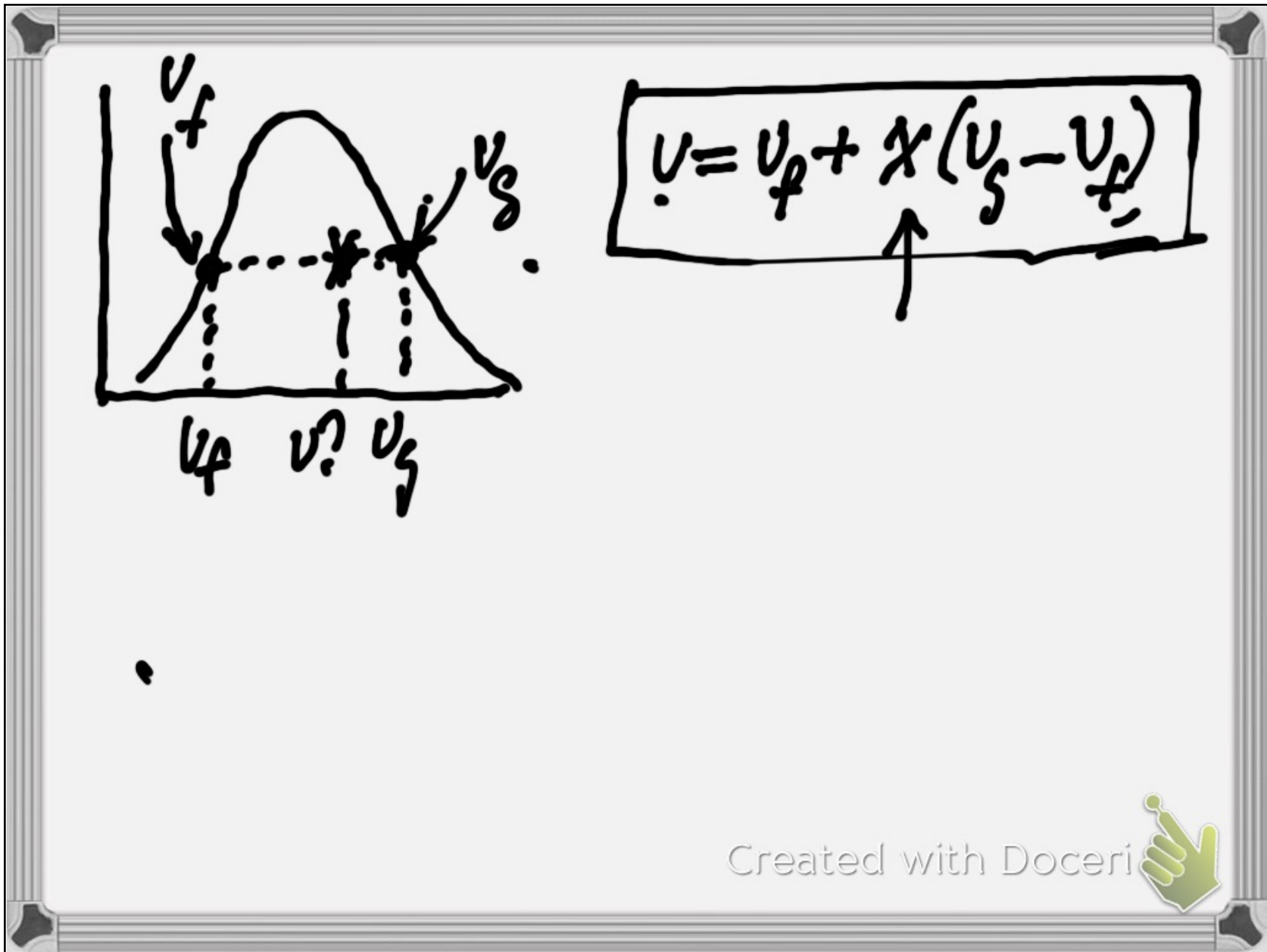
$x=0$: all-saturated liquid

$x=1$: all saturated vapor

$0 < x < 1$: mixture

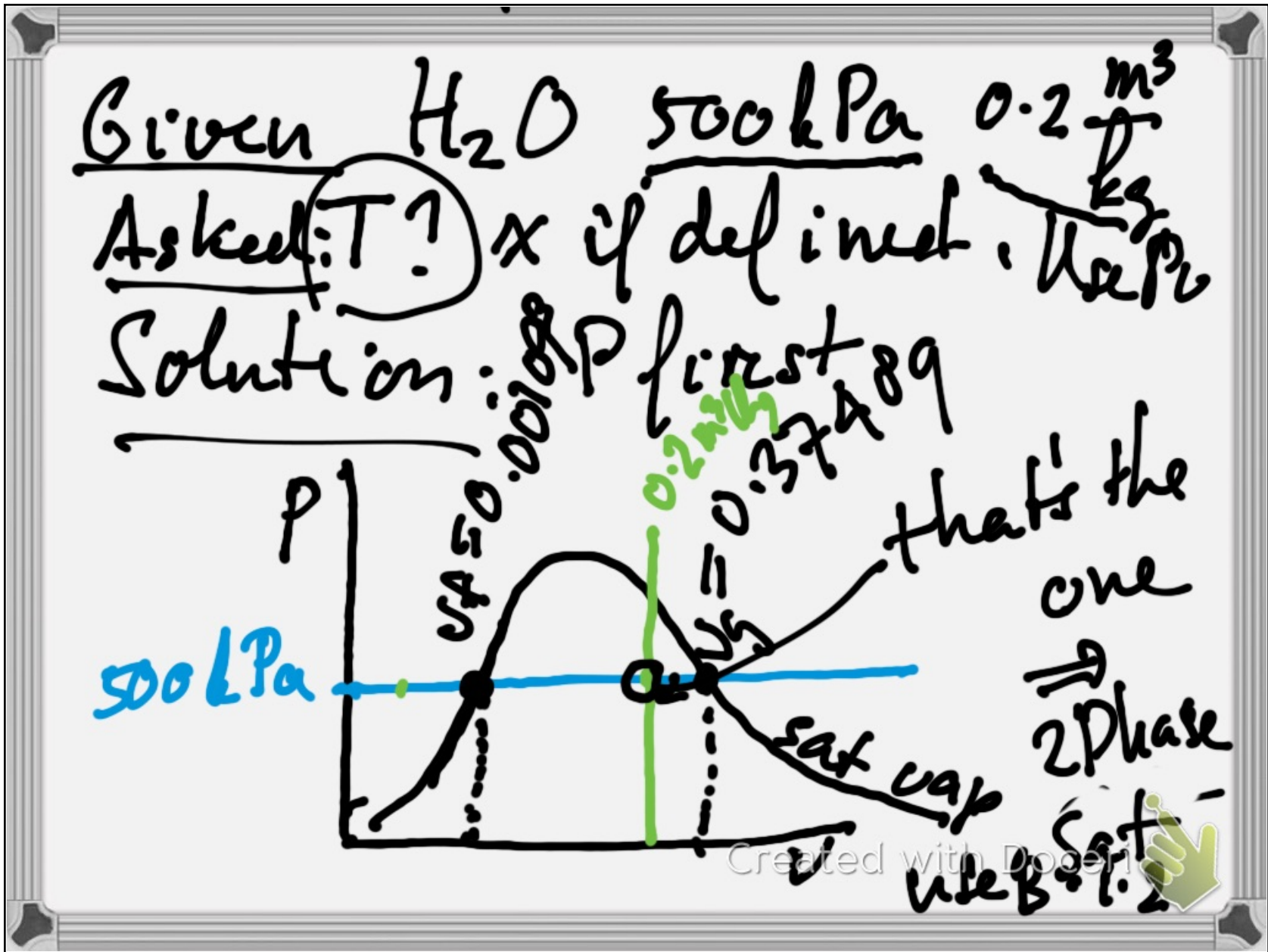
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$$T = \underline{\underline{151.06}}^{\circ}\text{C}$$

$$v = v_f + x(v_g - v_f)$$

$$0.2 \frac{\text{m}^3}{\text{kg}} = 0.001093 \frac{\text{m}^3}{\text{kg}} + x(0.37489 - 0.001093) \frac{\text{m}^3}{\text{kg}}$$

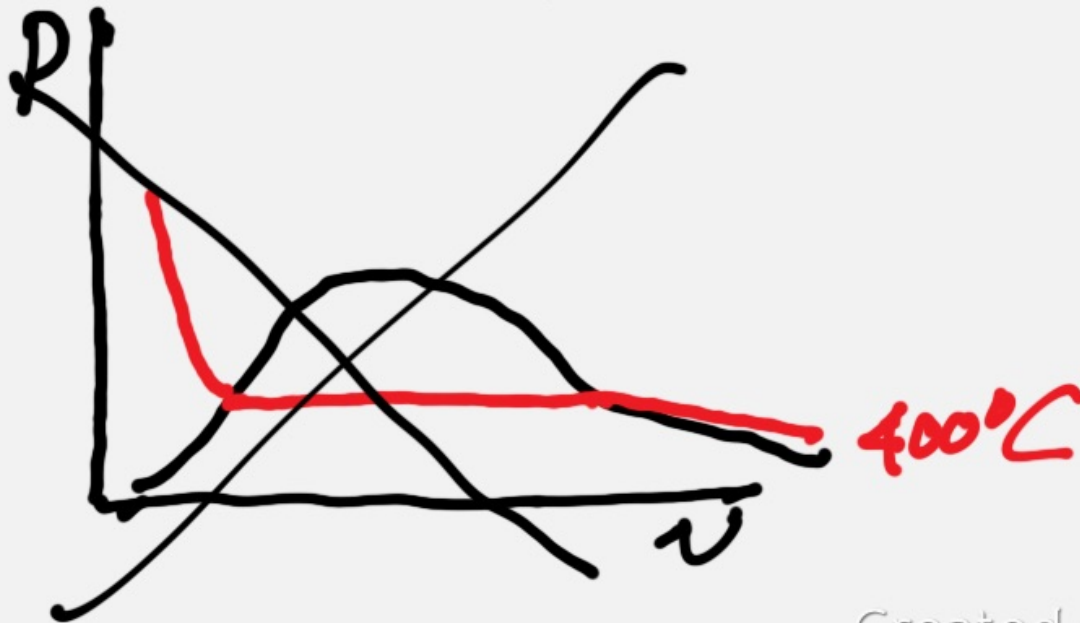
$$0.2 - 0.001093 = x(\dots)$$

$$\frac{0.2 - 0.001093}{0.37489 - 0.001093} = x = \underline{\underline{0.532}}$$

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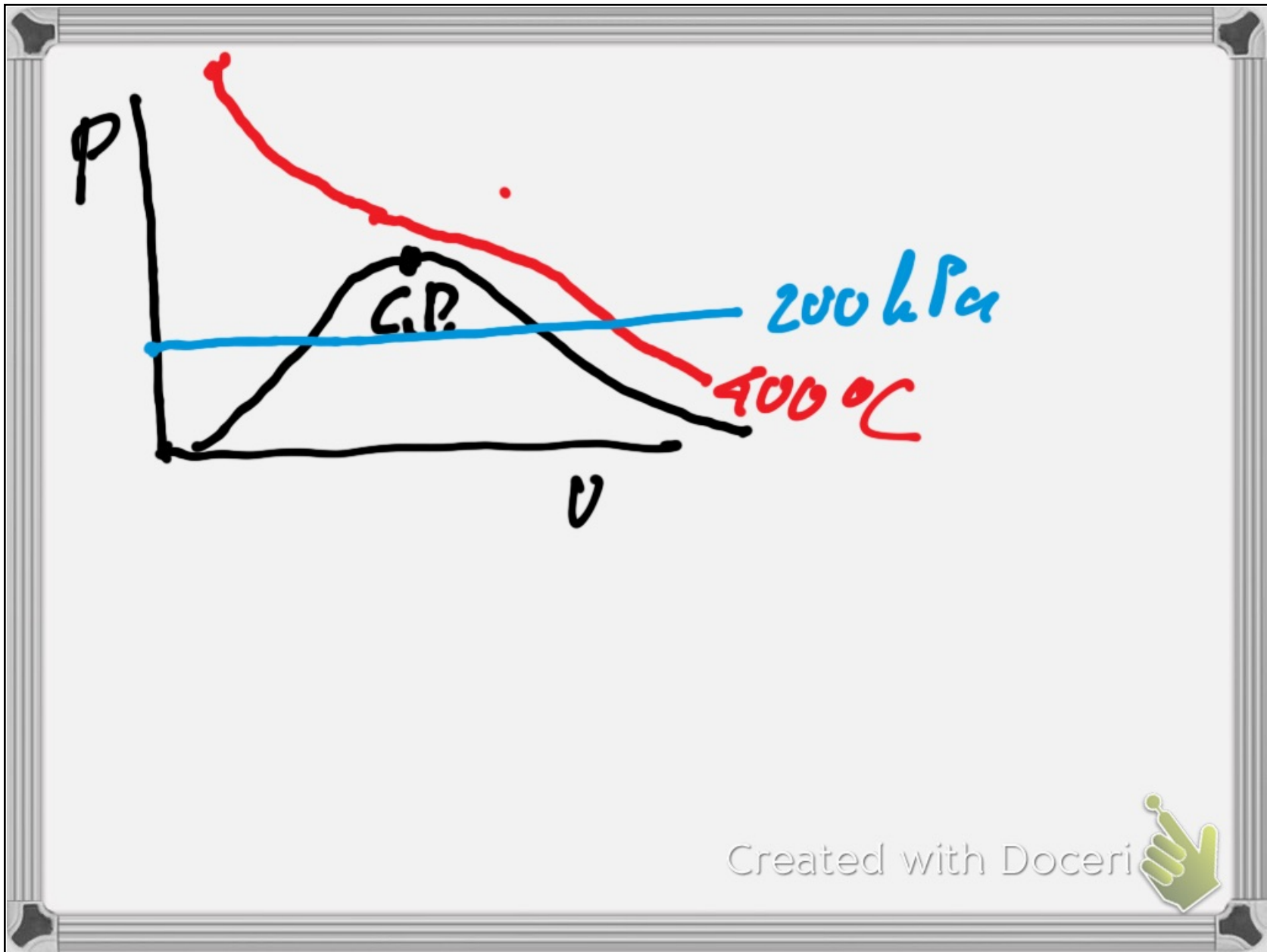


Given H_2O $T=400^\circ\text{C}$ $P=20\text{ bar}$
Asked: phase using P ,
temperature first



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Processes: Given data in black

①

piston

Sat Liq

60°C I

increase pressure

→

keeping temperature constant

②

piston

$V_2 = 0.99 V_1$ E

$T_2 = 60°C$ I

$x_1 = 0$ I

mass conservation $m_1 = m_2$

$V_2 = 0.99 \frac{V_1}{\frac{m_1}{m_2}} \Rightarrow V_2 = 0.99 V_1$


Asked P_2

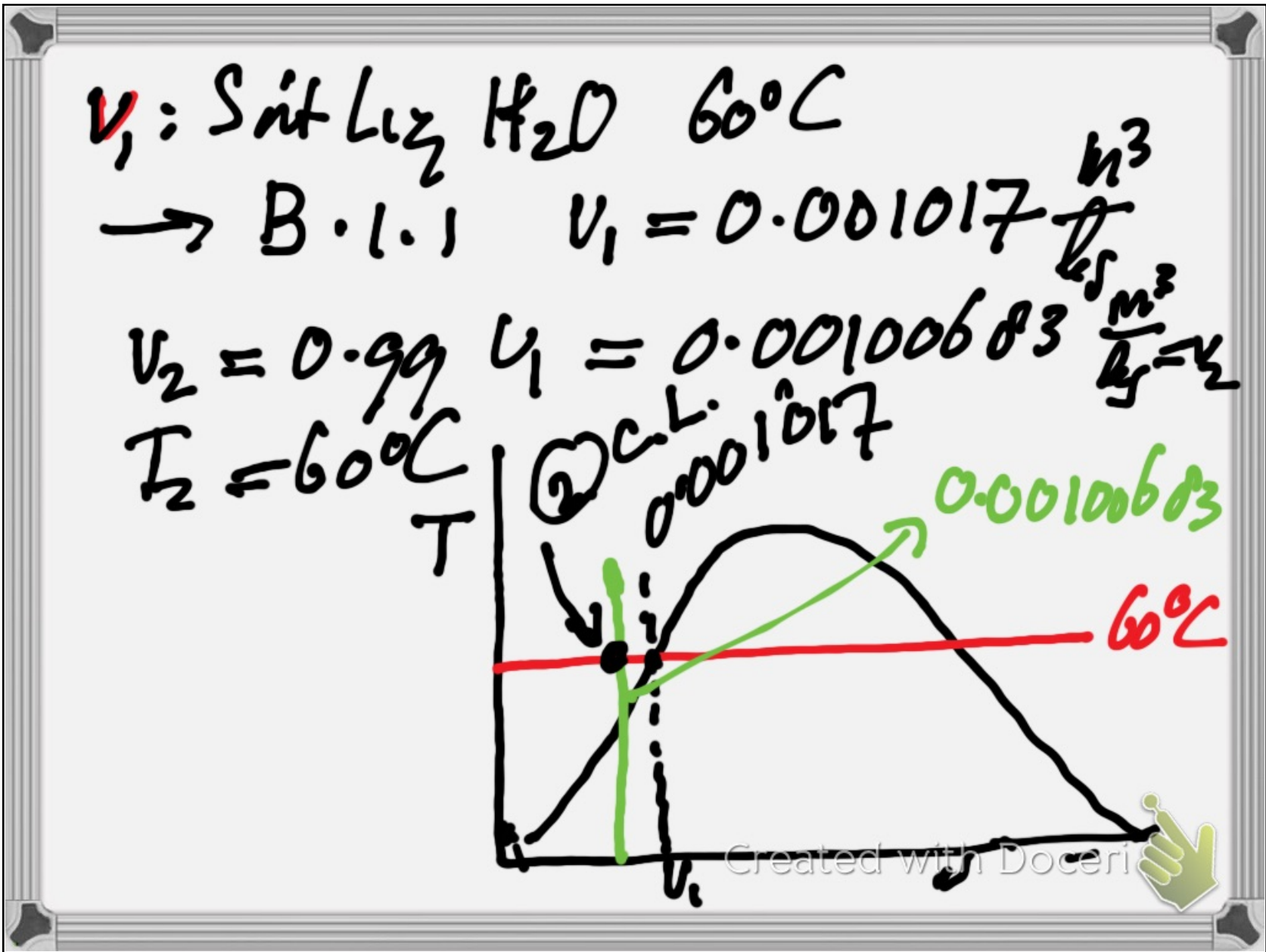
Solution

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Intensive: independent
table, of the amount
ex: P, T, α, V

Extensive: proportional
to the amount
 V, m

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