$$\frac{dP}{dT} = \frac{\lambda}{T(v_2 - v_1)}$$

95.

$\lambda = 2260\ kJ/Kg$

$P_1 = 2\ atm$

$\Delta P = P_1 - P_0 = 1\ atm = 101325\ Pa$

$\begin{cases} P_0 = 1\ atm \\ T_0 = 373\,K \end{cases}$

$v_2 = v_v =$

$$V_v = \frac{n R T_0}{P_0} \quad ; \quad v_v = \left(\frac{n}{m}\right) \frac{R T_0}{P_0}$$

$$m(H_2O) = 2 + 16\ g/mol \qquad \left(\frac{n}{m}\right) = \frac{1}{18}\ mol/g$$

$$v_v = \frac{\frac{1}{18} \times 10^3 \times 8{,}314 \times 373}{101325} \simeq 1{,}7\ m^3/Kg$$

$$v_\ell = \frac{1\ \ell}{1\ kg} = 10^{-3}\ m^3/kg \quad ; \quad v_v - v_\ell \simeq v_v$$

$$\frac{\Delta P}{\Delta T} \simeq \frac{\lambda}{T_0(v_v - v_\ell)} \simeq \frac{\lambda}{T_0 v_v} \quad ; \quad \Delta T \simeq \frac{T_0 v_v \Delta P}{\lambda}$$

$$\Delta T \simeq 28{,}4\ K \rightarrow T_1 \simeq T_0 + \Delta T = 128{,}4\ ^\circ C$$

— // —

ou: usando a transição de fase líquido-vapor

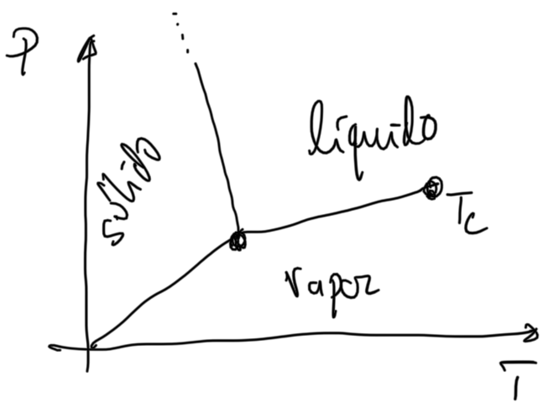
100.

$$\frac{dP}{dT} = \frac{\lambda}{T(v_v - v_l)} \simeq \frac{\lambda}{T v_v} = \frac{\lambda}{T\left(\frac{n}{m}\right)\frac{RT}{P}}$$

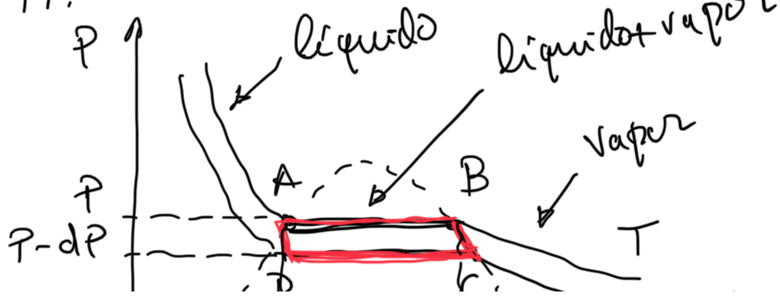
$$\frac{dP}{P} = \frac{\lambda}{R}\left(\frac{m}{n}\right)\frac{dT}{T^2} \rightarrow \int_0^1 \frac{dP}{P} = \frac{\lambda}{R}\left(\frac{m}{n}\right)\int_0^1 \frac{dT}{T^2}$$

$$\ln\left(\frac{P_1}{P_0}\right) = \frac{\lambda}{R}\left(\frac{m}{n}\right)\left[\frac{1}{T_0} - \frac{1}{T_1}\right]$$

98.



99.



$$\eta = \frac{W}{Q} \qquad W \simeq dP \times (V_v - V_\ell)$$

$$Q = m\lambda$$

$$\eta = 1 - \frac{T_2}{T_1} \quad ; \quad \eta = 1 - \frac{T - dT}{T} = \frac{dT}{T} \equiv \frac{dP(V_v - V_\ell)}{m\lambda}$$

$$\frac{dP}{dT} = \frac{m\lambda}{T(V_v - V_\ell)} = \frac{\lambda}{T(v_v - v_\ell)} \quad , \quad v = \frac{V}{m}$$

108.

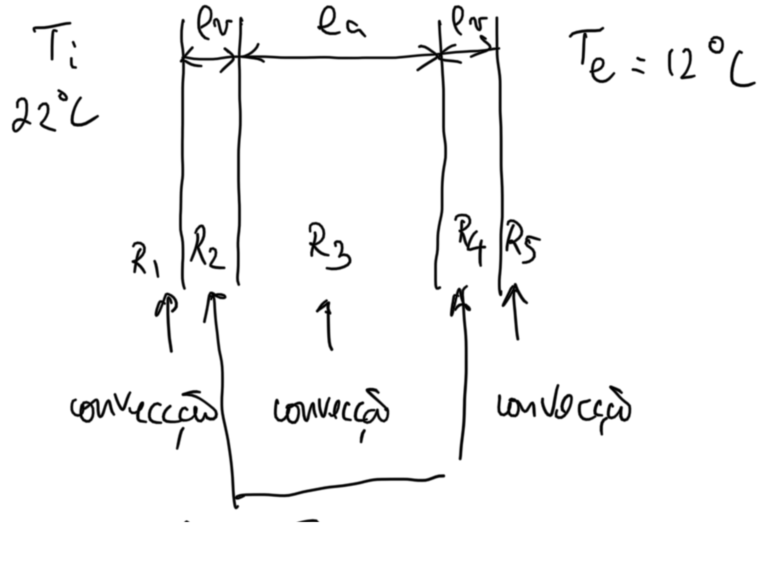
$T_i = 22\,°C$ $\qquad$ $l_a = 1\,cm$

$T_e = 12\,°C$ $\qquad$ $l_v = 4\,mm$ $\qquad$ $k_v = 0{,}8\ W/m.K$

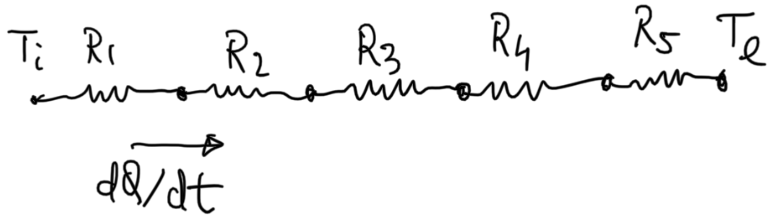
$A = 1\,m^2$

$h_i = 8\ W/m^2.K$ $\qquad$ $h_e = 25\ W/m^2.K$

$h_a = 7\ W/m^2.K$



Condução



a) $$\frac{dQ}{dt} = \frac{(T_i - T_e)}{R_{tot}} \qquad \left[I = \frac{\Delta V}{R} \right]$$

$$R_{tot} = R_1 + R_2 + R_3 + R_4 + R_5$$

[Condução: $\frac{dQ}{dt} = -KA\frac{dT}{dx} \rightarrow R_t = \frac{\Delta X}{KA} = \frac{l}{KA}$

Convecção: $\frac{dQ}{dt} = -hA\Delta T \rightarrow R_t = \frac{1}{hA}$]

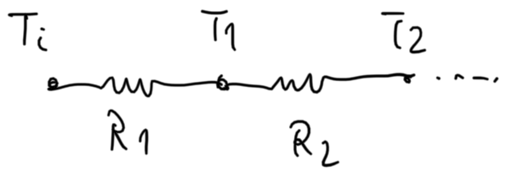
$$R_1 = \frac{1}{h_i A} = \frac{1}{8 \times 1} = 0{,}125 \text{ K/W}$$

$$R_2 = \frac{l_v}{K_v A} = \frac{0{,}004}{0{,}8 \times 1} = 0{,}005 \text{ K/W} = R_4$$

$$R_3 = \frac{1}{h_a A} = \frac{1}{7 \times 1} \simeq 0{,}143 \text{ K/W}$$

$$R_5 = \frac{1}{h_e A} = \frac{1}{25 \times 1} = 0{,}04 \text{ K/W}$$

$R_{tot} = 0{,}318$ K/W ; $\frac{dQ}{dt} = \frac{T_i - T_e}{R_{tot}} \simeq 31{,}45$ W b)



$\longrightarrow$

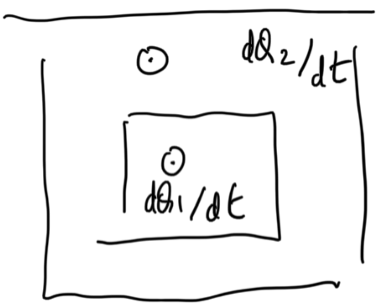
$\frac{dQ}{dt}$

$$\frac{dQ}{dt} = \frac{T_i - T_1}{R_1} \rightarrow T_1 = -\left(\frac{dQ}{dt}\right) R_1 +$$

$T_1 \simeq 18.07\,°C$

$$\frac{dQ}{dt} = \frac{(T_i - T_2)}{R_1 + R_2} \quad \text{ou} \quad \frac{dQ}{dt} = \frac{T_1 - T_2}{R_2} \quad \text{ou} \ldots$$

$T_2 \simeq 17.91\,°C$, $T_3 \simeq 13.41\,°C$, $T_4 \simeq 13{,}26\,°C$



Não escreve

N