Gabarito do exercício de Enchimento do Pneu por Sistema

ENCHIMENTO DE PNEU POR SISTEMA

R → Reservatório, P → Pneu, REF – REFERÊNCIA

1ª LEI P/ SISTEMA = $m_R + m_P$

1/ 1 – ESTADO NO INÍCIO PNEU

2 – ESTADO FINAL COMUM A m_P e m_R

$$(m_R u_2) + (m_P u_2) - m_R u_R - m_P u_1 = -W_{SIST} \quad (1)$$

$$(2)\ u_2(m_R + m_P) - m_P u_1 = m_R u_R - \left[-P_R m_R v_R + W_{\Delta V, PNEU} + W_{COTA}\right]$$

↑ já demonstrei.

$$(3)\ u_2(m_R + m_P) - m_P u_1 = m_R \underbrace{(u_R + P_R v_R)}_{h_R} - \underbrace{W_{\Delta V, PNEU} - W_{COTA}}_{= 1600\,J = W_{SIST}}$$

mas $u_2 - u_{ref} = c_v (T_2 - T_{ref})$

$h - h_{ref} = c_p (T - T_{ref})$

$$c_v (T_2 - T_{ref})(m_R + m_P) + u_{ref}(m_R + m_P) - m_P c_v (T_1 - T_{ref}) - m_P u_{ref} = m_R c_p (T_R - T_{ref}) + m_R h_{ref} - W_{SIST} \quad (4)$$

$$c_v T_2 (m_R + m_P) - c_v T_1 m_P = m_R c_p (T_R - T_{ref}) + m_R h_{REF} + c_v T_{ref}(m_R + m_P) - u_{ref}(m_R + m_P) - m_P c_v T_{ref} + m_P u_{ref} - W_{SIST} \quad (5)$$

$$c_v T_2 (m_R + m_P) - c_v T_1 m_P = m_R c_p T_R + (-W_{SIST}) + \underbrace{m_R h_{REF} - m_R c_p T_{REF} + c_v T_{ref}(m_R + m_P) - u_{ref}(m_R + m_P) - m_P c_v T_{ref} + m_P u_{ref}}_{=0} \quad (6)$$

$\rightarrow m_R(h_{REF} - c_p T_{REF}) + m_R(c_v T_{ref} - u_{ref}) + c_v T_{ref} m_p$ 21

$- u_{ref} m_p - c_v T_{ref} m_p + m_p u_{ref}$

$\rightarrow m_R (h_{REF} - c_p T_{ref} + c_v T_{ref} - u_{ref})$

$\downarrow$

$u_{ref} + (pv)_{ref}$

$\rightarrow m_R ((pv)_{REF} - c_p T_{ref} + c_v T_{ref})$

$\rightarrow m_R (RT_{REF} - T_{REF}(\underbrace{c_p - c_v}_{R}))$ $=0$

entao (6):

$$c_v T_2 (m_R + m_p) - c_v T_1 m_p = m_R c_p T_R - W_{SIST} \quad (7)$$

mas $P_2 v_2 = RT_2$ (8) e $v_2 = \left(\frac{m_R + m_p}{V_2}\right)^{-1}$ (9)

$\downarrow$

$$T_2 = \frac{P_2}{R}\left(\frac{(m_R + m_p)}{V_2}\right)^{-1} \quad (10)$$

$$c_v \frac{P_2}{R}\left(\frac{(m_R + m_p)}{V_2}\right)^{-1}(m_R + m_p) - c_v T_1 m_p = m_R c_p T_R - W_{SIST} \quad (11)$$

$$c_v \frac{P_2 V_2}{R} - c_v T_1 m_p = m_R c_p T_R - W_{SIST} \quad (12)$$

$$m_R = \frac{c_v \frac{P_2 V_2}{R} - c_v T_1 m_p + W_{SIST}}{c_p \times T_R} = 0.056\ kg$$

Gabarito do exercício “ Tapa no rosto”