

Gabarito Lista 4 - 2ª Lei da Termodinâmica

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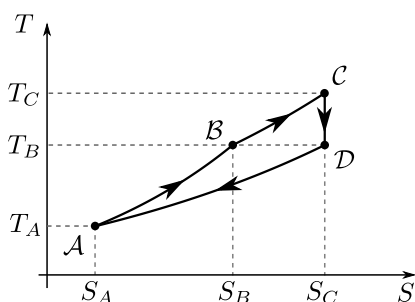
1. (a)

Etapa	W	Q
AB	0	$1.50P_0V_0$
BC	$0.64P_0V_0$	$1.60P_0V_0$
CD	$0.96P_0V_0$	0
DA	$-P_0V_0$	$-2.50P_0V_0$
Total	$0.60P_0V_0$	$-0.60P_0V_0$

Etapa	ΔU	ΔS
AB	$1.50P_0V_0$	$1.50nR \ln 2$
BC	$0.96P_0V_0$	$nR \ln 2$
CD	$-0.96P_0V_0$	0
DA	$-1.50P_0V_0$	$-2.50nR \ln 2$
Total	0	0

(b) $\eta = 19\%$.

(c)



2. (a) $Q_T = (T_C - T_A)(S_C - S_A)$.

(b) $W_T = (T_C - T_A)(S_C - S_A)$.

(c) $\eta = 1 - \frac{T_A}{T_C}$.

3. (a) $W_T = \frac{P_0V_0}{\gamma - 1} [r^\gamma - r + \gamma(r^{1/\gamma} - r)]$.

(b) $Q_T = \frac{P_0V_0}{\gamma - 1} [r^\gamma - r + \gamma(r^{1/\gamma} - r)]$.

(c) $\eta = 1 - \frac{r - r^\gamma}{\gamma(r^{1/\gamma} - r)}$.

(d) $T_q = T_C = \frac{P_0V_0}{nR} r^\gamma$.

$T_f = T_A = \frac{P_0V_0}{nR} r^{1/\gamma}$.

(e) $\eta = 1 - r^{\gamma-1/\gamma}$.

4. (a) $\int dQ/T = 0$.

(b) $\Delta S = nR \ln 2$.

(c) Sim. O processo é irreversível.

5. (a) $\Delta S_a = C_1 \ln \left[\frac{C_1 T_1 + C_2 T_2}{(C_1 + C_2) T_1} \right] + C_2 \ln \left[\frac{C_1 T_1 + C_2 T_2}{(C_1 + C_2) T_2} \right]$.

(b) $\Delta S_b = 2nR \ln 2$.

(c) $\Delta S_a = C_1 \ln \left[\frac{(T_1 + T_2)^2}{4T_1 T_2} \right]$. Processo irreversível.

$\Delta S_b = 0$. Processo reversível.

6. (a) $\Delta S_{\text{agua}} = -1,01 \text{ kJ/K}$.

(b) $\Delta S_{\text{lago}} = 1,14 \text{ kJ/K}$.

(c) $\Delta S_{\text{Univ}} = 0,13 \text{ kJ/K}$. O processo é irreversível.

7. (a) $\Delta S_Q = -\frac{Q}{T_Q}$

(b) $\Delta S_F = \frac{Q}{T_F}$

(c) $\Delta S_{\text{Univ}} = Q \left(\frac{1}{T_F} - \frac{1}{T_Q} \right) > 0$ e o processo é irreversível.