

Esercizio 1

Se $T_0=20^\circ\text{C}$, $T_1=80^\circ\text{C}$, $T_2=40^\circ\text{C}$, $P=200\text{W}$, $m=100\text{kg}$, $c=4186\text{J}/(\text{kg K})$

$$t^* = \frac{cm(T_1-T_0)}{P} \ln\left(\frac{T_1-T_0}{T_2-T_0}\right) \approx 1,38 \cdot 10^5 \text{ s}$$

Esercizio 2

$$\frac{dS}{dt} = \frac{(T_C - T_F)^2}{RT_F T_C}$$

Esercizio 3

10%

Esercizio 4

2,76m

Esercizio 5

$$P/L = \frac{2\pi k(T_C - T_A)}{\ln\left(\frac{R_2}{R_1}\right)} \approx 40\text{W/m}$$

Esercizio 6

Se $R_1=2\text{m}$, $R_2=2,6\text{m}$, $\Delta T=40\text{K}$, $k=0,592\text{W}/(\text{m K})$, $P_C=42\text{MJ/kg}$, $\Delta t=3600\text{s}$

$$m^* = \frac{2\pi k R_1 R_2 \Delta T \Delta t}{P_C (R_2 - R_1)} \approx 0,11 \text{ kg}$$

Esercizio 7

Se $\Delta T=10\text{K}$, $s=20\text{cm}$, $\rho_G=917\text{kg}/\text{m}^3$, $L_f=333 \cdot 10^3\text{J/kg}$,
 $k_G=2,2\text{W}/(\text{m K})$ [il valore di $0,592\text{W}/(\text{m K})$ sul Tipler è sbagliato]

$$t^* = \frac{\rho_G L_f s^2}{2\Delta T k_G} \approx 77 \text{ ore}$$

Esercizio 8

$$T = \sqrt[4]{\frac{P}{16\pi\sigma D^2}} \approx 277\text{K}$$

Esercizio 9

$$t_{TOT} = \frac{m}{Ae\sigma} \left[\frac{c}{3} \left(\frac{1}{T_0^3} - \frac{1}{T_I^3} \right) + \frac{L_f}{T_0^4} \right] \approx 3490s$$

Esercizio 10

$$\Delta T = \frac{HR^2}{6k} \approx 0,2K$$

Esercizio 11

$$S_G = \frac{H_{TOT}}{\left(1 + \frac{k_A \Delta T_A}{k_G \Delta T_G} \right)}$$

Esercizio 12

$$T_{CENTRO} = T + \frac{P}{4\pi Lk} \approx 464K$$

Esercizio 13

$$T_{PL}=8^{\circ}C$$

$$t \approx 100 \text{ giorni}$$

Esercizio 14

$$T(r) = T_1 + \frac{(T_2 - T_1) \ln\left(\frac{r}{R_1}\right)}{\ln\left(\frac{R_2}{R_1}\right)}$$