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EXERCÍCIOS - FENÔMENOS

1) $L = 80cm$

$A = 200cm^2$

$t_1 = 100°C$

$t_2 = 20°C$

$\dot{q} = K A \frac{T_2 - T_1}{L}$

$\dot{q} = 4,9.10^{-2} \cdot \frac{200.10^{-4}(100-20)}{0,80}$

a) $\dot{q} = 0,098 \frac{kcal}{s}$

$\Delta Q = 98.600 = 58.800 Cal$

$\Delta Q = 5,88.10^4 cal$

b) $P \Rightarrow Watts$

$\dot{q} = \frac{kcal}{s} \Rightarrow$

$\frac{98cal}{s} \rightarrow 1cal - 4,19J$

$98cal - x J$

$\dot{q} = 410,62 W$

c) $\Delta t = 10 min \rightarrow 600s$

$Q = ?$

$\Delta Q = P.t$

$\Delta Q = 410,62.600 =$

$\Delta Q = 246.372 J$

2) $\dot{q} = ?$

a) $A = 3,0 m^2$

$L = 40 mm$

$t_1 = 15°C$

$T_2 = 14°C$

$\dot{q} = \frac{\Delta T}{\frac{L}{KA}}$

$\dot{q} = \frac{1}{\frac{40.10^{-3}}{2,0.10^{-4}.3,0}}$

$\dot{q} = 0,0150 \frac{kcal}{s}$

$P = 100 W$

$1cal - 4,2J$

$0,0150 kcal \; x J$

$P = 630 W$

$1cal - 4,2J$

$150cal - x$

$x = 630 J$

$W = 630 W$

$n = 6,0$ lampadas

$1cal - 4,2J$

E3 C1 — $k_r = 5{,}7 \cdot 10^{-6}$ kcal/s.m°C M. Isolante

Prata (Pt) $9{,}9 \cdot 10^{-2}$ kcal/s m °C

Ex: Dedenda ter ar aprisionado entre as camadas de vidro, aumentando assim a resistência térmica, diminuindo a passagem de calor

5. $L_{cu} = 90{,}0$ cm
$A = 3{,}00$ cm²
$t_2 = 100$°C
$L_{Al} = 10{,}0$ cm
$T_1 = 1{,}00$°C
$q = ?$

$$\frac{q}{t} = \frac{k A (T_2 - T_1)}{L}$$

$$\frac{q}{t}_{cu} = \frac{k_{cu} A (T_2 - T)}{L_{cu}} \qquad \frac{q}{t}_{AL} = \frac{k_{AL} A (T - T_1)}{L_{AL}}$$

$$\frac{q}{t}_{cu} = \frac{q}{t}_{AL}$$

$$\frac{k_{cu} A (T_2 - T)}{L_{cu}} = \frac{k_{AL} A (T - T_1)}{L_{AL}} \quad \times L_{cu} L_{AL}$$

$$L_{AL} k_{cu} (T_2 - T) = L_{cu} k_{AL} (T - T_1)$$
$$L_{AL} k_{cu} T_2 - L_{AL} k_{cu} T = L_{cu} k_{AL} T - L_{cu} k_{AL} T_1$$
$$L_{AL} k_{cu} T_2 + L_{cu} k_{AL} T_1 = L_{cu} k_{AL} T + L_{AL} k_{cu} T$$
$$L_{AL} k_{cu} T_2 + L_{cu} k_{AL} T_1 = (L_{cu} k_{AL} + L_{AL} k_{cu}) T$$
$$T = \frac{L_{AL} k_{cu} T_2 + L_{cu} k_{AL} T_1}{L_{cu} k_{AL} + L_{AL} k_{cu}}$$

$$T = \frac{0{,}1 \cdot 386 \cdot 100 + 0{,}90 \cdot 220 \cdot 1}{0{,}90 \cdot 220 + 0{,}1 \cdot 386} \quad \frac{3860 + 198}{198 + 38{,}6} \quad \frac{4058}{236{,}6} \quad 17{,}15$$

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$$\dot{q}_{cu} = \frac{k_{cu} A (T_2 - T)}{L_{cu}}$$

$$\dot{q}_{cu} = \frac{386 \cdot 3,00 \cdot 10^{-4} (100 - 17,15)}{0,900\ m} = 10,66\ W \checkmark$$

$$\dot{q}_{Ae} = \frac{k_{Ae} \cdot A (T - T_1)}{L_{Ae}}$$

$$\dot{q}_{Ae} = \frac{220\ 3,00 \cdot 10^{-4} (17,15 - 1)}{0,100} = 10,66\ W \checkmark$$

6) $t_1 = 37°C$

$t_2 = 27°C$

$\dot{q} = 100\ W$

$A = 1,5\ m^2$

$L = 3,00\ mm$

$k = ?$

$$\dot{q} = k A \frac{T_2 - T_1}{L}$$

$$100 = \frac{k \cdot 1,5 (37 - 27)}{3,00 \cdot 10^{-3}}$$

$$\frac{100 \cdot 3,00 \cdot 10^{-3}}{15} = k = 0,02\ \frac{W}{mk}$$

$$k = 2,0 \cdot 10^{-2}\ \frac{W}{mk} \checkmark$$

7) $L = ?$

$R_{AR} \Rightarrow L = 1\ cm$

$$R_{TERMICA} = \frac{L}{kA}$$

$$R_A = \frac{L}{0.026} \qquad R_{PE} = \frac{L}{429}$$

$$\frac{0,01}{0.026} = \frac{L_{PE}}{429} \qquad L_{PE} = 165\ m$$