TERMODINÂMICA

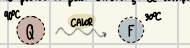
TEMPERATURA

mede agitação média das partículas de um corpo

FRIO → T° → QUENTE

CALOR energia térmica em trânsito entre corpos

* fluxo provocado pela diferença de temperaturas



O processo se cessa quando atinge o equilíbrio térmico

$T_A = T_B$

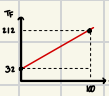
	°C	°F	K
P_V	100	212	373
P_G	0	32	273

→ 0 absoluto

CONVERSÕES

$$\frac{\Delta T_c}{5} = \frac{\Delta T_F}{9} = \frac{\Delta T_k}{5}$$

1 Celsius e Farenheit



$$\frac{T_c}{5} = \frac{T_F - 32}{9}$$

$$T_F = \frac{9}{5} T_c + 32$$

2 Celsius e Kelvin

$$T_c = T_k - 273$$

3 Outras

$$\frac{M - i}{F - i} = \frac{M - i}{F - i}$$

Q1: 100,1 °F → °C ?

a) $\frac{x}{5} = \frac{100,1 - 32}{9}$

$9x = 68,1 \cdot 5$

$x = \frac{342}{9} = 38°C$

b) K: $38 + 273 = 311$

Q2: 0°C = 10cm 100°C = 15cm

13cm ?

F	100°	15
M	x°	13
i	0°	10

$\frac{x - 0}{100 - 0} = \frac{13 - 10}{15 - 10}$

$x \cdot 5 = 3 \cdot 100 \therefore x = 60°C$

Q3:

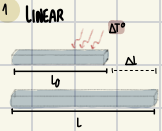
$T_1 = 120°C$

$T_2 = 438K \therefore 165°C$

$\frac{165 - 120}{5} = \frac{x}{9} \therefore x = 81°F$

DILATAÇÃO TÉRMICA

1 LINEAR

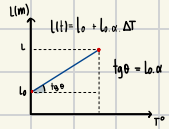


→ coeficiente de dilatação LINEAR

$\Delta L = L_0 \cdot \alpha \cdot \Delta T$

ex: $\alpha = 12 \cdot 10^{-6}$ $\alpha = 0,5 \cdot 10^{-6}$...

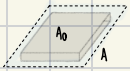
GRÁFICO

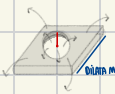


2 SUPERFICIAL

$\Delta A = A_0 \cdot \beta \cdot \Delta T$

$\beta = 2 \cdot \alpha$





Corpo oco dilata-se tal qual maciço

3 VOLUMÉTRICA

$\Delta V = V_0 \cdot \gamma \cdot \Delta T$

$\gamma = 3\alpha$

Q1: $\alpha = 1,2 \cdot 10^{-5}$ $\Delta T = 60$ $A_0 = 5m^2$

$\Delta A = 5 \cdot (2,4 \cdot 10^{-5}) \cdot 60 = 7,2 \cdot 10^{-3}$

$\Delta V_L = 400mL$

$\Delta V_F = 100mL$

$\Delta V_{aparente} = 300mL$

$\Delta V_{ap} = \Delta V_L - \Delta V_F$

$V_0 \cdot \gamma_{ap} \cdot \Delta T = V_0 \cdot \gamma_L \cdot \Delta T - V_0 \cdot \gamma_F \cdot \Delta T$

$\gamma_{ap} = \gamma_L - \gamma_F$

Q2: $V_0 = 10L$ $\Delta T = 90 - 10 = 80$ $\Delta V_{ap} = 352$

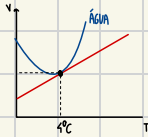
$\gamma_{\theta} = 5 \cdot 10^{-4}$

$352mL = 10 \cdot 80 \cdot 5 \cdot 10^{-4} - 10 \cdot 80 \cdot \gamma$

$0,352 = 0,4 - 800 \cdot \gamma$

$\gamma = 6 \cdot 10^{-5} \xrightarrow{:3} 2 \cdot 10^{-5} = \alpha$

DILATAÇÃO ANÔMALA DA ÁGUA



$V_{min} = 4°C$

$0° - 4°$ $V_{diminui} \therefore d\uparrow$

$4° - 0°$ $V_{aumenta} \therefore d\downarrow$

CALORIMETRIA

CALOR SENSÍVEL: muda temperatura

$Q = C \cdot \Delta T \quad \therefore \quad Q = m \cdot c \cdot \Delta T$

CALOR LATENTE: muda estado físico

$Q = m \cdot L$

CAPACIDADE TÉRMICA: (corpo)

$$C = \frac{Q}{\Delta T} \left[\frac{cal}{°C}\right] ou \left[\frac{J}{K}\right]$$

* mais C dificulta variação de T°

$C = m \cdot c$ → substância

CALOR ESPECÍFICO(c)

$$c = \frac{C}{m} \left[\frac{cal}{g°C}\right]$$

ex: $c_{H_2O} = 1 cal/g°C$

$c_{FERRO} = 0,11 cal/g°C$

$P = \frac{Q}{t}$

Q1: $29K = \frac{\Delta T \cdot C}{t} = \frac{40 \cdot C}{240}$ (÷4,2 = 30)

$\therefore C = 420 cal/C°$