Fisica do Calor (4300159)

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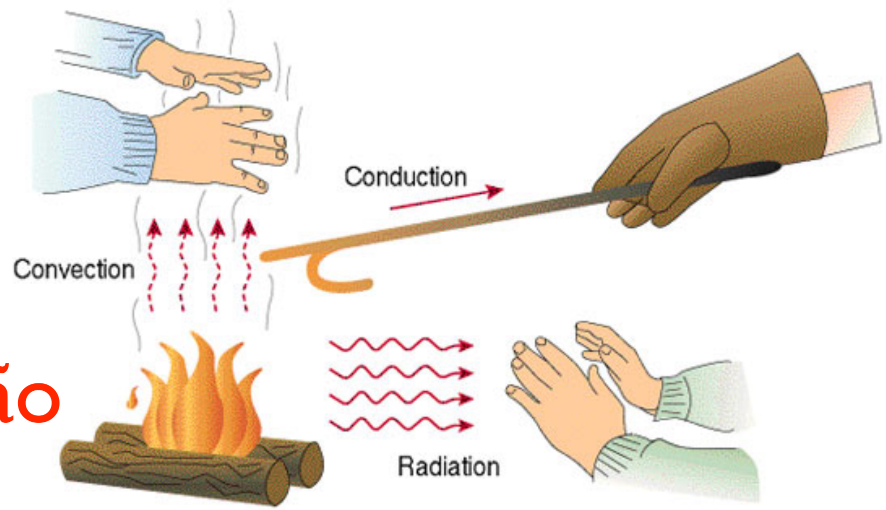
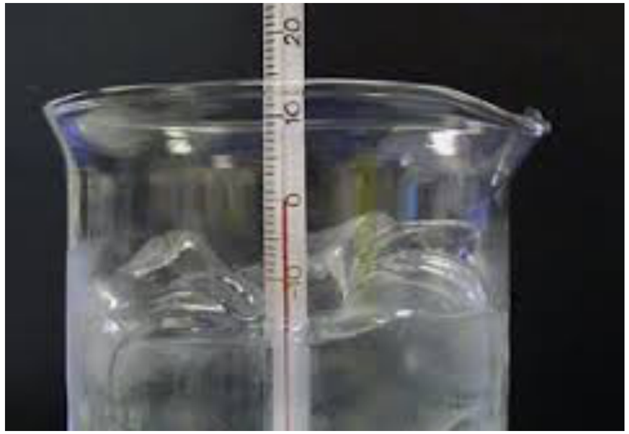
A04

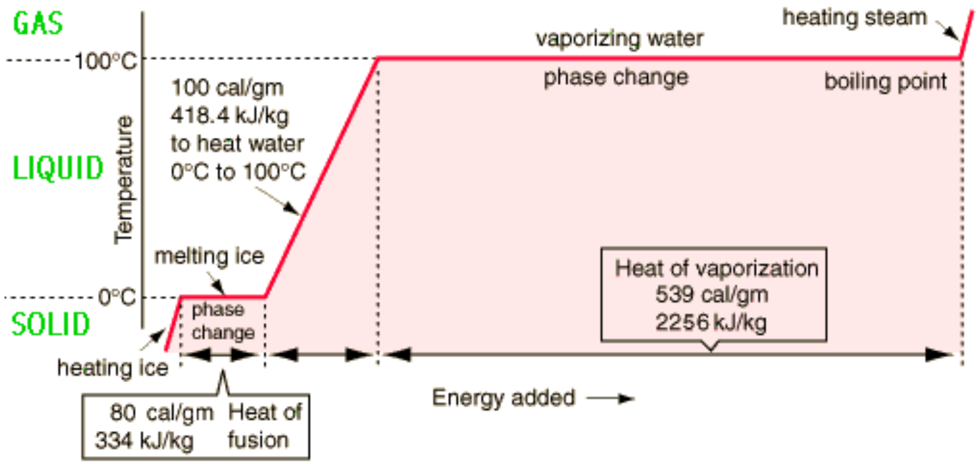


Condução, convenção
Radiação

Mudança de Fase

Derreter 1 kg de gelo versus 10 kg?
Evaporar 1 kg de agua versus 10 kg?
Derreter gelo versus derreter ferro?





$$Q = \pm mL$$

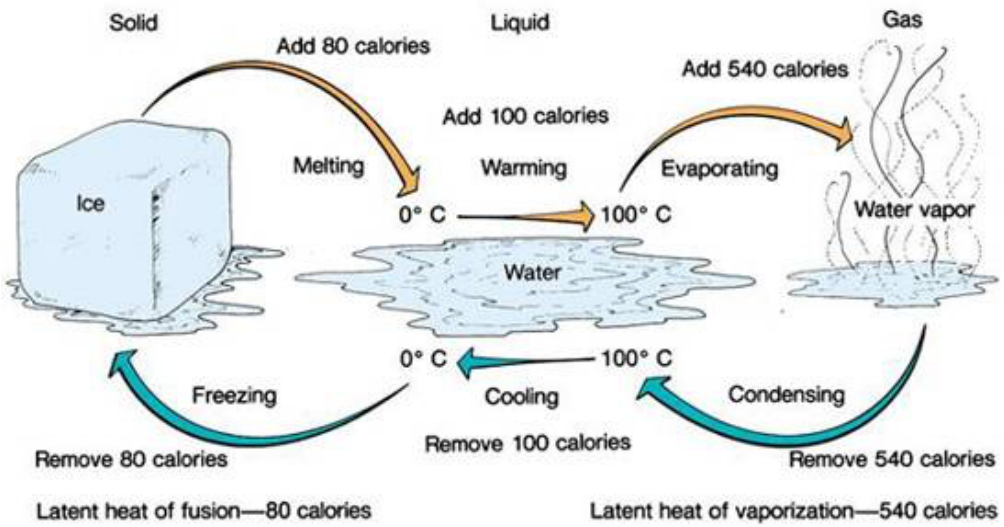
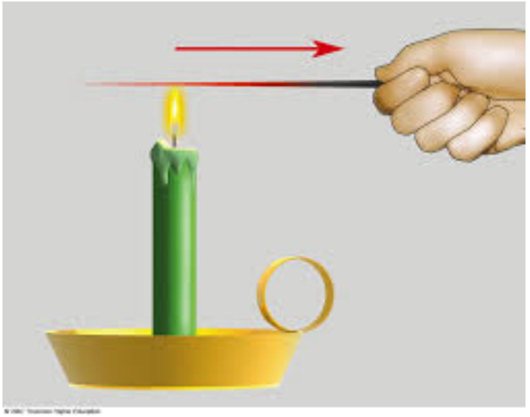


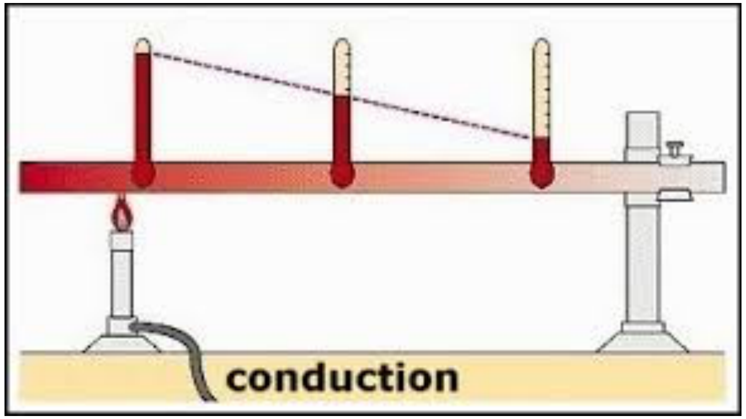
Table 17.4 Heats of Fusion and Vaporization

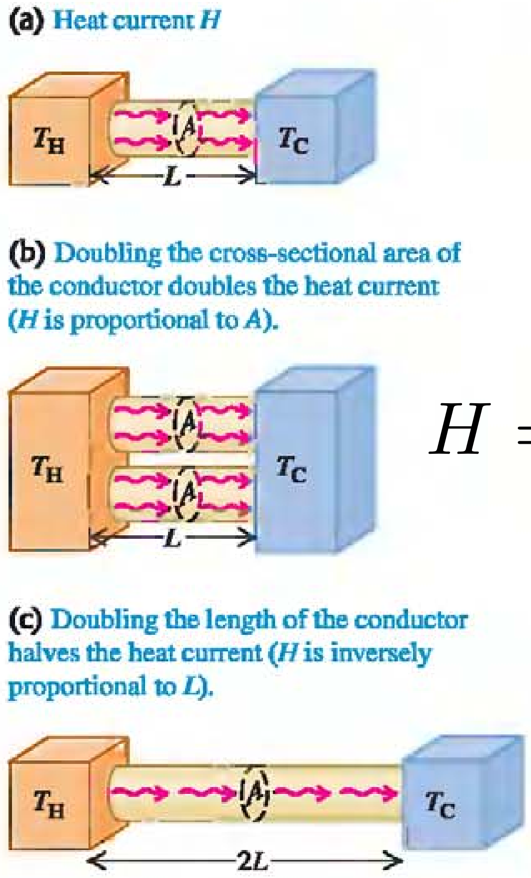
Substance	Normal Melting Point		Heat of Fusion, L_f (J/kg)	Normal Boiling Point		Heat of Vaporization, L_v (J/kg)
	K	°C		K	°C	
Helium	*	*	*	4.216	−268.93	20.9×10^3
Hydrogen	13.84	−259.31	58.6×10^3	20.26	−252.89	452×10^3
Nitrogen	63.18	−209.97	25.5×10^3	77.34	−195.8	201×10^3
Oxygen	54.36	−218.79	13.8×10^3	90.18	−183.0	213×10^3
Ethanol	159	−114	104.2×10^3	351	78	854×10^3
Mercury	234	−39	11.8×10^3	630	357	272×10^3
Water	273.15	0.00	334×10^3	373.15	100.00	2256×10^3
Sulfur	392	119	38.1×10^3	717.75	444.60	326×10^3
Lead	600.5	327.3	24.5×10^3	2023	1750	871×10^3
Antimony	903.65	630.50	165×10^3	1713	1440	561×10^3
Silver	1233.95	960.80	88.3×10^3	2466	2193	2336×10^3
Gold	1336.15	1063.00	64.5×10^3	2933	2660	1578×10^3
Copper	1356	1083	134×10^3	1460	1187	5069×10^3

*A pressure in excess of 25 atmospheres is required to make helium solidify. At 1 atmosphere pressure, helium remains a liquid down to absolute zero.

Mecanismos de transferencia de calor: (1) Condução







$$H = \frac{dQ}{dt} = kA\frac{\Delta T}{L}$$

Condutividade térmica, k

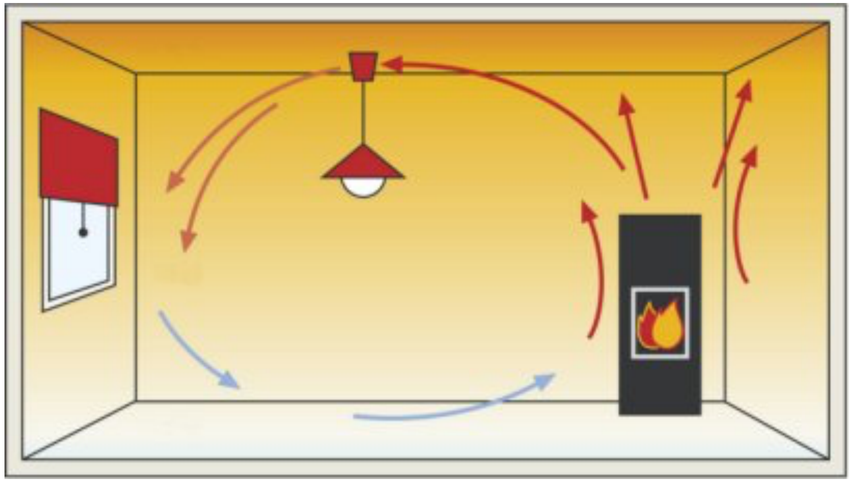
$$|H| = kA\frac{dT}{dx}$$

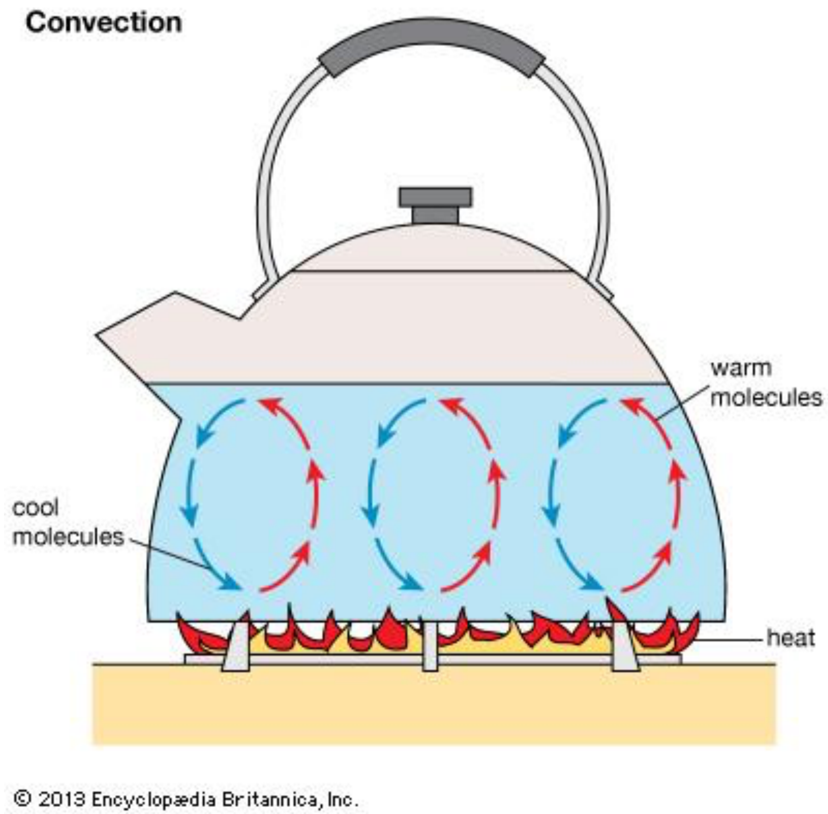
Corrente de calor H

$$H = \frac{dQ}{dt}$$

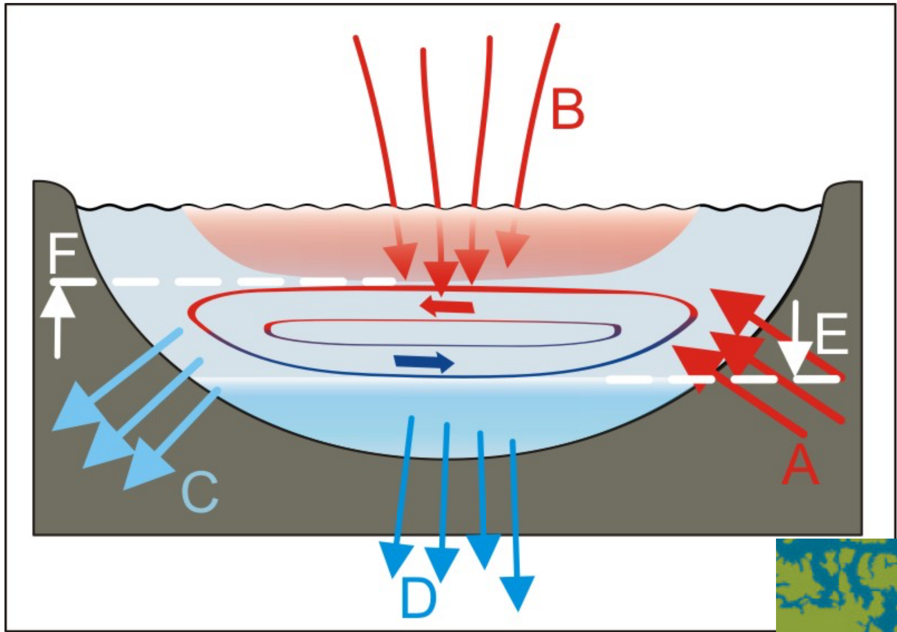
depende de 4 fatores, quais? como?

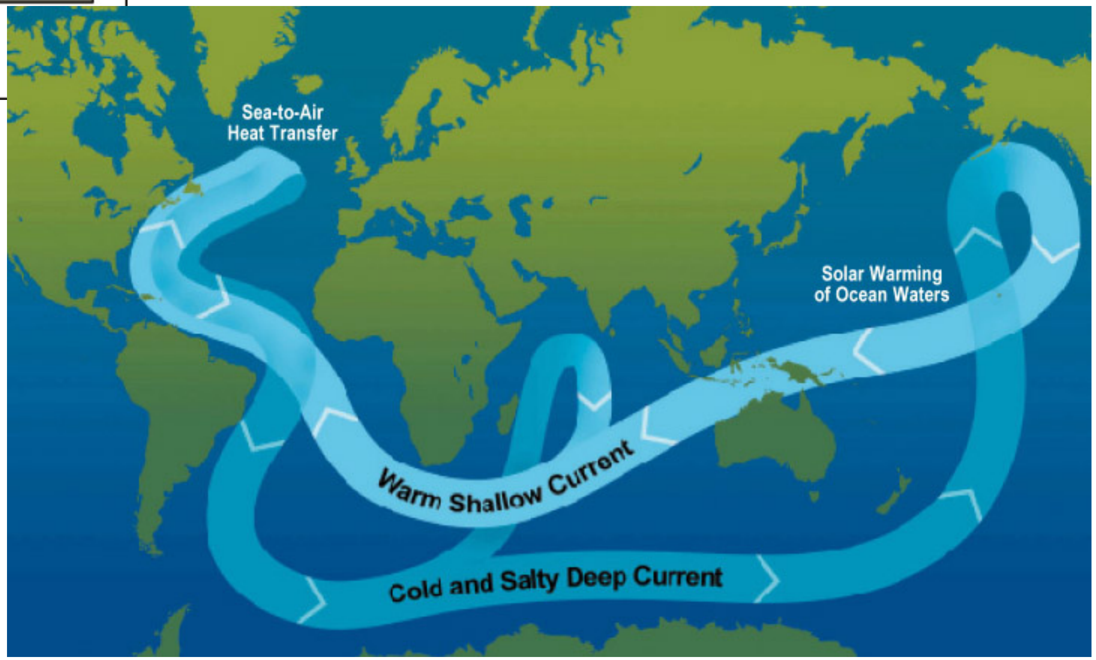
Mecanismos de transferencia de calor: (1) Convecção





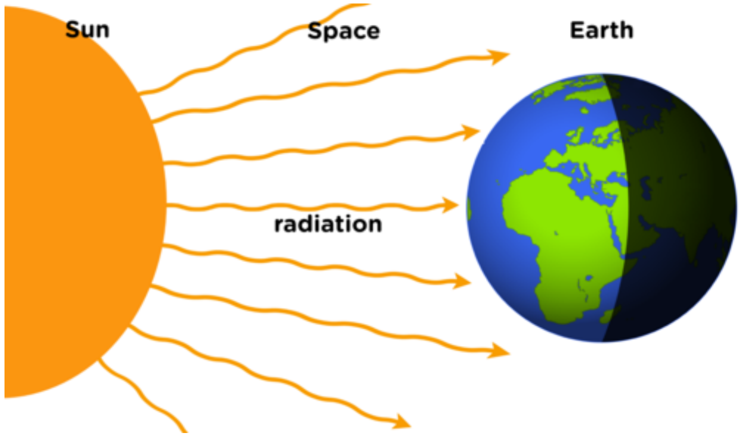
A, B - Entrada de calor
C, D - Sumidouros de calor

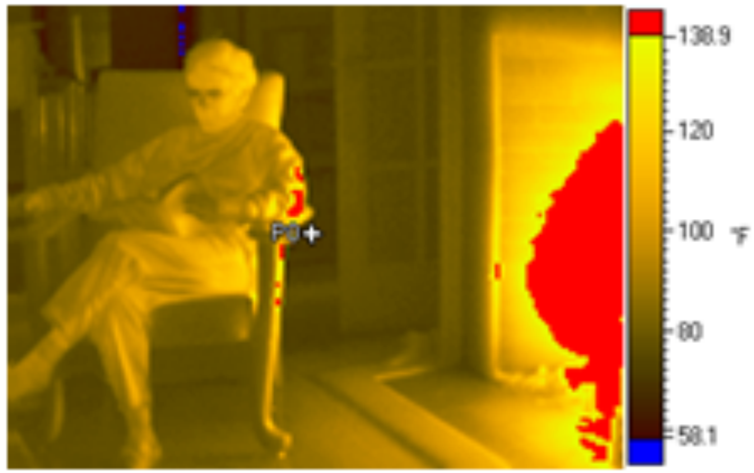




Mecanismos de transferencia de calor: (1) Radiação

Transferencia de calor via ondas eletromagnéticas.
A 20ºC, quase toda a energia irradiada é via infra-vermelho.
A medida que a temperatura vai aumentando, o comprimento de onda vai ficando menor. A 800 ºC um corpo emite radiação visível, na região do vermelho (apesar de que a maioria da energia ainda sera infravermelha).





A 3000 ºC (lâmpada incandescente), ja existe luz suficiente para aparentar uma cor tipo branco-quente)

$$H = \frac{dQ}{dt}$$

Depende da area superficial A

Da temperatura (em Kelvin)

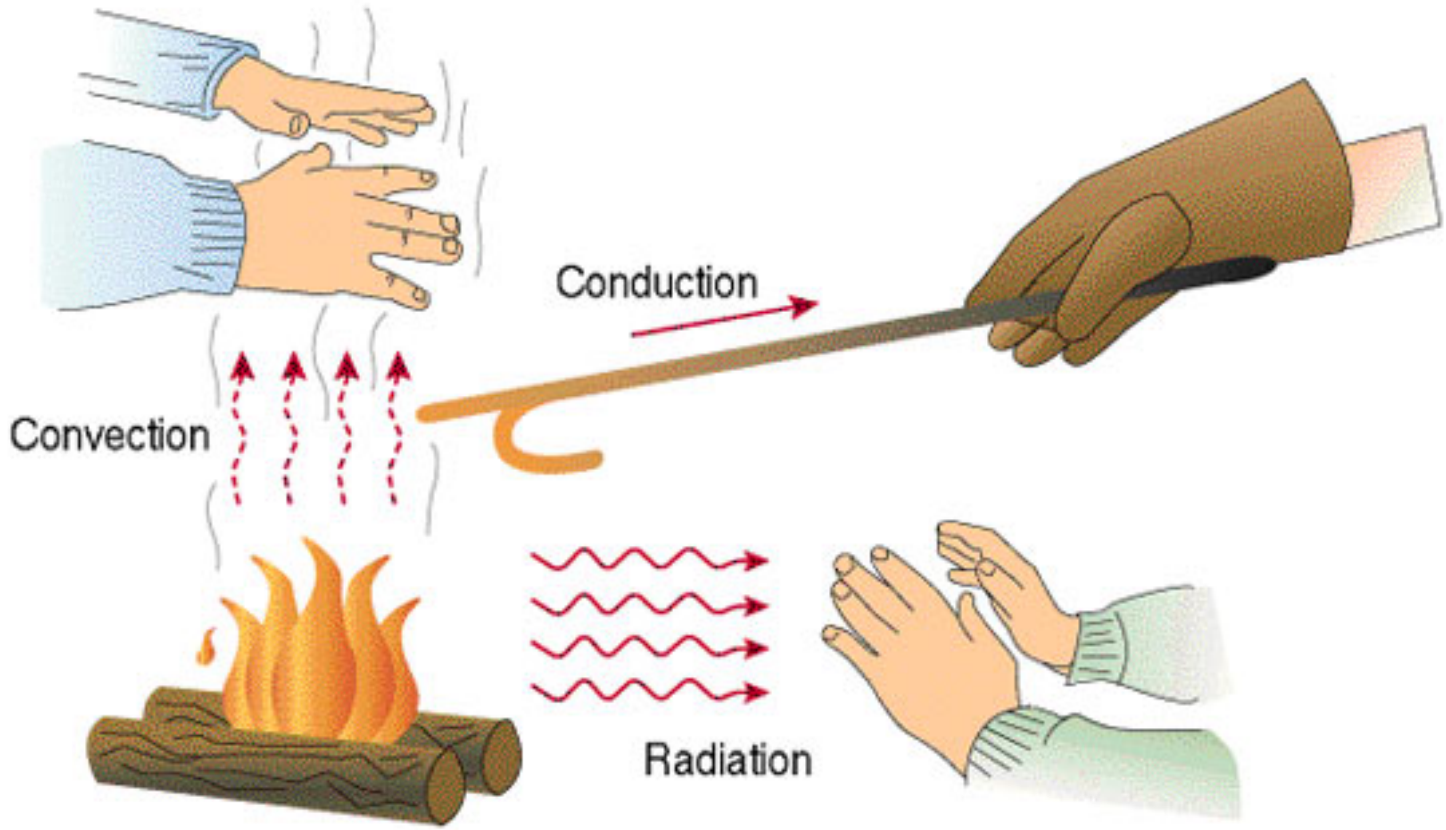
Do tipo da superfície, e que varia entre 0 e 1.

$$H = Ae\sigma T^4$$

↑

Stefan-Boltzmann constant

$$\sigma = 5.670400 \times 10^{-8}\,\mathrm{W/m^2\,K^4}$$


Conduction
Convection
Radiation