

QUESTION:

The temperature of a body is increased from -173 C to 357 C. What is the ratio of energies emitted by the body per second in these two cases?

ANSWER

According to the Stefan–Boltzmann law the total energy radiated per unit surface area of a black body across all wavelengths per unit time is $\varepsilon = \sigma T^4$

Hence (-173 C=100 K, 357 C = 630 K)

$$\frac{\varepsilon_1}{\varepsilon_2} = \left(\frac{T_1}{T_2}\right)^4$$

$$\frac{\varepsilon_1}{\varepsilon_2} = \left(\frac{100}{630}\right)^4 = 6.348 \cdot 10^{-4}$$

ANSWER

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