activity of the body; the amount of the body exposed; and the amount of insulation on the body (clothes and fat). We now discuss each of the mechanisms of heat loss for the case of a nude body (to simplify so as not to have to include the role of clothing).

2.4.1 Heat Loss by Radiation

All objects, regardless of their temperature, emit energy in the form of electromagnetic radiation. In general, the amount of energy emitted by the body is proportional to the absolute temperature raised to the fourth power (Equation 2.5).

$$E_r = \epsilon \, A \, \sigma \, T^4 \tag{2.5}$$

where E_r is the rate of energy emitted; ϵ is the emissivity, which has values of $0 \leq \epsilon \leq 1$ and accounts for a surface not being a perfect emitter; A is the area, σ is the Stefan-Boltzmann constant, and T is the absolute temperature. The body also receives radiant energy from surrounding objects. The approximate difference between the energy radiated by the body and the energy absorbed from radiation from the surroundings can be calculated using equation 2.6.

$$H_r = K_r \, A_r \, \epsilon \, (T_s - T_w) \tag{2.6}$$

where H_r is the rate of energy loss (or gain) due to radiation. A_r is the effective body surface area emitting the radiation, ϵ is the emissivity of the surface, T_s is the skin temperature (C), and T_w is the temperature of the surrounding walls (C). [We can use C here instead of K, as we are computing ΔT. K_r is a constant that depends upon various physical parameters and is about 2.1×10^4 J/(m^2 hr C) (5.0 kcal/(m^2 hr C)]. The emissivity ϵ in the infrared region is independent of the color of the skin and is very nearly equal to 1, indicating that the skin at this wavelength is almost a perfect absorber and emitter of radiation. (If we could see the deep infrared emitted by the body, we would all be "black.")

Under normal conditions about half of our energy loss is the result of radiation, even if the temperature of the surrounding walls is not much lower than body temperature.