

59. (a) Recalling that a change in Kelvin temperature is numerically equivalent to a change on the Celsius scale, we find that the rate of heat conduction is

$$P_{\text{cond}} = \frac{kA(T_H - T_C)}{L} = \frac{(401 \text{ W/m}\cdot\text{K})(4.8 \times 10^{-4} \text{ m}^2)(100 \text{ C}^\circ)}{1.2 \text{ m}} = 16 \text{ J/s} .$$

- (b) Using Table 19-4, the rate at which ice melts is

$$\left| \frac{dm}{dt} \right| = \frac{P_{\text{cond}}}{L_F} = \frac{16 \text{ J/s}}{333 \text{ J/g}} = 0.048 \text{ g/s} .$$