

Answer on Question #64846-Physics-Other

An ice box has a total area of $A = 0.950\text{m}^2$ wall thickness $d = 2.50\text{cm} = 0.025\text{ m}$ the box contain ice water and can beverages at $T_1 = 0^\circ\text{C}$. How much ice melts in $t = 1\text{ day} = 24\text{ h} = 86400\text{ s}$ if the ice box is kept in the trunk of the car at $T_2 = 35.0^\circ\text{C}$?

Solution

The rate of heat transfer:

$$\frac{Q}{t} = \frac{kA(T_2 - T_1)}{d}$$
$$\frac{Q}{t} = \frac{(0.010)(0.950)(35 - 0)}{0.025} = 13.3\text{ W}.$$

The heat for melting the ice:

$$Q = mL.$$
$$m = \frac{Q}{L} = \frac{\left(\frac{Q}{t}\right)t}{L} = \frac{(13.3)(86400)}{334 \cdot 10^3} = 3.44\text{ kg}.$$

Answer: 3.44 kg.

Answer provided by <https://www.AssignmentExpert.com>