46. We denote the ice with subscript I and the coffee with c, respectively. Let the final temperature be T_f. The heat absorbed by the ice is $Q_I = \lambda_F m_I + m_I c_w\,(T_f - 0°\text{C})$, and the heat given away by the coffee is $|Q_c| = m_w c_w\,(T_I - T_f)$. Setting $Q_I = |Q_c|$, we solve for T_f:

$$\begin{aligned} T_f &= \frac{m_w c_w T_I - \lambda_F m_I}{(m_I + m_c) c_w} \\ &= \frac{(130\,\text{g})\,(4190\,\text{J/kg}\cdot\text{C}°)\,(80.0°\text{C}) - \big(333 \times 10^3\,\text{J/g}\big)\,(12.0\,\text{g})}{(12.0\,\text{g} + 130\,\text{g})\,(4190\,\text{J/kg}\cdot\text{C}°)} \\ &= 66.5°\text{C}\ . \end{aligned}$$

Note that we work in Celsius temperature, which poses no difficulty for the J/kg·K values of specific heat capacity (see Table 19-3) since a change of Kelvin temperature is numerically equal to the corresponding change on the Celsius scale. Therefore, the temperature of the coffee will cool by $|\Delta T| = 80.0°\text{C} - 66.5°\text{C} = 13.5\text{C}°$.