

36. (a) Using Eq. 19-17, the heat transferred to the water is

$$\begin{aligned} Q_w &= c_w m_w \Delta T + L_V m_s \\ &= (1 \text{ cal/g}\cdot\text{C}^\circ)(220 \text{ g})(100^\circ\text{C} - 20.0^\circ\text{C}) + (539 \text{ cal/g})(5.00 \text{ g}) \\ &= 20.3 \text{ kcal} . \end{aligned}$$

(b) The heat transferred to the bowl is

$$Q_b = c_b m_b \Delta T = (0.0923 \text{ cal/g}\cdot\text{C}^\circ)(150 \text{ g})(100^\circ\text{C} - 20.0^\circ\text{C}) = 1.11 \text{ kcal} .$$

(c) If the original temperature of the cylinder be T_i , then $Q_w + Q_b = c_c m_c (T_i - T_f)$, which leads to

$$T_i = \frac{Q_w + Q_b}{c_c m_c} + T_f = \frac{20.3 \text{ kcal} + 1.11 \text{ kcal}}{(0.0923 \text{ cal/g}\cdot\text{C}^\circ)(300 \text{ g})} + 100^\circ\text{C} = 873^\circ\text{C} .$$