38. We note from Eq. 19-12 that 1 Btu = 252 cal. The heat relates to the power, and to the temperature change, through $Q = Pt = cm\Delta T$. Therefore, the time t required is

$$\begin{aligned} t &= \frac{cm\Delta T}{P} = \frac{(1000\,\text{cal/kg}\cdot\text{C}^\circ)(40\,\text{gal})(1000\,\text{kg}/264\,\text{gal})(100^\circ\text{F} - 70^\circ\text{F})(5\text{C}^\circ/9\text{F}^\circ)}{(2.0\times 10^5\,\text{Btu/h})(252.0\,\text{cal/Btu})(1\,\text{h}/60\,\text{min})} \\ &= 3.0\ \text{min}\ . \end{aligned}$$

The metric version proceeds similarly:

$$\begin{aligned} t &= \frac{c\rho V\Delta T}{P} = \frac{(4190\,\text{J/kg}\cdot\text{C}^\circ)(1000\,\text{kg/m}^3)(150\,\text{L})(1\,\text{m}^3/1000\,\text{L})(38^\circ\text{C} - 21^\circ\text{C})}{(59000\,\text{J/s})(60\,\text{s}/1\,\text{min})} \\ &= 3.0\ \text{min}\ . \end{aligned}$$