

42. The power consumed by the system is

$$\begin{aligned} P &= \left(\frac{1}{20\%} \right) \frac{cm\Delta T}{t} \\ &= \left(\frac{1}{20\%} \right) \frac{(4.18 \text{ J/g}\cdot^\circ\text{C})(200 \times 10^3 \text{ cm}^3)(1 \text{ g/cm}^3)(40^\circ\text{C} - 20^\circ\text{C})}{(1.0 \text{ h})(3600 \text{ s/h})} \\ &= 2.3 \times 10^4 \text{ W} . \end{aligned}$$

The area needed is then

$$A = \frac{2.3 \times 10^4 \text{ W}}{700 \text{ W/m}^2} = 33 \text{ m}^2 .$$