

$$Q = \dot{m} C_p \Delta T$$

$$Q = 1500 \text{ W}$$

$$\dot{m} = ?$$

$$C_p = 4.1813 \frac{\text{J}}{\text{g K}} \text{ (water at } 25^\circ\text{C)}$$

$$\Delta T = 4^\circ\text{C} = 7.2^\circ\text{F} = 4 \text{ K}$$

$$\dot{m} = \frac{Q}{C_p \Delta T}$$

$$C_p = \frac{4.1813 \text{ J}}{\text{g K}} \frac{453.59 \text{ gm}}{1 \text{ lbm}} = 1896.596 \frac{\text{J}}{\text{lbm K}}$$

$$\dot{m} = \frac{1500 \cancel{\text{J}}}{\cancel{\text{s}} 1896.596 \cancel{\text{J}} 4 \text{ K}} \frac{1 \text{ lbm K}}{1} = 0.19772 \frac{\text{lbm}}{\text{s}}$$

$$\frac{0.19772 \text{ lbm}}{\text{s}} \frac{1 \cancel{\text{ft}}^3}{62.4 \text{ lbm}} \frac{7.48 \cancel{\text{gal}}}{1 \cancel{\text{ft}}^3} \frac{60 \text{ s}}{1 \text{ min}} = \boxed{1.42 \text{ gal/min}}$$

METRIC MODE ↓

$$\dot{m} = \frac{Q}{C_p \Delta T} \quad Q = 1500 \text{ W} \quad \dot{m} = ? \quad C_p = 4.1813 \frac{\text{J}}{\text{gm K}} \quad \Delta T = 4 \text{ K} \quad \rho = 998.2 \text{ kg/m}^3$$

$$\dot{m} = \frac{1500 \cancel{\text{J}}}{\cancel{\text{s}} 4.1813 \cancel{\text{J}} 4 \text{ K}} \frac{\text{gm K}}{1000 \text{ gm}} \frac{\text{kg}}{1} = .089685 \text{ kg/s}$$

$$\frac{.089685 \text{ kg}}{\text{s}} \frac{\text{m}^3}{998.2 \text{ kg}} \frac{60 \text{ s}}{1 \text{ min}} \frac{1000 \cancel{\text{L}}}{1 \cancel{\text{m}}^3} = \boxed{5.39 \frac{\text{L}}{\text{min}}}$$