Solution 1.18

A resistance heater is used to heat water to desired temperature. The amount of electric energy used in kWh and kJ are to be determined.

Analysis The resistance heater consumes electric energy at a rate of 4 kW or 4 kJ/s. Then the total amount of electric energy used in 3 hours becomes

Total energy = (Energy per unit time)(Time interval)

$$= (4 \text{ kW})(3 \text{ h})$$

$$= \textbf{12 kWh}$$

Noting that 1 kWh = (1 kJ/s)(3600 s) = 3600 kJ,

Total energy = (12 kWh)(3600 kJ/kWh)

$$= \textbf{43,200 kJ}$$

Discussion Note kW is a unit for power whereas kWh is a unit for energy.