

Solution 1.15E

The constant-pressure specific heat of air given in a specified unit is to be expressed in various units.

Analysis Using proper unit conversions, the constant-pressure specific heat is determined in various units to be

$$c_p = (1.005 \text{ kJ/kg} \cdot ^\circ\text{C}) \left(\frac{1 \text{ kJ/kg} \cdot \text{K}}{1 \text{ kJ/kg} \cdot ^\circ\text{C}} \right) = \mathbf{1.005 \text{ kJ/kg} \cdot \text{K}}$$

$$c_p = (1.005 \text{ kJ/kg} \cdot ^\circ\text{C}) \left(\frac{1000 \text{ J}}{1 \text{ kJ}} \right) \left(\frac{1 \text{ kg}}{1000 \text{ g}} \right) = \mathbf{1.005 \text{ J/g} \cdot ^\circ\text{C}}$$

$$c_p = (1.005 \text{ kJ/kg} \cdot ^\circ\text{C}) \left(\frac{1 \text{ kcal}}{4.1868 \text{ kJ}} \right) = \mathbf{0.240 \text{ kcal/kg} \cdot ^\circ\text{C}}$$

$$c_p = (1.005 \text{ kJ/kg} \cdot ^\circ\text{C}) \left(\frac{1 \text{ Btu/lbm} \cdot ^\circ\text{F}}{4.1868 \text{ kJ/kg} \cdot ^\circ\text{C}} \right) = \mathbf{0.240 \text{ Btu/lbm} \cdot ^\circ\text{F}}$$