

19.8 In order to determine the change in length of the copper wire, we must employ a rearranged form of Equation 19.3b and using the value of α_l taken from Table 19.1 [$17.0 \times 10^{-6} (\text{°C})^{-1}$] as

$$\begin{aligned}\Delta l &= l_0 \alpha_l \Delta T = l_0 \alpha_l (T_f - T_0) \\ &= (15 \text{ m}) \left[17.0 \times 10^{-6} (\text{°C})^{-1} \right] (-9\text{°C} - 40\text{°C}) \\ &= -1.25 \times 10^{-2} \text{ m} = -12.5 \text{ mm} \quad (-0.49 \text{ in.})\end{aligned}$$