

25. The resistance at operating temperature  $T$  is  $R = V/i = 2.9 \text{ V}/0.30 \text{ A} = 9.67 \Omega$ . Thus, from  $R - R_0 = R_0\alpha(T - T_0)$ , we find

$$\begin{aligned} T &= T_0 + \frac{1}{\alpha} \left( \frac{R}{R_0} - 1 \right) \\ &= 20^\circ\text{C} + \left( \frac{1}{4.5 \times 10^{-3}/\text{K}} \right) \left( \frac{9.67 \Omega}{1.1 \Omega} - 1 \right) \end{aligned}$$

which yields approximately  $1900^\circ\text{C}$ . Since a change in Celsius is equivalent to a change on the Kelvin temperature scale, the value of  $\alpha$  used in this calculation is not inconsistent with the other units involved. Table 27-1 has been used.