Answer on Question #70768 Physics / Electric Circuits

If the resistance of a copper site at $t_1 = 30°C$ is $R_1 = 4$ Ohm, then what will be the resistance at $t_2 = 100°$ C? The temparature coefficient of resistance of copper wire $\alpha = 42.5 \times 10^{-4} °C^{-1}$.

Solution:

The dependence of the resistance on temperature is given by relationship

$$R(t) = R(0)(1 + \alpha t).$$

So

$$R(t_1) = R(0)(1 + \alpha t_1)$$

$$R(t_2) = R(0)(1 + \alpha t_2)$$

$$\frac{R(t_2)}{R(t_1)} = \frac{(1 + \alpha t_2)}{(1 + \alpha t_1)}$$

Finally

$$R(t_2) = R(t_1)\frac{(1 + \alpha t_2)}{(1 + \alpha t_1)}$$

$$= 4\frac{1 + 42.5 \times 10^{-4} \times 100}{1 + 42.5 \times 10^{-4} \times 30} = 5\ \Omega$$

Answer: 5 Ω