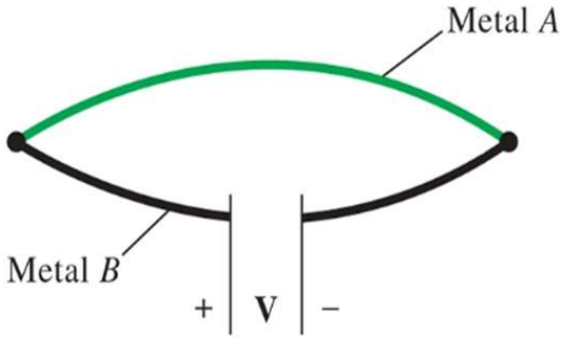
Given:

A bismuth-antimony thermocouple reads a voltage difference of 0.1 mV. The Seebeck coefficients of bismuth and antimony are -72 μV/K and 47 μV/K, respectively.

$$\Delta V := 0.1\,mV \qquad S_{Bi} := -72\,\frac{\mu V}{K} \qquad S_{Sb} := 47\,\frac{\mu V}{K}$$



Required:

If the temperature of the reference junction is known to be 22°C, what is the temperature of the measuring junction?

Solution:

The temperature of the reference junction is defined as

$$T_{ref} := 22\,°C$$

The difference of the Seebeck coefficients is defined as

$$S_{Sb} - S_{Bi} = \frac{-\Delta V}{\Delta T} = \frac{-\Delta V}{T_{ref} - T_m}$$

Solving for the temperature of the measuring junction yields

$$T_m := T_{ref} + \frac{\Delta V}{S_{Sb} - S_{Bi}} = 22.84 \cdot °C$$