Answer on Question #37958, Physics, Other

Question:

When the temperature of a thin silver [α = 19 × 10-6 (C°)-1] rod is increased, the length of the rod increases by 1.9 × 10-3 cm. Another rod is identical in all respects, except that it is made from gold [α = 14 × 10-6 (C°)-1]. By how much ΔL does the length of the gold rod increase when its temperature increases by the same amount as that for the silver rod?

Answer:

The change in the units' length when temperature change can be expressed as:

$$\Delta l = l_0 \alpha \Delta T$$

where l_0 is initial length, α is linear expansion coefficient, ΔT is change of temperature.

The change of length for silver rod equals:

$$\Delta l_s = l_0 \alpha_s \Delta T$$

The change of length for gold rod equals:

$$\Delta l_g = l_0 \alpha_g \Delta T$$

Therefore:

$$\frac{\Delta l_s}{\Delta l_g} = \frac{\alpha_s}{\alpha_g}$$

$$\Delta l_g = \Delta l_s \frac{\alpha_g}{\alpha_s} = 1.4 * 10^{-3}\ cm$$

Answer: $1.4 * 10^{-3}\ cm$