

20. (a) We use $\rho = m/V$ and $\Delta\rho = \Delta(m/V) = m\Delta(1/V) \simeq -m\Delta V/V^2 = -\rho(\Delta V/V) = -3\rho(\Delta L/L)$.
The percent change in density is

$$\frac{\Delta\rho}{\rho} = -3\frac{\Delta L}{L} = -3(0.23\%) = -0.69\% .$$

- (b) Since $\alpha = \Delta L/(L\Delta T) = 0.23 \times 10^{-2}/(100^\circ\text{C} - 0.0^\circ\text{C}) = 23 \times 10^{-6}/^\circ\text{C}$, the metal is aluminum (using Table 19-2).