

15. Since a volume is the product of three lengths, the change in volume due to a temperature change ΔT is given by $\Delta V = 3\alpha V \Delta T$, where V is the original volume and α is the coefficient of linear expansion. See Eq. 19-11. Since $V = (4\pi/3)R^3$, where R is the original radius of the sphere, then

$$\Delta V = 3\alpha \left(\frac{4\pi}{3} R^3 \right) \Delta T = (23 \times 10^{-6} / \text{C}^\circ)(4\pi)(10 \text{ cm})^3(100 \text{ C}^\circ) = 29 \text{ cm}^3 .$$

The value for the coefficient of linear expansion is found in Table 19-2.