

87. We equate the buoyant force F_b to the combined weight of the cork and sinker:

$$\rho_w V_w g = \rho_c V_c g + \rho_s V_s g$$

With $V_w = \frac{1}{2}V_c$ and $\rho_w = 1.00 \text{ g/cm}^3$, we obtain

$$V_c = \frac{2\rho_s V_s}{\rho_w - 2\rho_c} = \frac{2(11.4)(0.4)}{1 - 2(0.2)} = 15.2 \text{ cm}^3 .$$

Using the formula for the volume of a sphere (Appendix E), we have

$$r = \left(\frac{3V_c}{4\pi} \right)^{1/3} = 1.54 \text{ cm} .$$