

Density Computations

3.7 This problem calls for a computation of the density of molybdenum. According to Equation 3.5

$$\rho = \frac{nA_{\text{Mo}}}{V_C N_A}$$

For BCC, $n = 2$ atoms/unit cell, and

$$V_C = \left(\frac{4R}{\sqrt{3}} \right)^3$$

Thus,

$$\begin{aligned} \rho &= \frac{nA_{\text{Mo}}}{\left(\frac{4R}{\sqrt{3}} \right)^3 N_A} \\ &= \frac{(2 \text{ atoms/unit cell})(95.94 \text{ g/mol})}{\left[(4)(0.1363 \times 10^{-7} \text{ cm})^3 / \sqrt{3} \right]^3 / (\text{unit cell})(6.023 \times 10^{23} \text{ atoms/mol})} \\ &= 10.21 \text{ g/cm}^3 \end{aligned}$$

The value given inside the front cover is 10.22 g/cm³.