

3.10 For the simple cubic crystal structure, the value of n in Equation 3.5 is unity since there is only a single atom associated with each unit cell. Furthermore, for the unit cell edge length, $a = 2R$ (Figure 3.23). Therefore, employment of Equation 3.5 yields

$$\begin{aligned}\rho &= \frac{nA}{V_C N_A} = \frac{nA}{(2R)^3 N_A} \\ &= \frac{(1 \text{ atom/unit cell})(74.5 \text{ g/mol})}{\left\{ \left[(2)(1.45 \times 10^{-8} \text{ cm}) \right]^3 / (\text{unit cell}) \right\} (6.023 \times 10^{23} \text{ atoms/mol})} \\ &= 5.07 \text{ g/cm}^3\end{aligned}$$