

$$\begin{aligned}\rho_{\text{Au}} &= \frac{n_{\text{Au}}}{V_{\text{C}} N_{\text{A}}} \\ &= \frac{(3.9998998 \text{ atoms/unit cell})(196.97 \text{ g/mol})}{(6.996 \times 10^{-23} \text{ cm}^3/\text{unit cell})(6.023 \times 10^{23} \text{ atoms/mol})} \\ &= 18.698 \text{ g/cm}^3\end{aligned}$$

Thus, the influence of the vacancies is almost insignificant--their presence reduces the density by only 0.001 g/cm³ (from 18.699 g/cm³ to 18.698 g/cm³).