

4.2 Determination of the number of vacancies per cubic meter in gold at 900°C (1173 K) requires the utilization of Equations 4.1 and 4.2 as follows:

$$\begin{aligned}
 N_v &= N \exp\left(-\frac{Q_v}{kT}\right) = \frac{N_A \rho_{\text{Au}}}{A_{\text{Au}}} \exp\left(-\frac{Q_v}{kT}\right) \\
 &= \frac{(6.023 \times 10^{23} \text{ atoms/mol})(18.63 \text{ g/cm}^3)}{196.9 \text{ g/mol}} \exp\left[-\frac{0.98 \text{ eV/atom}}{(8.62 \times 10^{-5} \text{ eV/atom-K})(1173 \text{ K})}\right] \\
 &= 3.52 \times 10^{18} \text{ cm}^{-3} = 3.52 \times 10^{24} \text{ m}^{-3}
 \end{aligned}$$