

12.30 This problem asks that we compute the number of Frenkel defects per cubic meter in silver chloride at 350°C. Solution of this problem is possible using Equation 12.2. However, we must first determine the value of N , the number of lattice sites per cubic meter, which is possible using a modified form of Equation 4.2; thus

$$\begin{aligned}
 N &= \frac{N_{\text{AP}}}{A_{\text{Ag}} + A_{\text{Cl}}} \\
 &= \frac{(6.023 \times 10^{23} \text{ atoms/mol})(5.50 \text{ g/cm}^3)(10^6 \text{ cm}^3/\text{m}^3)}{107.87 \text{ g/mol} + 35.45 \text{ g/mol}} \\
 &= 2.31 \times 10^{28} \text{ lattice sites/m}^3
 \end{aligned}$$

And, finally the value of N_{fr} is computed using Equation 12.2 as

$$\begin{aligned}
 N_{fr} &= N \exp\left(-\frac{Q_{fr}}{2kT}\right) \\
 &= (2.31 \times 10^{28} \text{ lattice sites/m}^3) \exp\left[-\frac{1.1 \text{ eV}}{(2)(8.62 \times 10^{-5} \text{ eV/K})(350 + 273 \text{ K})}\right] \\
 &= 8.24 \times 10^{23} \text{ defects/m}^3
 \end{aligned}$$