

Trex 9.17) In Alfecca ( $\alpha$  CBr), 1 H atoms are in the  $n = 2$  state for every 10 million in the ground state. Assume M-B Statistics are valid to find the temperature.

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$$\begin{array}{llll}
 k = & 8.62\text{E-}05 & \text{eV/K} & \\
 N = 1: & g(E_1) = 2 & E_1 = -13.6 & \text{eV} \\
 N = 2: & g(E_2) = 8 & E_2 = -3.4 & \text{eV}
 \end{array}$$

The Equation to use (the approximation of the integral) is:

$$\begin{aligned}
 \frac{n(E_2)}{n(E_1)} &= \frac{g(E_2)}{g(E_1)} e^{\beta(E_1 - E_2)} \\
 T &= \frac{E_1 - E_2}{k} / \ln\left(\frac{n(E_2)}{n(E_1)} \frac{g(E_1)}{g(E_2)}\right) \\
 T &= \frac{-10.2}{8.62\text{E-}05} / \ln\left(\frac{1}{10000000} \frac{2}{8}\right) \\
 T &= -1.18\text{E+}05 / \ln\left(\frac{2}{80000000}\right) \\
 T &= -1.18\text{E+}05 / \ln(2.50\text{E-}08) \\
 T &= -1.18\text{E+}05 / -17.50439 \\
 T &= 6,760 \text{ K}
 \end{aligned}$$