21.64. The ammonia molecule (NH_3) has a dipole moment of $5.0 \times 10^{-30}\,C \cdot m$. Ammonia molecules in the gas phase are placed in a uniform electric field $\vec{E}$ with magnitude $1.6 \times 10^6\,N/C$. (a) What is the change in electric potential energy when the dipole moment of a molecule changes its orientation with respect to $\vec{E}$ from parallel to perpendicular? (b) At what absolute temperature T is the average translational kinetic energy $\frac{3}{2}kT$ of a molecule equal to the change in potential energy calculated in part (a)? (*Note:* Above this temperature, thermal agitation prevents the dipoles from aligning with the electric field.)