# Population of levels according to their energy

- At about room temperature, rotational energy is contributing fully
- At about 1000 K, vibrational energy levels are reached
- At about 10 000 K, vibration is contributing fully to the internal energy

Distribution of Molecular Speeds

- The observed speed distribution of gas molecules in thermal equilibrium is shown at right

- N_v is called the **Maxwell-Boltzmann speed distribution function**
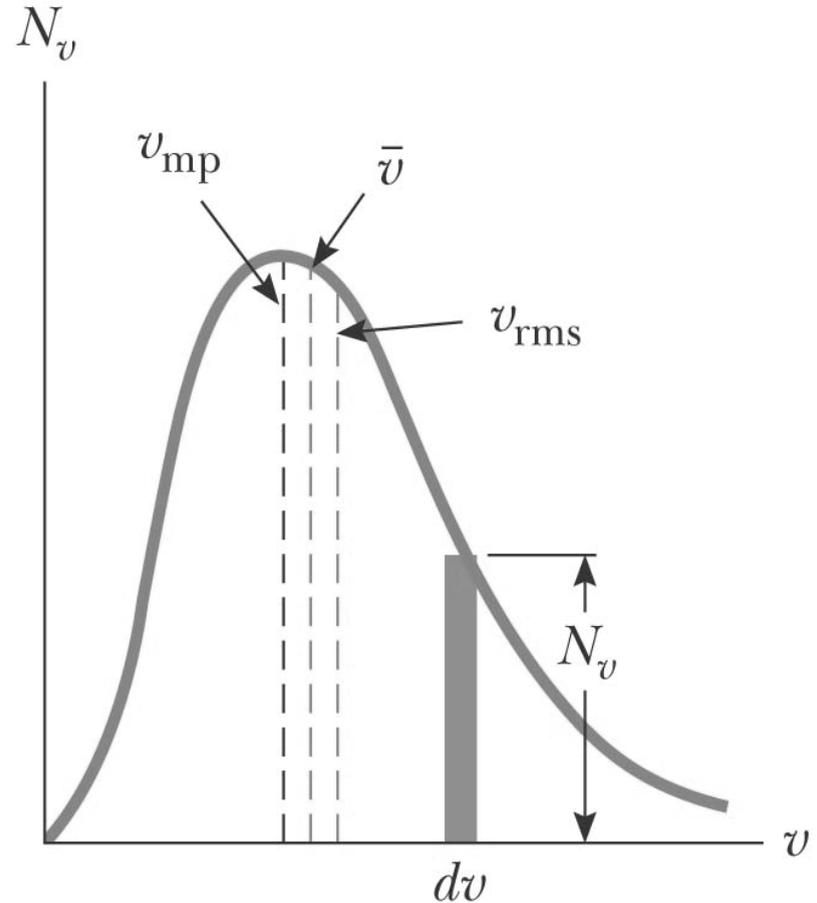
Distribution Function

- The fundamental expression that describes the distribution of speeds in *N* gas molecules is

$$N_V = 4\pi N \left(\frac{m}{2\pi k_B T} \right)^{3/2} v^2 e^{-mv^2/2k_B T}$$

- *m* is the mass of a gas molecule, k_B is Boltzmann's constant and *T* is the absolute temperature