5.7 Calculation of the microcanonical ensemble

The microcanonical ensemble is just a specialization of the canonical ensemble: We only sum up micro states p_i with energies $U_i = U$. The remaining p_i are zero; thus we find

$$1 = \sum_{i=1}^{W} p_i = \frac{1}{Z} \exp\left(-\frac{U}{kT}\right) \sum_{i=1}^{W} 1 = \frac{1}{Z} \exp\left(-\frac{U}{kT}\right) W \qquad . \tag{5.60}$$

and

$$S = k \ln(Z) + \frac{1}{T} U = k \ln(W) \qquad . \tag{5.61}$$

W: Number of the micro states of a system with energies U.
The isolated system is therefor characterized by $U = const.$ and $S = const.$