Chapter 8
Canonical Ensemble (E,V,N)

1. Why we need Canonical Ensemble approach when already we have Microcanonical ensemble in place?

The requirement for the canonical systems is twofold:

(a) Using the asymptotic expressions of $\Omega(\mathrm{E})$ (Density of states) for microcanonical ensemble, complete thermodynamics of the system could be derived in a straight forward manner. However, for most physical systems, the *mathematical* problem of determining $\Omega(\mathrm{E})$ is quite difficult. So, an alternative approach within the framework of the ensemble theory is unavoidable.

(b) Practically, it is difficult to measure or keep energy constant. But the temperature T can be kept constant using a reservoir (large heat capacity) in contact with the system.