Statistical Mechanics

Group A : statistical Physics

In statistical mechanics, deals with physical systems comprising a large numbers ($\sim 10^{23}$) of identical particles.

Macroscopic states and microscopic states

Let us consider a physical system comprising a large numbers N of identical particles which are freely moving within the system.

\# In ideal case, interaction between the particles considered to be zero and separation between them is supposed to be large.

Let No. of particle in a system = N

volume occupied = V

N and V are large quantity.

particle density $\rho = \frac{N}{V}$

" ρ is finite"

Total energy of the system = $\sum_i n_i \epsilon_i$

Where n_i is the numbes of particles having energy ϵ_i.

Total number of particle $N = \sum_i n_i$

Here energy of particles is assumed to be discrete where as in classical mechanics energy is considered to be continuous.

* From the macroscopic point of view, a state of a system is described by a number N of the constituent particles, its volume V and energy E.
* Such a state of the system, described by N, V and E is known as a macroscopic state or macrostate.
* The macroscopic parameters (N, V, E) provide no information about the system. These information is obtained by averaging over whole constituent particles.
* It does not provide information about the position and momentum coordinates of the constituent particles.