

STATISTICAL MECHANICS

* KINETIC THEORY OF GASES \rightarrow FIRST ATTEMPT TO UNDERSTAND THE MACROSCOPIC PROPERTIES OF A SYSTEM FROM A MICROSCOPIC STARTING POINT.

* STATISTICAL MECHANICS - TO ~~to~~ derive bulk

properties of a physical system using the concepts of statics & mechanics ^{together} of constituents particles of the system.

Let us consider a physical system composed of N identical particles confined to a volume V .

$N \rightarrow$ may be of the order of 10^{23}

\Rightarrow we discuss in the thermodynamic limit

$$\left(\lim_{\substack{N \rightarrow \infty \\ V \rightarrow \infty}} \right) \frac{N}{V} = \text{fixed} = n \rightarrow \text{particle density}$$

In thermodynamic limit \rightarrow Extensive properties of system size $(\propto N)$

and Intensive properties \rightarrow independent of the system size

Energy \rightarrow Total energy E of the system

$$E = \sum_{\omega} n_{\omega} \epsilon_{\omega}, \quad \text{where we have assumed noninteracting particles}$$

$$\text{and } N = \sum_{\omega} n_{\omega}$$

$n_{\omega} \rightarrow$ number of particles with energy ϵ_{ω} .