

Kinds of Ensemble :- N, V, T, E.

- ① Microcanonical ensemble - N, V, E fixed T varied
- ② Canonical ensemble - N, V, T fixed E varied
- ③ Grand ensemble - N, T fixed N, E varied

Monoatomic Ideal gas → Let us consider a monoatomic ideal gas consisting of N identical particles, each of mass m enclosed in a container of volume V at a temp T. The energy of a molecule may be written as,

$$E = \frac{p^2}{2m} = \epsilon_k \quad \text{--- (1)}$$

where the first term is the kinetic energy of the translational motion and ϵ_k is the energy associated with an internal state of the motion.

The partition function of a system in this case is given by,

$$Q_N = \frac{1}{N!} [Q_1]^N \quad \text{--- (2)}$$

where Q_1 is a single particle partition function.

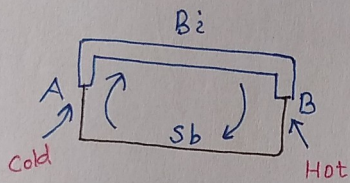
$$Q_1 = Q_{tr} Q_{in} \quad \text{--- (3)}$$

Q_{tr} is the translational partition function and is given by,

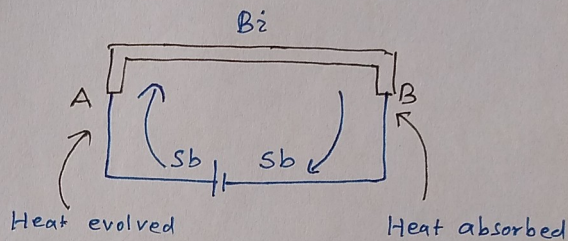
$$\begin{aligned} Q_{tr} &= \frac{1}{h^3} \int e^{-p^2/2mkT} dq db \\ &= V \left[\frac{2\pi mkT}{h^2} \right]^{3/2} \quad \text{--- (4)} \end{aligned}$$

Ques :- What is Peltier effect? Define Peltier Coefficient. Describe an experiment to demonstrate Peltier effect. 125

If a current is sent round the circuit of a thermocouple, heat is evolved at one junction and absorbed at the other i.e., one junction is heated and the other is cooled. This is Peltier effect.



(fig. 1.)



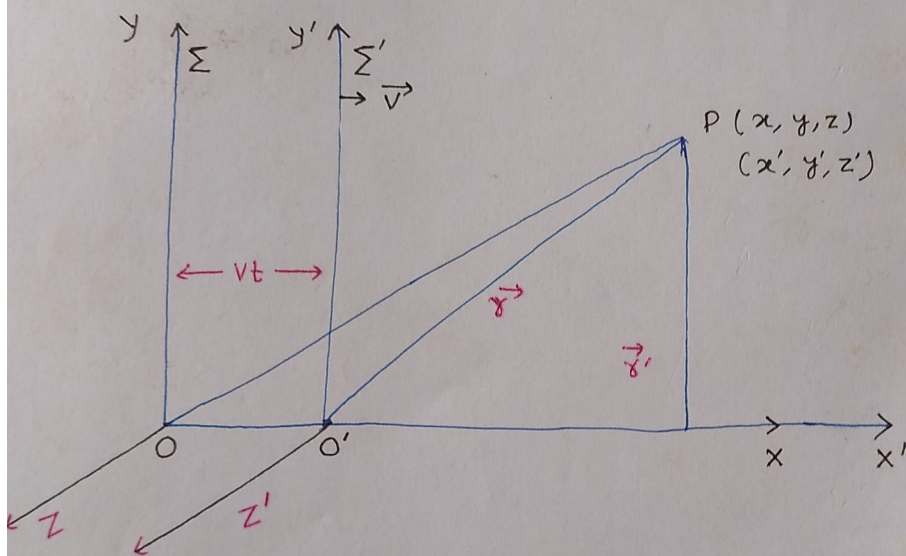
(fig. 2.)

In an (Sb - Bi) couple when the junction B is heated, and A is kept cold, current flows from Sb to Bi at the junction A and from Bi to Sb at the junction B as shown in fig. 1. When a battery is placed in the circuit and both junctions A and B are kept at the same temperature, heat is evolved at the junction A and absorbed at the junction B provided the current flows from Sb

Sh. Q.

Discuss Galilean Transformations.

The Galilean Transformations express Space-time relation of any event in different inertial reference frames. Suppose the inertial frame Σ' moves relative to the inertial frame Σ with the uniform velocity \vec{V}_0 along the common x-axis, the other two axes of Σ' remaining parallel to corresponding axes of Σ . Let us take the moment when the origins O' and O coincide as the initial time.



(Fig.)

At time t , during which the