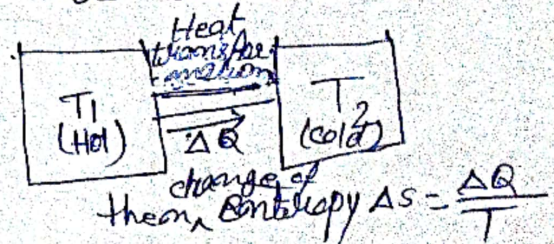


⇒ Entropy is a function of quantity of heat which shows the possibility of conversion of that heat into work.

⇒ The increase in the entropy is lower when heat is added at a high temperature and the increase in entropy is higher when heat is added at a low temperature.

⇒ The maximum entropy means, there is minimum availability for conversion into work and the minimum ~~at~~ entropy means there is maximum availability for conversion into work.

⇒ Entropy, often denoted by the symbol S , is defined as



a measure of the a system's disorder or randomness. It quantifies the amount of thermal energy in a system that is not available ~~for~~ to perform work. The higher entropy, the greater the disorder and the less energy available for work. In thermodynamics entropy can be expressed in units of Joules per Kelvin (J/K).

> Significance in thermodynamics. Entropy is center of the second law of thermodynamics, which state that the total ~~entropy~~ entropy of an isolated system can never decrease over time. This law implies that natural

Processes tend to move towards a state of maximum disorder or equilibrium, where entropy is at its highest. Consequently, certain processes are irreversible, meaning they cannot spontaneously reverse without external work being done.

⇒ Mathematical formulation, The change in entropy (ΔS) during a process can be calculated using the formula $\Delta S = \frac{Q}{T}$ where Q is the heat added to the system and T is the absolute temperature at which the process occurs. This equation highlights that the entropy increases when heat is added to a system at a constant temperature.

⇒ Examples of Entropy →

(A) Melting ice → When ice melts, it transitions from a structured solid state (low entropy) to a more disordered liquid state (high entropy). This process requires energy input, illustrating how energy is needed to increase entropy.

(B) Mixing substances → When two different gases mix, the entropy of the system increases as the molecules become more randomly distributed compared to their initial state.

(C) Heat Engines → In heat engines can be

Converted into work due to the increase in Entropy. Some energy is always lost. ~~loss~~ heat.

Entropy is crucial concept in thermodynamics that help explain the direction of spontaneous process and the limitations of energy conversion.