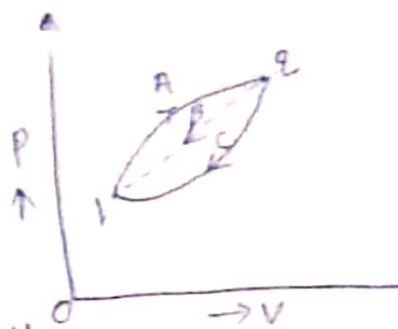


Second law in terms of Entropy $\rightarrow$

A close system undergoing reversible process from state 1 to state 2 along the path A and from



State 2 to 1 along the path B.

For a reversible process, change in entropy is given by

$$\int \frac{dQ}{T} = 0$$

$$\therefore \int_{1A}^{2A} \frac{dQ}{T} + \int_{2B}^{1B} \frac{dQ}{T} = 0 \quad \text{--- (1)}$$

The second law of thermodynamics, in terms of entropy of an isolated system can only increase over time, or remain constant in ideal cases (like reversible processes) but never decreases. Spontaneous natural processes always lead to an overall increase in the universe's entropy, essentially moving systems from order to disorder. Entropy is a measure of disorder and randomness within a system. The second law indicates that systems naturally evolve towards a state of greater disorder over time.