Some definitions

Irreversible Process:

Spontaneous process with change of external parameters; will not occur spontaneously in reverse.

Fundamental Postulate of Statistical Mechanics:

Over time an isolated system in equilibrium will be found in each accessible microstate with equal probability.

Second Law of Thermodynamics:

Spontaneous processes always tend toward a macrostate with the largest number of accessible microstates.

Some definitions

Irreversible Process:

Spontaneous process with change of external parameters; will not occur spontaneously in reverse.

Or, spontaneous process in which number of accessible microstates (Ω) increases.

Note dissipative processes are included but not necessary.

Fundamental Postulate of Statistical Mechanics:

Over time an isolated system in equilibrium will be found in each accessible microstate with equal probability.

Second Law of Thermodynamics:

Spontaneous processes always tend toward a macrostate with the largest number of accessible microstates.

Or, Ω always increases.

Some more definitions

Probability distributions:

Probability in interval dx: $P(x)\,dx$

mean value of *x*: $< x > = \int x\,P(x)\,dx$

(or may write as $\bar{x}$)

k^{th} moment of *x* about mean:

$$< (x - \bar{x})^k > = \int (x - \bar{x})^k\,P(x)\,dx$$

Stirling's approximation:

$$\ln(N!) \cong N\ln(N) - N \;\; [+ \tfrac{1}{2}\ln(2\pi N)]$$