

Thermodynamic equilibrium

@wikipedia

A state of a [thermodynamic system](#) which is in [thermal](#), [mechanical](#), and [chemical](#) equilibrium.

Specifically it is achieved at:

Maximum Entropy	Minimum Helmholtz free energy	Minimum Gibbs Free Energy
$S \rightarrow \max$	$A(T, V) \rightarrow \min$	$G(p, T) \rightarrow \min$
for isolated system	for a system with $T = \text{const}$, $V = \text{const}$	for a system with $p = \text{const}$, $T = \text{const}$

Particularly in [Fluid Dynamics](#) it means that:

(1) $G \rightarrow \min \Leftrightarrow dG = 0$	The Gibbs free energy is at minimum
(2) $T = \text{const}$	the fluid temperature is constant at any moment of time t and spatial location $\mathbf{r} = (x, y, z)$ of a fluid flow
(3) $p = \text{const}$	the fluid pressure is constant at any moment of time t and spatial location $\mathbf{r} = (x, y, z)$ of a fluid flow
(4) $\rho = \rho(p, T) = \text{const}$	fluid density is a function of pressure p and temperature T only
(5) $\mu = \mu(p, T) = \text{const}$	fluid viscosity is a function of pressure p and temperature T only
(6) $\lambda = \lambda(p, T) = \text{const}$	fluid thermal conductivity is a function of pressure p and temperature T only
(7) $c_p = c_p(p, T) = \text{const}$	fluid isobaric specific heat capacity is a function of pressure p and temperature T only
(8) $\alpha = \alpha(p, T) = \text{const}$	fluid Joule–Thomson coefficient is a function of pressure p and temperature T only

See also

[Natural Science](#) / [Physics](#) / [Thermodynamics](#) / [Thermodynamic system](#)

[[Vapour Liquid Equilibrium \(VLE\)](#)]