

Properties

Intensive

- Don't depend on size of system

- Temperature

- Pressure

- Chemical Potential

Extensive

- Depend on size of system

- Mass

- Entropy

- Volume

Laws

First: The internal energy of a system is the sum of the work done on the system and the heat transferred

-> Total energy of universe cannot change

-> $U = Q + W + W'$

-> Enthalpy: $H = U + PV$

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Systems

Isolated: No transfer of heat or matter

- will never change thermodynamic state once it reaches equilibrium

- Entropy can never decrease, only remain constant or increase

- Internal Energy is always constant

- No work done on or by system

Open: Can exchange both energy and matter with surroundings

Closed: Can transfer work and energy

- Thermodynamic state can change after equilibrium is reached

Processes

Reversible: No entropy produced

- No permanent changes in the universe

Irreversible: Results in dissipations, entropy production, and permanent changes

Adiabatic: No heat transfer

Isobaric: Constant Pressure -> $dP = 0$

Isochoric: Constant volume -> $dV = 0$

Isothermal: Constant temperature -> $dT = 0$

Cyclical: Returns system to initial state ->

$\Delta U = 0$



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