

THERMODYNAMIC SYSTEMS

A thermodynamic system is the region of the Universe with specific boundaries that is analyzed using thermodynamic theories, principles, and laws.

Everything that is not part of a thermodynamic system is said to be in the surroundings. The system and surroundings are separated by a boundary that may be fixed (always stays in the same spot), movable (location can change), imaginary (There is nothing separating the surroundings and the system, and the boundary is merely a designated space), or real (The boundary is a physical object.)

There are five types of thermodynamic system, and each type allows different things to pass through the boundary. The types are:

Open System: In open systems, matter, heat, and work can cross the boundary to enter or exit the system. The First Law of Thermodynamics when applied to an open system is: "the increase in the internal energy of a system is equal to the amount of energy added to the system by matter flowing in and by heating, minus the amount lost by matter flowing out and in the form of work done by the system."

Closed System: In a closed system, heat and work can cross the boundary, but matter can't cross the boundary. In addition, there is a type of boundary that may be in a closed system that heat can't cross, adiabatic, and one that work can't cross, rigid.

Isolated system: In an isolated system, neither matter, heat, or work can cross the boundary. Therefore, differences in thermal energy will typically lessen until the system reaches thermodynamic equilibrium.

Diathermic Systems: In a diathermic system, heat can cross the boundary, but nothing else.

Adiabatic Systems: In an adiabatic system, heat may not cross the boundary, but everything else can.