THE LAWS OF THERMODYNAMICS

In thermodynamics, there are four laws of very general validity, and as such they do not depend on the details of the interactions or the systems being studied. Hence, they can be applied to systems about which one knows nothing other than the balance of energy and matter transfer. Examples of this include Einstein's prediction of spontaneous emission around the turn of the 20th century and current research into the thermodynamics of black holes.

The four laws are:

- Zeroth law of thermodynamics, stating that thermodynamic equilibrium is an equivalence relation.

If two thermodynamic systems are separately in thermal equilibrium with a third, they are also in thermal equilibrium with each other.

- First law of thermodynamics, about the conservation of energy

The change in the internal energy of a closed thermodynamic system is equal to the sum of the amount of heat energy supplied to the system and the work done on the system.

- Second law of thermodynamics, about entropy

The total entropy of any isolated thermodynamic system tends to increase over time, approaching a maximum value.

- Third law of thermodynamics, about absolute zero temperature

As a system asymptotically approaches absolute zero of temperature all processes virtually cease and the entropy of the system asymptotically approaches a minimum value; also stated as: "the entropy of all systems and of all states of a system is zero at absolute zero" or equivalently "it is impossible to reach the absolute zero of temperature by any finite number of processes".

- Onsager reciprocal relations (sometimes called the Fourth Law of Thermodynamics)

Express the equality of certain relations between flows and forces in thermodynamic systems out of equilibrium, but where a notion of local equilibrium exists.