

Zeroth Law of Thermodynamics

When two bodies in thermal contact reach thermal equilibrium, the temperature is constant. This is essentially the 0th Law of Thermodynamics:

If A is in thermal equilibrium with B, and B is in thermal equilibrium with C, then A is in thermal equilibrium with C.

The important characteristic of systems in thermal equilibrium is that no changes in macroscopic quantities occur. Much can be happening on the microscopic scale but this is all random. Most systems in every day life are not in thermal equilibrium since macroscopic changes in temperature occur all the time. But if we consider very small time periods, or very small volumes, we can apply the concepts of thermal equilibrium to most macroscopic systems.

In any case, systems in thermal equilibrium are quite boring, as by definition nothing is happening on a macroscopic scale. We can instead look at what happens off equilibrium but still infinitely close to it, to model systems that change but very slowly. These are called quasistatic changes.