Thermodynamic Equilibrium

The term ‘equilibrium’ in thermodynamics appears when

the state of a system is an equilibrium state if the **macroscopic** variables that characterise the system do not change in time.

Macroscopic variables

The state of a gas in thermodynamics is specified by macroscopic variables such as **pressure, volume, temperature, mass and composition** that are felt by our sense perceptions and are measurable

For example, a gas inside a closed rigid container, completely insulated from its surroundings, with fixed values of pressure, volume, temperature, mass and composition that do not change with time, is in a state of thermodynamic equilibrium

Adiabatic wall

– an insulating wall (can be movable) that does not allow flow of energy (heat) from one to another. The systems are insulated from the rest of the surroundings also by similar adiabatic walls

Diathermic wall

– a conducting wall that allows energy flow (heat) from one to another. It is then found that the macroscopic variables of the systems A and B change spontaneously until both the systems attain equilibrium states. After that there is no change in their states.

Thermodynamic Temperature

There is a thermodynamic variable whose value is **equal** for two systems in thermal equilibrium is called **temperature** (T).