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The Entropy “S” is a measure for disorder of a system (referring to the amount of micro states, that a system might achieve):  $S = k \ln(\Omega)$

where  $k$  = Boltzman constant, and  $\Omega$  = microcanonical total amount of states of the different equivalent micro states

Reversible processes leave the “order” of state unchanged; they do not progress spontaneously: For reversible processes, the Entropy  $S$  remains constant,  $\Delta S = 0$ . Irreversible process diminish the “order” of state; they do progress spontaneously: For irreversible change of states, the Entropy diminishes,  $\Delta S < 0$ .