4.7: Summary

Some of the important terms and definitions discussed in this chapter are as follows.

- The derivation of the mathematical statement of the second law shows that during a reversible process of a closed system, the infinitesimal quantity $đq/T_\mathrm{b}$ equals the infinitesimal change of a state function called the entropy, S. Here $đq$ is heat transferred at the boundary where the temperature is T_b.

  In each infinitesimal path element of a process of a closed system, $\mathrm{d}S$ is equal to $đq/T_\mathrm{b}$ if the process is reversible, and is greater than $đq/T_\mathrm{b}$ if the process is irreversible, as summarized by the relation $\mathrm{d}S \geq đq/T_\mathrm{b}$.

  The second law establishes no general relation between entropy changes and heat in an open system, or for an impossible process. The entropy of an open system may increase or decrease depending on whether matter enters or leaves. It is possible to imagine different impossible processes in which $\mathrm{d}S$ is less than, equal to, and greater than $đq/T_\mathrm{b}$.