CHAPTER OVERVIEW

4: The Second Law

The second law of thermodynamics concerns entropy and the spontaneity of processes. This chapter discusses theoretical aspects and practical applications.

We have seen that the first law allows us to set up a balance sheet for energy changes during a process, but says nothing about why some processes occur spontaneously and others are impossible. The laws of physics explain some spontaneous changes. For instance, unbalanced forces on a body cause acceleration, and a temperature gradient at a diathermal boundary causes heat transfer. But how can we predict whether a phase change, a transfer of solute from one solution phase to another, or a chemical reaction will occur spontaneously under the existing conditions? The second law provides the principle we need to answer these and other questions—a general criterion for spontaneity in a closed system.