CHAPTER OVERVIEW

25: Bose-Einstein and Fermi-Dirac Statistics

In developing the theory of statistical thermodynamics and the Boltzmann distribution function, we assume that molecules are distinguishable and that any number of molecules in a system can have the same quantum mechanical description. These assumptions are not valid for many chemical systems. Fortunately, it turns out that more rigorous treatment of the conditions imposed by quantum mechanics usually leads to the same conclusions as the Boltzmann treatment. The Boltzmann treatment can become inadequate when the system consists of low-mass particles (like electrons) or when the system temperature is near absolute zero.

25.1: Quantum Statistics

25.2: Fermi-Dirac Statistics and the Fermi-Dirac Distribution Function

25.3: Bose-Einstein Statistics and the Bose-Einstein Distribution Function

Thumbnail: Comparison of average occupancy of the ground state for three statistics. (CC BY-SA 4.0; Victor Blacus via Wikipedia)
