

8.1: Orbitals Do Not Provide the Complete Picture; Their Occupancy By the N Electrons Must Be Specified

Knowing the orbitals of a particular species provides one information about the sizes, shapes, directions, symmetries, and energies of those regions of space that are **available** to the electrons (i.e., the complete set of orbitals that are available). This knowledge does **not** determine into which orbitals the electrons are placed. It is by describing the electronic configurations (i.e., orbital occupancies such as $1s^2 2s^2 2p^2$ or $1s^2 2s^2 2p^1 3s^1$) appropriate to the energy range under study that one focuses on how the electrons occupy the orbitals. Moreover, a given configuration may give rise to several energy levels whose energies differ by chemically important amounts. for example, the $1s^2 2s^2 2p^2$ configuration of the Carbon atom produces nine degenerate 3P states, five degenerate 1D states, and a single 1S state. These three energy levels differ in energy by 1.5 eV and 1.2 eV, respectively.

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