

## CHAPTER OVERVIEW

### 4: Atomic Orbitals

Valence atomic orbitals on neighboring atoms combine to form bonding, non-bonding and antibonding molecular orbitals. In Section 1 the Schrödinger equation for the motion of a single electron moving about a nucleus of charge  $Z$  was explicitly solved. The energies of these orbitals relative to an electron infinitely far from the nucleus with zero kinetic energy were found to depend strongly on  $Z$  and on the principal quantum number  $n$ , as were the radial "sizes" of these hydrogenic orbitals. Closed analytical expressions for the  $r, \theta$ , and  $\phi$  dependence of these orbitals are given in Appendix B. The reader is advised to also review this material before undertaking study of this section.

[4.1: Shapes of Atomic Orbitals](#)

[4.2: Directions of Atomic Orbitals](#)

[4.3: Sizes and Energies](#)

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