Sections 7.15 - 7.16: Atomic Electron Configuration: The Aufbau Principle

The **atomic electron configuration** is the arrangement of electrons in an atom. In terms of energy, the most stable state is the ground state. The electron configuration of an atom is the arrangement of electrons in the lowest possible energy state.

The Pauli Exclusion Principle lets us fill the orbitals with electrons in order of increasing energy.

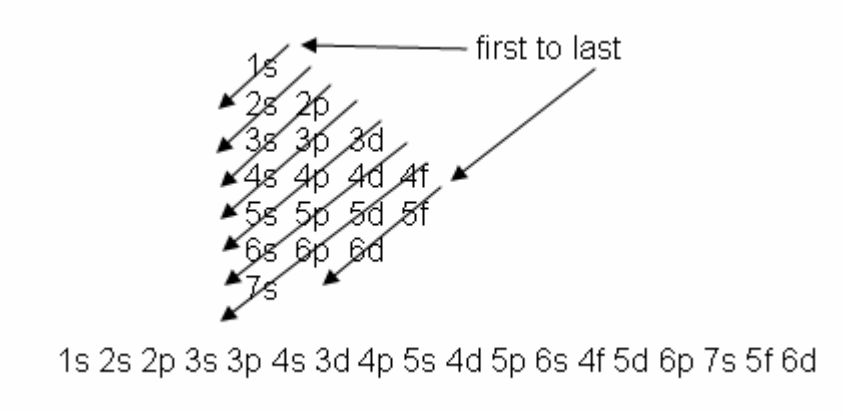
$$ns < np < nd < nf$$

The process of placing electrons in the orbitals (i.e. figuring out which orbitals are filled partially or fully with electrons) is called the "**Aufbau**" or the Build-up process.

Strategy:

We fill the orbitals with electrons in such a way that the lowest energy orbitals are filled first and the least stable (highest energy) orbitals are filled last. We follow Pauli's exclusion principle, meaning that we put no more than 2 electrons in each orbital.

The order in which the orbitals are filled is shown on the schematic below.



Also, remember that a given subshell (fixed n and ℓ) may have more than one orbital (a "p" subshell (ℓ = 1) contains 3 orbitals, a "d" subshell (ℓ = 2) contains 5 orbitals, an "f" subshell (ℓ = 3) contains 7 orbitals).

This information, as well as the order in which these subshells are filled, can be found on the periodic table itself. Remember that each orbital contains a maximum of two electrons.

In Section 7.16, see the animation of the electron configurations of various atoms. Hund's rule is also explained along with the animations.

Remember: **Hund's rule** states that one should always try to half-fill degenerate orbitals before we fill them completely. This explains why of the two electron configurations shown below for nitrogen (N), only the one on the right is correct.