

14.3: Visualizing Orbitals

Historically, the energy available orbitals in an electron were identified by observing the wavelengths of light that would be emitted as the electron changed energy levels. Until we understood that light was quantized in photons, it was difficult to explain this as different energy levels. However, it was recognized that there were specific spectroscopic “lines” (i.e. wavelengths associated with a given transition) for each atom. The nomenclature that grew up around these lines is what gives us the nomenclature that we use today to name the various orbitals. Alas, the reasons for the letters that we use have little to do with the physics of the atom and everything to do with how the spectroscopic lines looked to the scientists who identified them. Each orbital is indicated by a form nx , where n is the principle quantum number and x is a letter corresponding to the angular momentum quantum number l . That letter is s for orbitals with $l = 0$, it is p for orbitals with $l = 1$; it is d for orbitals with $l = 2$; and it is f for orbitals with $l = 3$.

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