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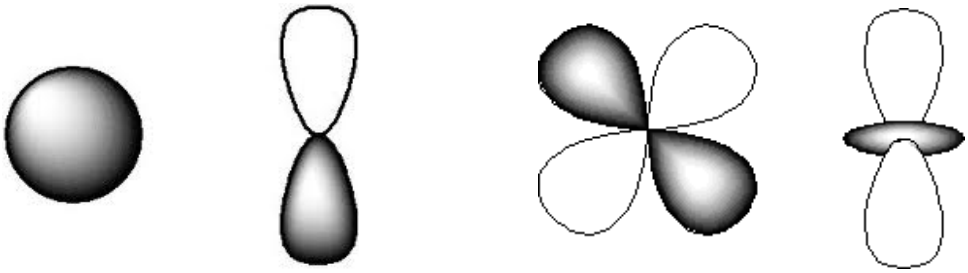
Office Hour: Tu 5:30-6:30pm Location: Bixby Common

Chem 4A Scholars Worksheet 8

Hydrogen Atom and atomic orbitals

Warm up:

Name the following orbitals:



Questions:

1. *How many radial nodes does the following hydrogen atom wavefunction has? Where does the probability goes to zero?*

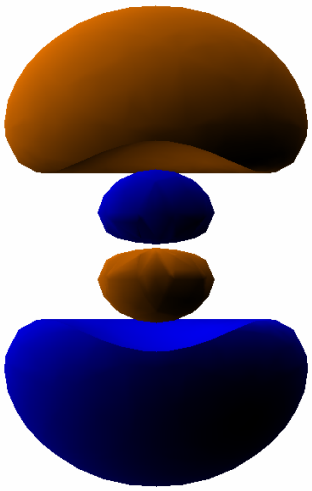
$$\left(\frac{1}{3a_0}\right)^{3/2} \frac{4\sqrt{2}}{3} \left(1 - \frac{1}{6}\frac{r}{a_0}\right) \frac{r}{a_0} e^{-r/3a_0}$$

It has 1 radial nodes, the probability is zero at r=0,r=6a and r=∞

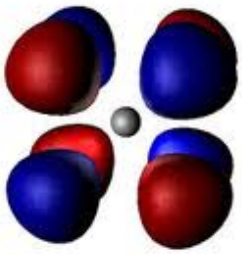
If the orbital has one angular nodes, write down the notation for the orbital?

It is 3p orbital

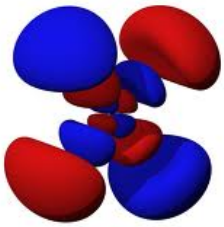
Draw a picture of the orbital on the coordinate below make sure you mark the nodes and the sign of the orbital:



2. *Name the following orbitals, marke the number of angular and radial nodes:*



4f, 0 radial nodes and 3 angular nodes



5d, 2 radial nodes and 2 angular nodes

3. *Sketch the radial wavefunction, and radial probability P(r)= $4\pi r^2|\psi(r)^2|$ of 1s and 3p.*