Chem 4531, Problem Set #7, Fall 2016

To be returned before class on Friday, October 21

1. If the electron in a H-atom is in its ground state, calculate the probability of finding it within a sphere of radius 2a₀. (4 points)

2. Using the total wavefunction for 2s state, determine the radial function R(r) in the H-atom and calculate the expectation value of the radius for this state. (4 points)

3. The electronic energy levels of H-atoms are described in Section 10.2 of Silbey, Alberty and Bawendi. Calculate the wavelengths (in nm) of the three longest wavelength electronic transitions of H, assuming the initial state is the ground state. (4 points)

4. Calculate the ionization energy of Tritium (³H), which is a radioactive isotope that is extensively used in nuclear fusion experiments. (3 points)

5. What is the most probable point (not radius) at which an electron in a 2pᵢ orbital of Li²⁺ will be found? (3 points)

6. Calculate the expectation values of the potential and kinetic energies for an electron in the 2s state of an H-atom. (5 points)