

“Hydrogen’s Atomic Orbitals” Inference-Making Reading Activity
(*Chemistry: Matter and Change*, pp. 153-154, Glencoe/McGraw-Hill, 2008)

As you read the passage below, predict the missing words. Guessing is OK!

Because the boundary of an atomic orbital is fuzzy, the orbital does not have an exact defined size. To overcome the inherent uncertainty about the electron’s location, chemists arbitrarily draw an orbital’s surface to contain 90% of the electron’s total probability distribution. This means that the _____ of finding the electron _____ the boundary is 0.9 and _____ probability of finding it _____ the boundary is 0.1. In _____ words, it is more _____ to find the electron _____ to the nucleus and _____ the volume defined by _____ boundary than to find _____ outside the volume.

Recall that the Bohr _____ model assigns quantum numbers _____ electron orbits. Similarly, the _____ mechanical model assigns four _____ numbers to atomic orbitals. _____ first one is the _____ quantum number (n) and indicates _____ relative size and energy _____ atomic orbitals. As n increases, the orbital _____ larger, the electron spends _____ time farther from the _____, and the atom’s energy _____. Therefore, n specifies the atom’s _____ energy levels. An atom’s _____ energy level is assigned _____ principal quantum number of 1. _____ the hydrogen atom’s single _____ occupies an orbital with $n = 1$, _____ atom is in its _____ state. Up to 7 energy

_____ have been detected for _____ hydrogen atom, giving n values _____ from 1 to 7.

Energy levels contain energy _____. Energy level 1 consists of _____ single sublevel, energy level 2 _____ of two sublevels, energy level 3 _____ of three energy sublevels, _____ so on. To better _____ the relationship between the atom's _____ levels and sublevels, picture _____ seats in a wedge-shaped _____ of a theater. As _____ move away from the _____, the rows become higher _____ contain more seats. Similarly, _____ number of energy sublevels _____ an energy level increases _____ n increases.

Sublevels are labeled s , p , d , or f _____ to the shape of _____ atom's orbitals. All s orbitals _____ spherical, and all p orbitals _____ dumbbell-shaped; however, not all d or f orbitals _____ the same shape. Each _____ can contain, at most, _____ electrons. The single sublevel _____ energy level 1 corresponds to _____ spherical orbital called the $1s$ _____. The two sublevels in _____ level 2 are designated $2s$ and $2p$. The $2s$ _____ corresponds to the $2s$ orbital, _____ is spherical like the $1s$ _____ but larger in size. _____ $2p$ sublevel corresponds to _____ dumbbell-shaped p orbitals designated $2p_x$, $2p_y$, and $2p_z$. The _____ x , y , and z merely designate the orientations _____ the p orbitals along the x , y , and z coordinate _____. Each of the p orbitals _____ to an energy sublevel _____ the same energy.