(2) radial density versus \( r \).

1. Density versus radius \( r \): In this case, the square of the wave function is plotted against \( r \). These plots are sometimes misleading. For example, the 1s orbital plot looks like

You may feel the probability of finding the electron is the highest in the nucleus, yet you have learned that the electron is most likely at a distance \( r = 53 \) pm from the center of the atom.

2. Radial density (RD) versus \( r \): To really represent the probability of finding the electron at \( r \) at a given time, the radial distribution against \( r \) is often plotted. In this plot, instead of plotting square-of-the-wave-function, we modify square-of-the-wave-function by the volume associated with \( r \), \((4\pi r^2)\). This modification converts electron density to radial electron density.

The radial density plot of 1s orbital has a shape as shown below:

At the center of the atom, the value of the wavefunction is large, but when \( r = 0 \), the volume element \((4\pi r^2)\) is almost zero when \( r \rightarrow 0 \). Thus, the radial distribution rises as \( r \) increases, reaching a maximum at some value of \( r \). For the H atom, the maximum of the radial distribution is at \( r = 53 \) pm.

Contributors and Attributions

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