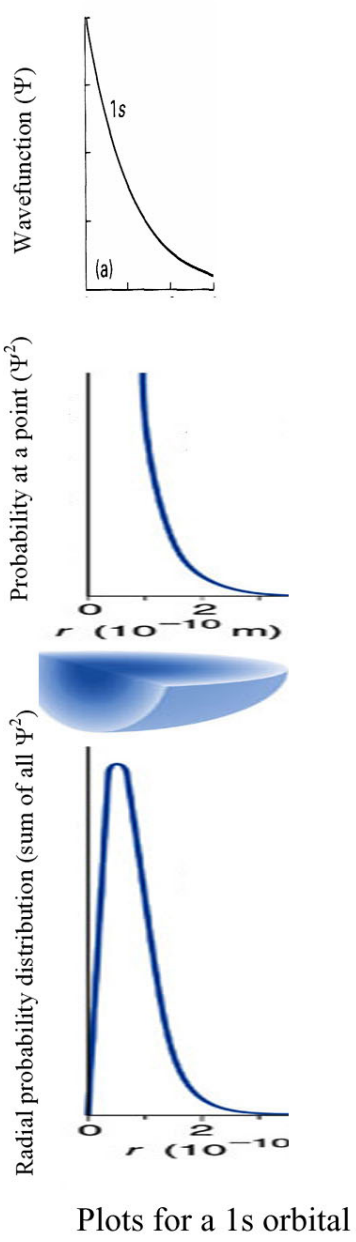
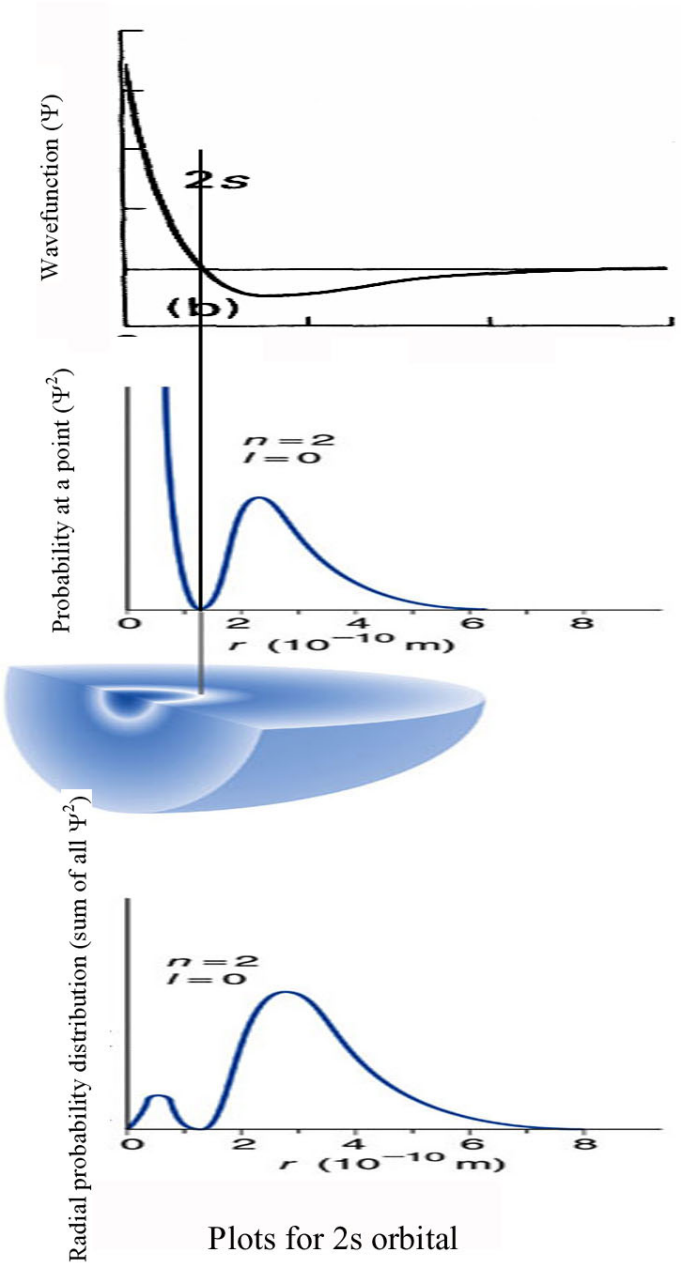
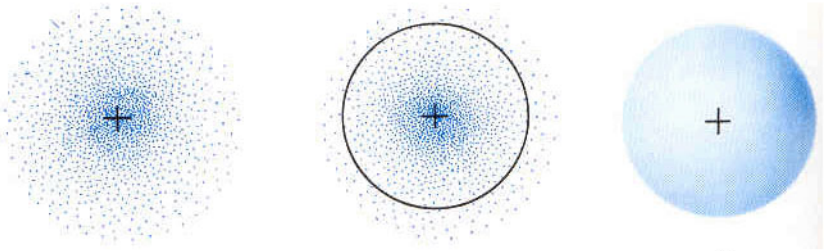
Wavefuntion, probability at a point, radial probability functions for 1s and 2s orbitals



Plots for a 1s orbital

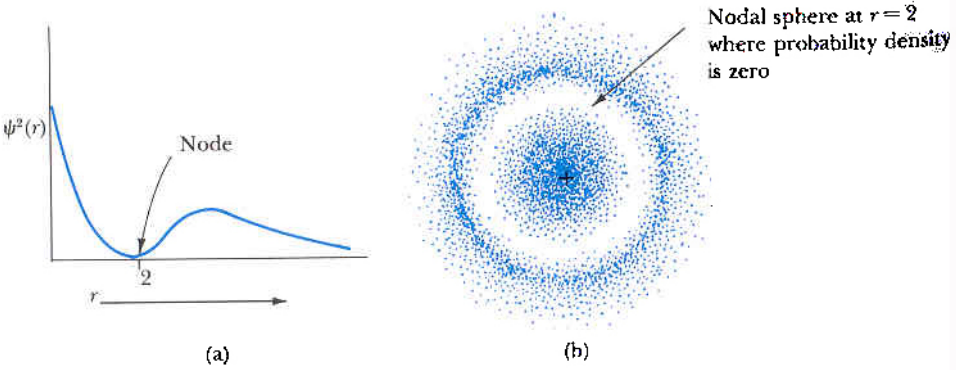


Plots for 2s orbital



(a) (b) (c)

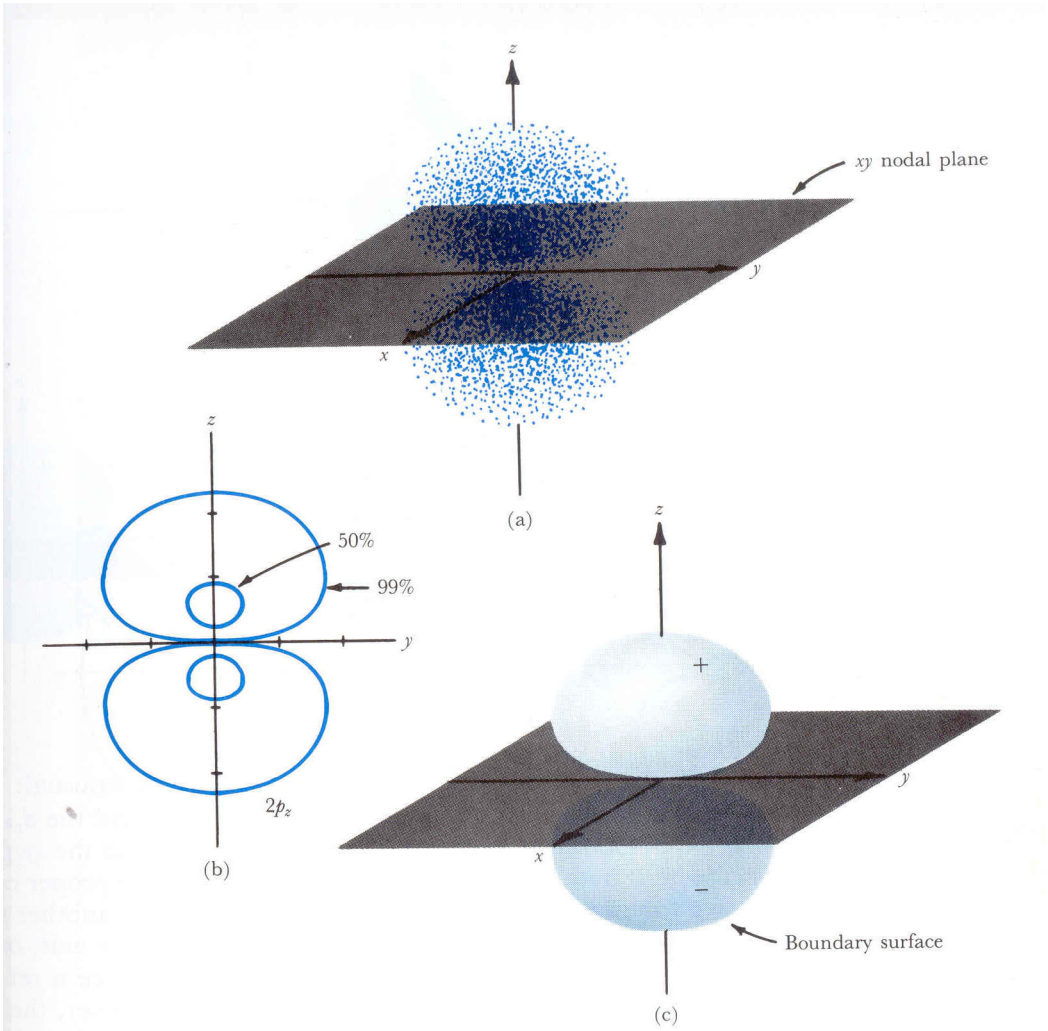
Three ways of representing the spherical electron probability density function of the 1*s* orbital of hydrogen. (a) $|\psi|^2$ represented by the density of stippling; (b) a black circle representing a cross section through the spherical shell that encloses 90% of the probability (radius 2.7 atomic units or 1.4 Å); (c) the 90% probability shell portrayed as a surface.



(a) (b)

The 2*s* hydrogen orbital. (a) The graph of $|\psi|^2$ against r. (b) A cross section through the probability function plotted in three dimensions. Probability density is represented by stippling.

From Chemical Principles, 3rd Edition, by Dickerson, Gray, and Haight, Benjamin/Cummings Pub; 1979.



Three ways of representing the $2p_z$ atomic orbital of hydrogen. (a) $|\psi|^2$ represented by stippling. (b) Contour diagram of the $2p_z$ orbital. The contours represent lines of constant $|\psi|^2$ in the *yz* plane and have been chosen so that, in three dimensions, they enclose 50% or 99% of the total probability density. The $2p_z$ orbital is symmetrical around the *z* axis. (c) The 99% probability shell portrayed as a surface. The plus and minus signs on the two lobes represent the relative signs of ψ and should not be confused with electric charge. Note that there is no probability of finding the electron on the *xy* plane. Such a surface, which need not be planar, is called a *nodal surface*.

From Chemical Principles, 3rd Edition, by Dickerson, Gray, and Haight, Benjamin/Cummings Pub; 1979.

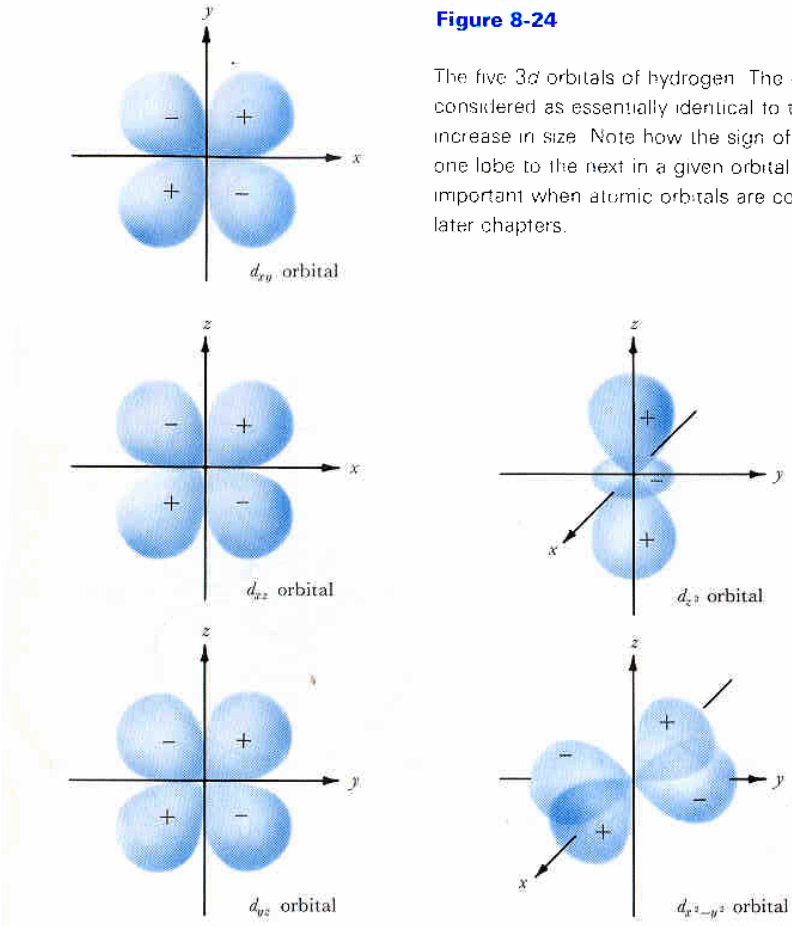
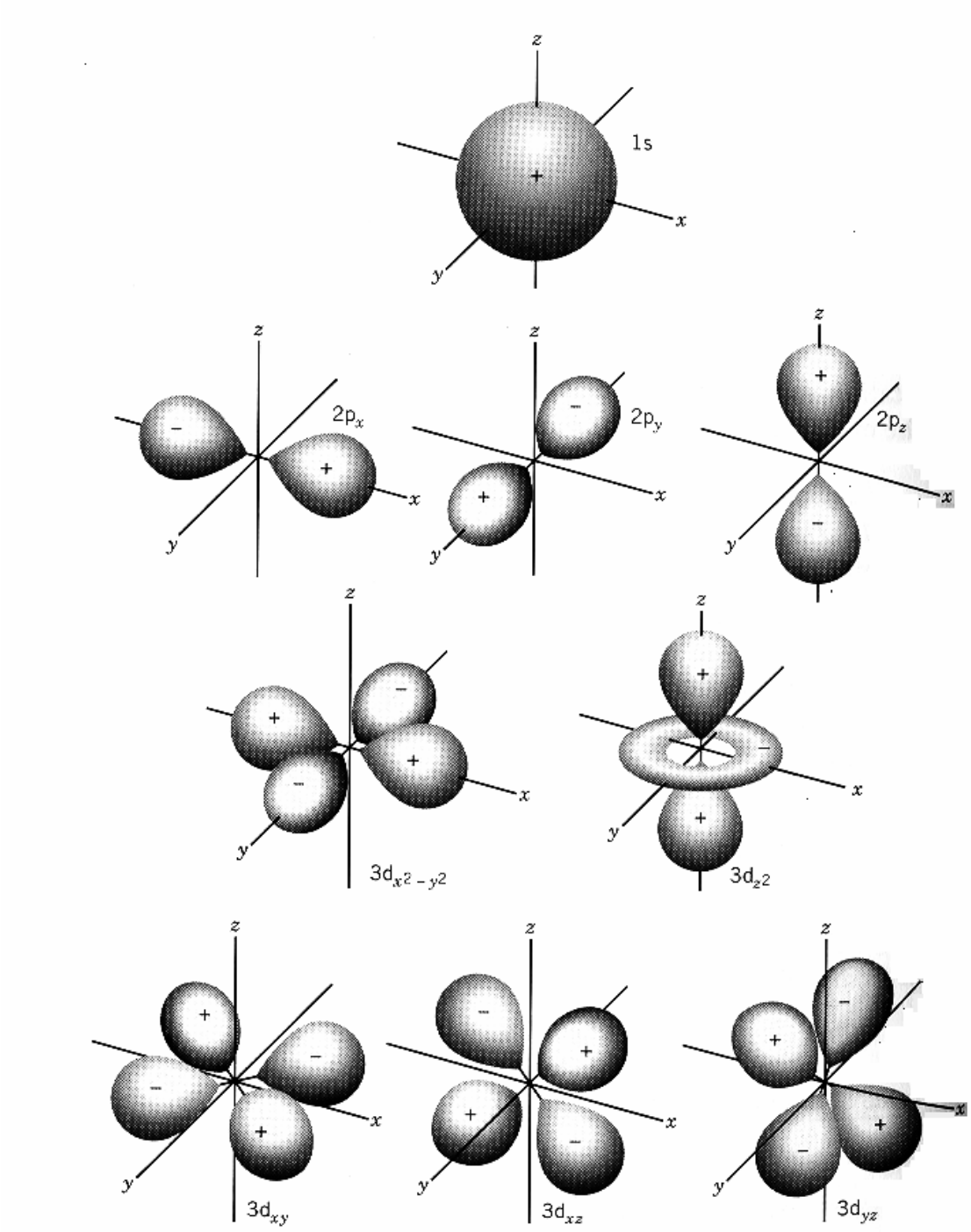


Figure 8-24

The five 3*d* orbitals of hydrogen. The 4*d*, 5*d*, and 6*d* orbitals can be considered as essentially identical to these 3*d* orbitals, except for an increase in size. Note how the sign of the wave function changes from one lobe to the next in a given orbital. This change of sign will be important when atomic orbitals are combined to make a chemical bond in later chapters.

From Chemical Principles, 3rd Edition, by Dickerson, Gray, and Haight, Benjamin/Cummings Pub; 1979.



From Chemical Principles, 3rd Edition, by Dickerson, Gray, and Haight, Benjamin/Cummings Pub; 1979.

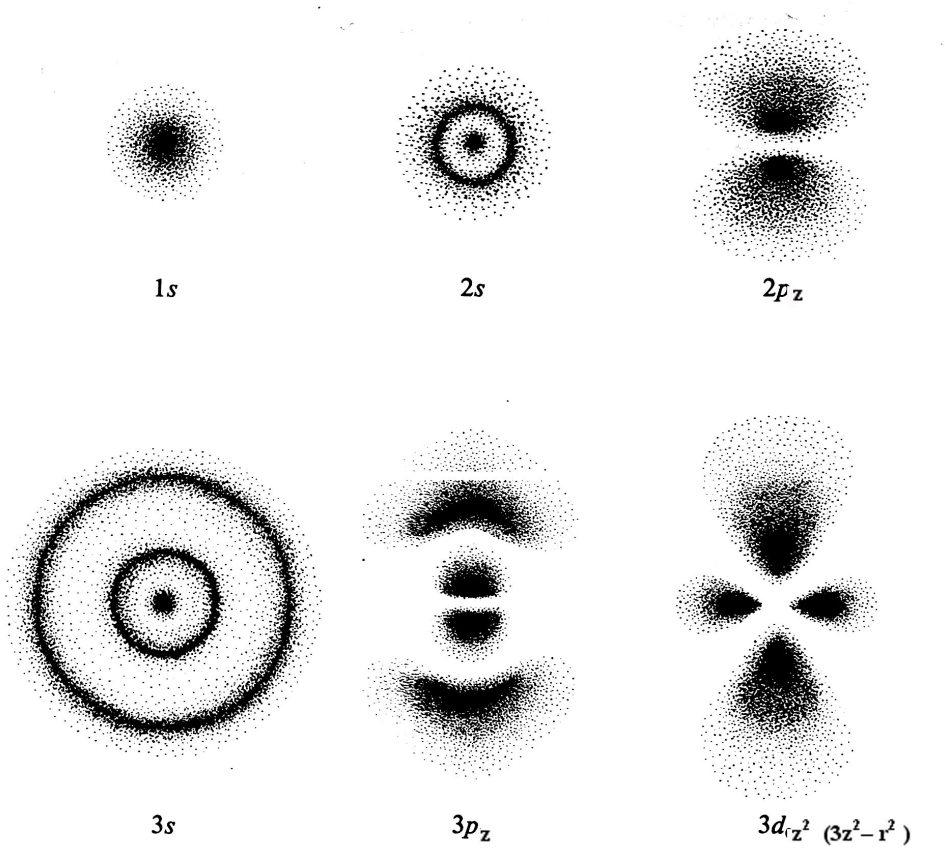


Figure 6-12. Probability density plots of some hydrogen atomic orbitals. The density of the dots represents the probability of finding the electron in that region.

from **Quantum Chemistry**, by D.A. McQuarrie, University Science Books, 1983.