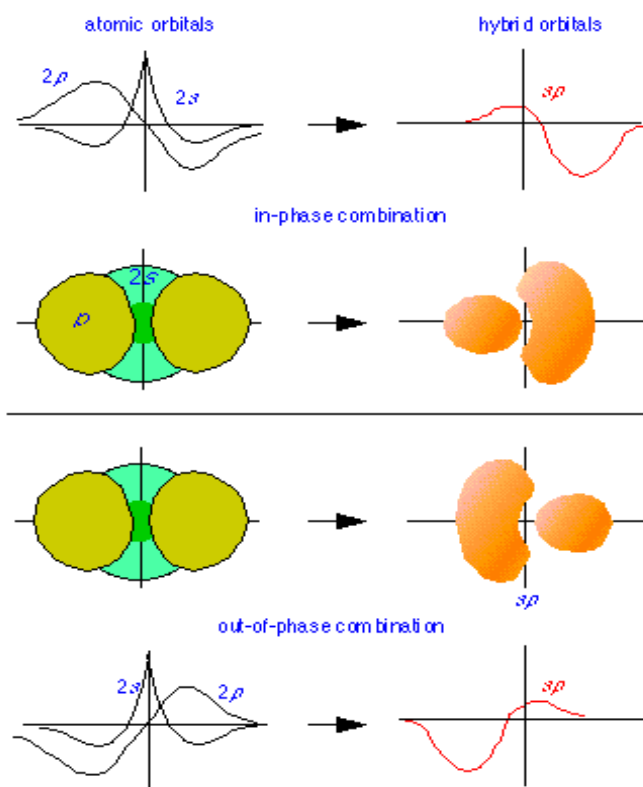


CONSTRUCTING HYBRID ORBITALS

Constructing hybrid orbitals

Below: "Constructive" and "destructive" combinations of 2p and 2s wave functions (line plots) give rise to the sp hybrid function shown at the right. The solid figures depict the corresponding probability functions ψ^2 .

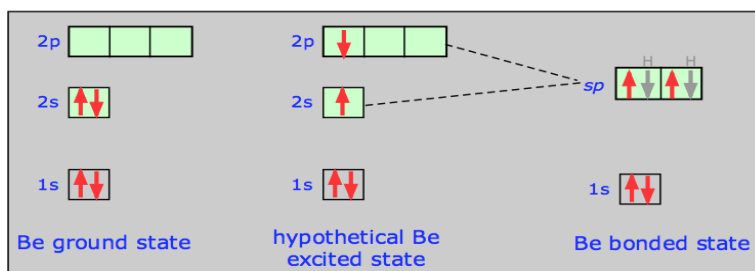


Hybrid orbitals are constructed by combining the ψ functions for atomic orbitals.

Because wave patterns can combine both constructively and destructively, a pair of

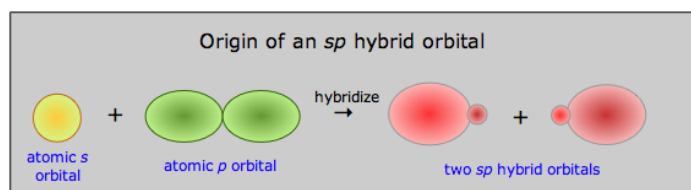
atomic wave functions such as the s- and p- orbitals shown at the left can combine in two ways, yielding the sp hybrids shown.

From an energy standpoint, we can represent the transition from atomic s- and p- orbitals to an sp hybrid orbital in this way:



Notice here that 1) the total number of occupied orbitals is conserved, and 2) the two sp hybrid orbitals are intermediate in energy between their parent atomic orbitals.

In terms of plots of the actual orbital functions ψ we can represent the process as follows:



The probability of finding the electron at any location is given not by ψ , but by ψ^2 , whose form is roughly conveyed by the solid figures in this illustration.

Source: <http://www.chem1.com/acad/webtext/chembond/cb06.html>