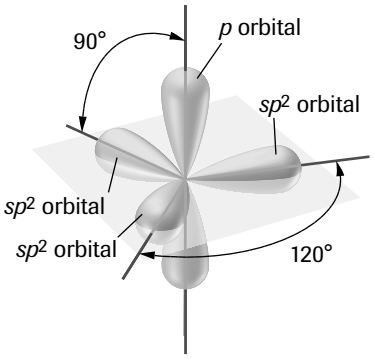
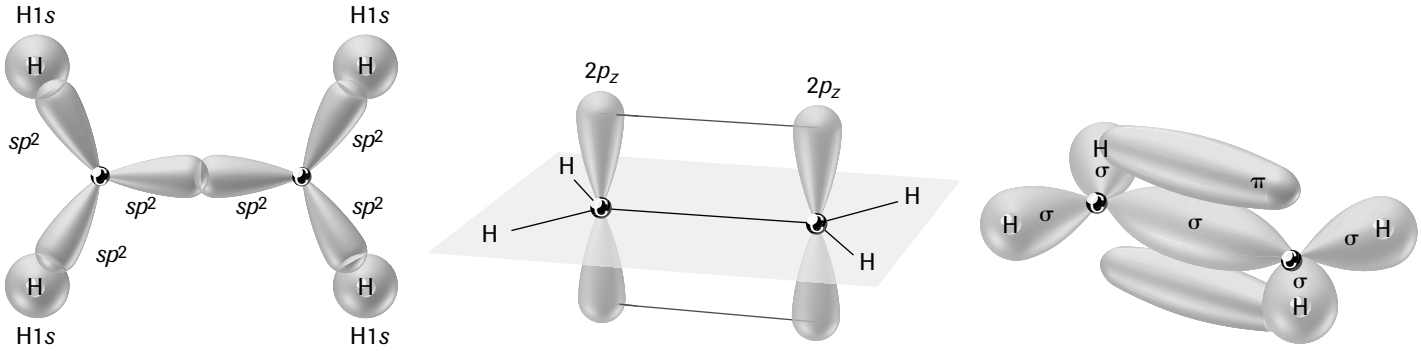
Double and Triple Covalent Bonds

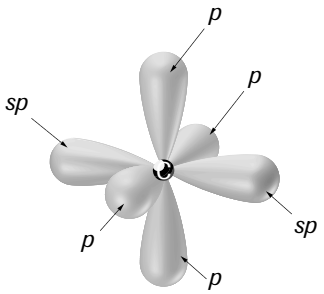


For this carbon atom, the sp^2 hybrids are planar at 120° to each other and the *p* orbital is at right angles to the plane of the hybrid orbitals.

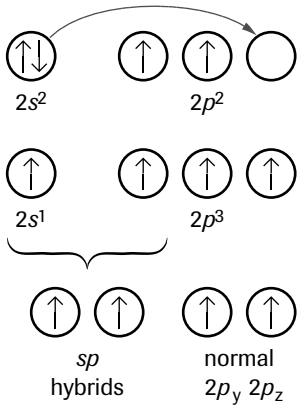
(a) **(b)** **(c)**



(a) The sigma bonds for a C_2H_4 molecule use the sp^2 hybrid orbitals.
(b) The two half-filled *p* orbitals of the adjacent carbon atoms overlap sideways.
(c) The complete bonding orbitals for a C_2H_4 molecule.



Instead of mixing all four orbitals, valence bond theory suggests that only two are mixed to form *sp* hybrid orbitals and two unhybridized *p* orbitals for a carbon atom.



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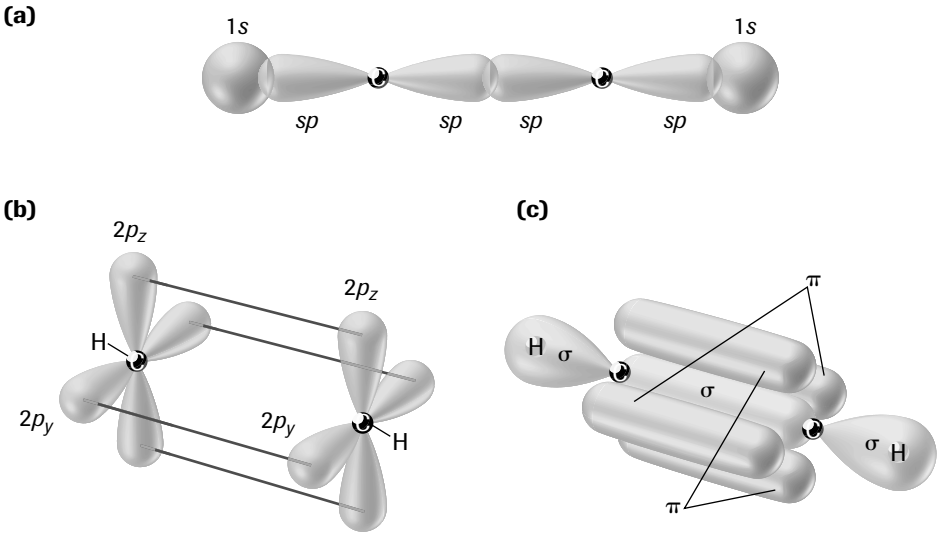

(a) The sigma bonds for a C_2H_2 molecule use the *sp* hybrid orbitals.
(b) The two pairs of half-filled *p* orbitals of the adjacent carbon atoms overlap sideways.
(c) The complete bonding orbitals for a C_2H_2 molecule.