



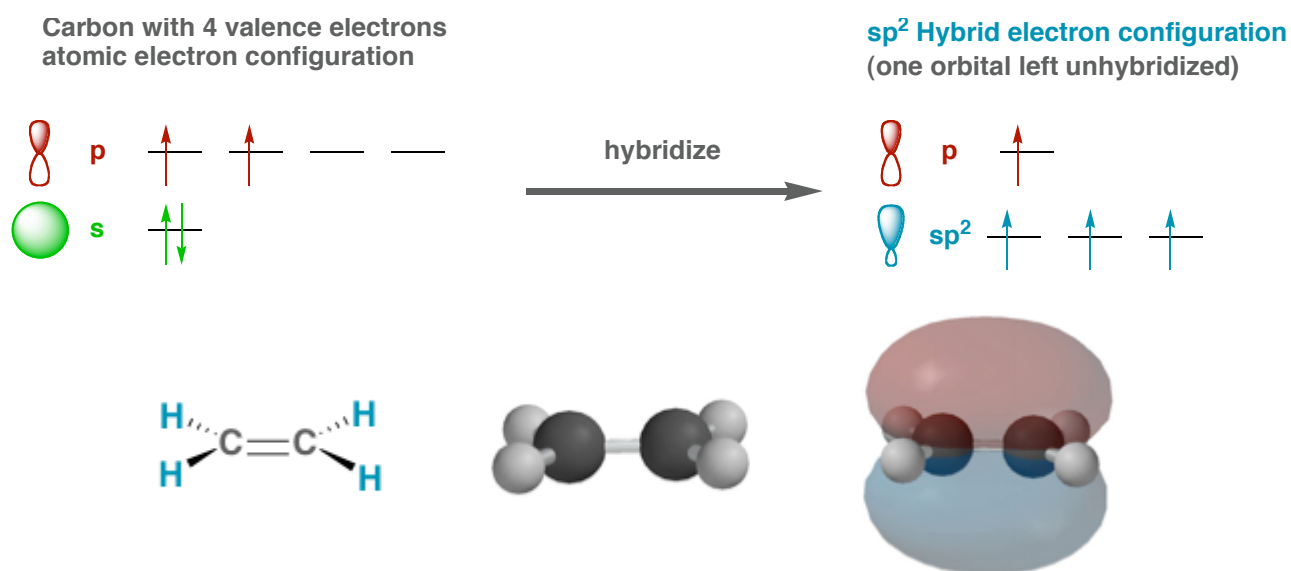
# Chem 341 • Organic Chemistry I

Lecture Summary 03 • August 27, 2007

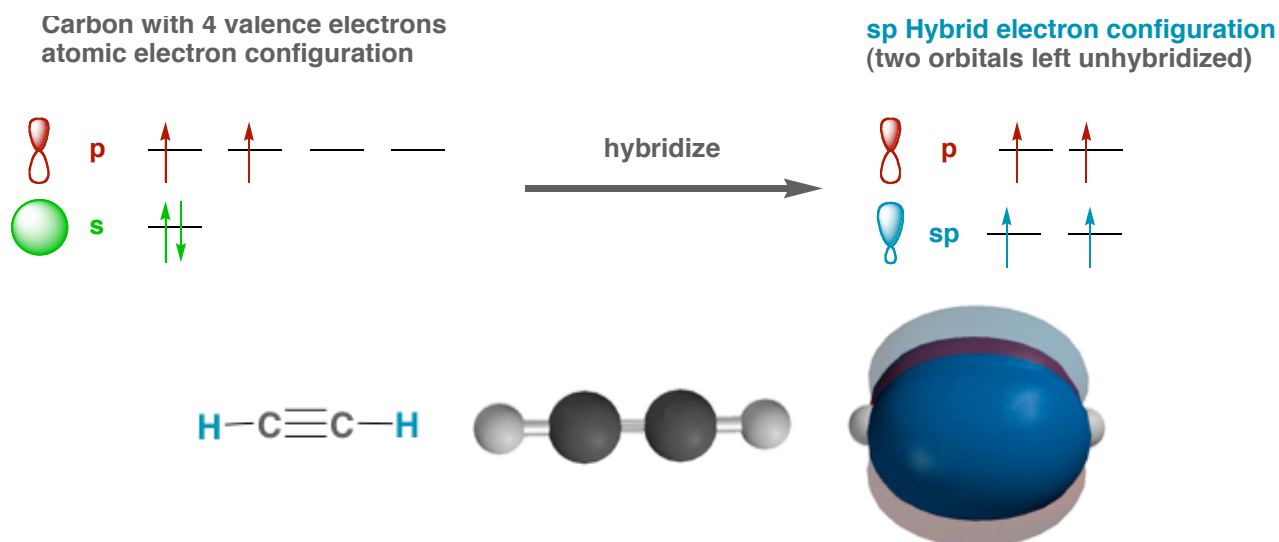
## Chapter 1 - Structure and Bonding

### Hybridization (cont.)

Double bonds are formed by the side-to-side overlap of unhybridized p orbitals. This is called a pi ( $\pi$ ) bond. If a p remains unhybridized, there are only 1 s and 2 p's left to form 3 equal hybrid  $sp^2$  orbitals. This defines a plane and the molecule ethene has a planar geometry with  $120^\circ$  bond angles (each C is trigonal planar).



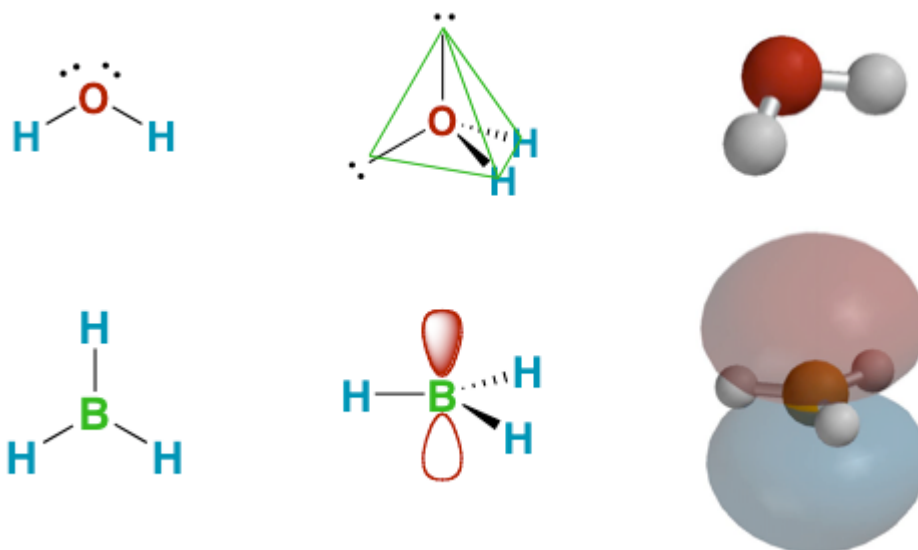
If there are two pi bonds to a carbon (as in a triple bond), then two p orbitals must remain unhybridized. The resulting two hybrids are sp and adopt a linear geometry with  $180^\circ$  bond angles.



Hybridization also occurs in other atoms such as oxygen, nitrogen, boron, etc. Water (H<sub>2</sub>O) is a bent molecule because the two lone pairs reside in hybrid orbitals and defines the sp<sup>3</sup> hybridized tetrahedron. BF<sub>3</sub>, which has one empty orbital, is trigonal planar due to its sp<sup>2</sup> hybridization.

**Note:**

Empty orbitals remain *unhybridized* p orbitals and lone pairs will occupy *hybridized* orbitals.



## Chapter 2 - Polar Covalent Bonds; Acids and Bases

### Polar Covalent Bonds

Molecules are polar and bonds are polarized along a continuum from covalent to ionic depending on the difference in electronegativity. A polar covalent bond has some amount of partial + and - charges at either end.

