

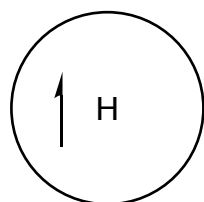
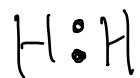
Today

Sections 1.7-1.15
An Introduction to Valence Bond Theory

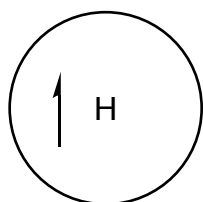
Next Class

Sections 2.1, 2.11, and 2.10
Acids and Bases

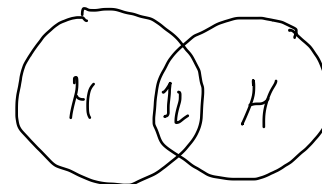
Sections 2.6 - 2.9
How structure affects acidity and basicity



1s

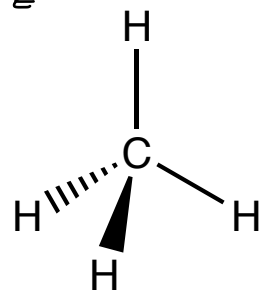


1s

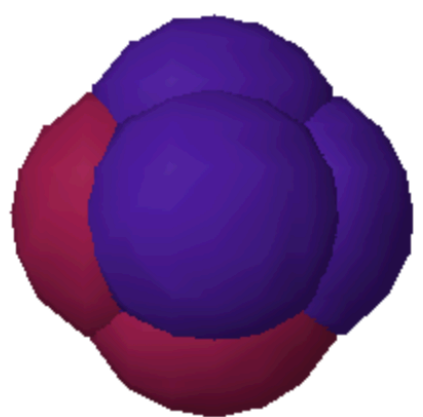


Atomic orbitals overlap
so e^- 's can be
shared between 2 atoms

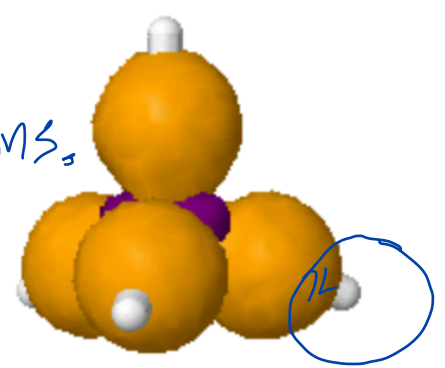
The $2s$ and $2p_x, 2p_y, 2p_z$ orbitals don't point in the right directions to overlap with the 4 H $1s$ orbitals



so we are going to hybridize our atomic orbitals



Point e^- in 4 different directions. We need 4 hybrid orbitals.



AO's are crossed to make 4 hybrid orbitals

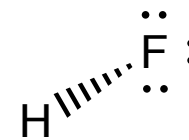
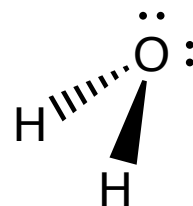
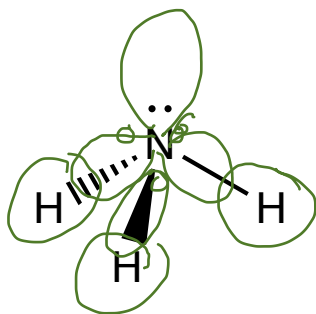
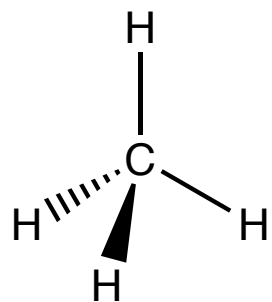
<https://www.westfield.ma.edu/PersonalPages/cmasi/organic/hybrid/hybrid.html>

Identify atoms that use sp^3 hybrid orbitals to form bonds and hold lone-pair electrons

Single bonds, lone-pair electrons, and hybrid orbitals

Bicker + argue

Section 1.7, 1.11, 1.12, 1.13



4 σ bonds
to separate in
space

4 { 3 σ bonds +
1 pair of
lp e⁻'s

4 { 2 σ bonds
2 pair of
lp e⁻'s

4 { 1 σ bond
3 pair of
lp e⁻'s

this N atom
is sp^3 hybridized

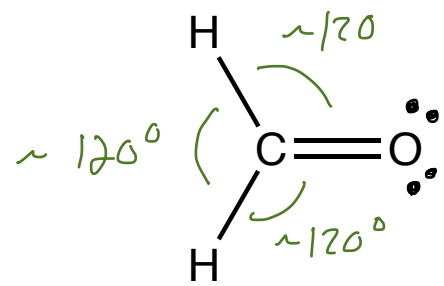
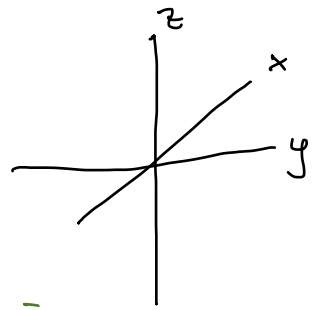
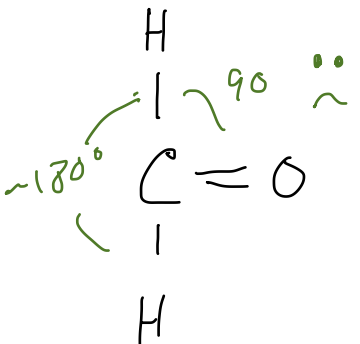
sp^3
O atom

sp^3
F atom

Identify atoms that use sp^3 hybrid orbitals to form bonds and hold lone-pair electrons

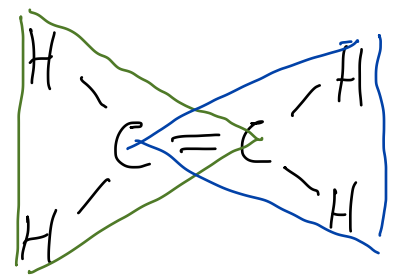
Double bonds and sp^2 hybridization

VSEPR says 3 sets of e^- 's
Section 1.8

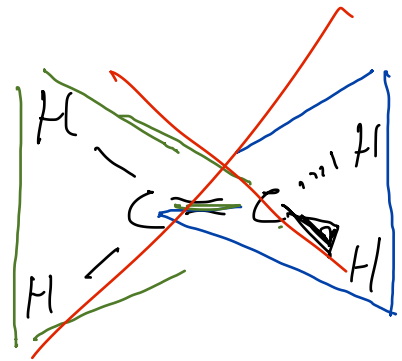


trigonal planar 3 directions
means we need 3
hybrid orbitals

The orbitals that form π bonds are \perp to the orbitals that form σ bonds. Double bonds are made from $\sigma + \pi$

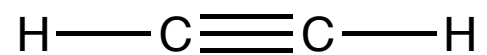


but



<https://www.westfield.ma.edu/PersonalPages/cmasi/organic/hybrid/hybrid2.html>

Identify atoms that use sp^2 hybrid orbitals to form bonds and hold lone-pair electrons



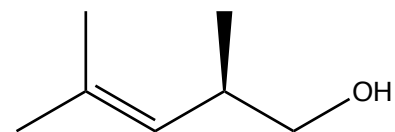
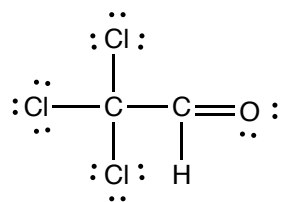
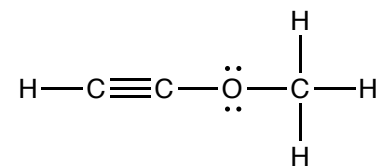
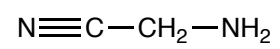
<https://www.westfield.ma.edu/PersonalPages/cmasi/organic/hybrid/hybrid2.html>

Identify atoms that use sp hybrid orbitals to form bonds and hold lone-pair electrons



Determine the hybridization of unusual molecular fragments

Practice



Explain observations and make predictions based on the hybridization of an atom



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