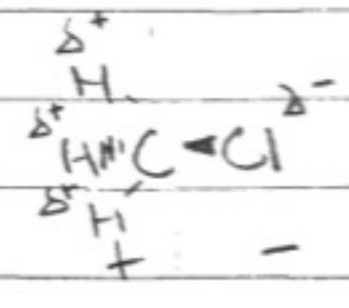


Σ bonds and π bonds

Polar molecules have dipole moments

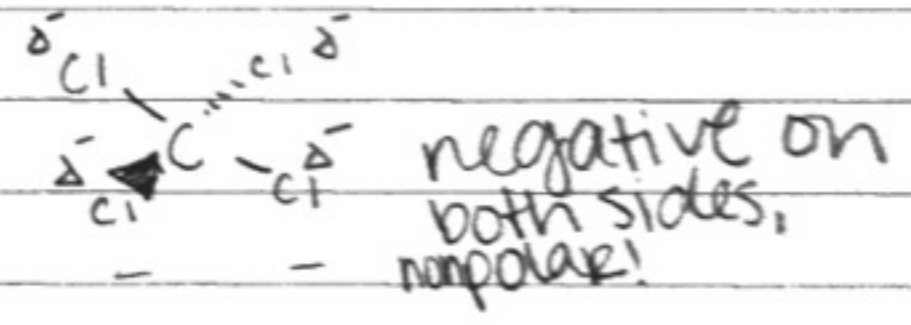
- 1) structure
 - 2) polarity of bonds (ΔEN) - electronegativity
 - 3) shape
- NH₃ polar
H₂O polar
CH₄ nonpolar

CH₃Cl - polar bonds? C-Cl
- polar molecules? yes.
- dipole moment? yes.

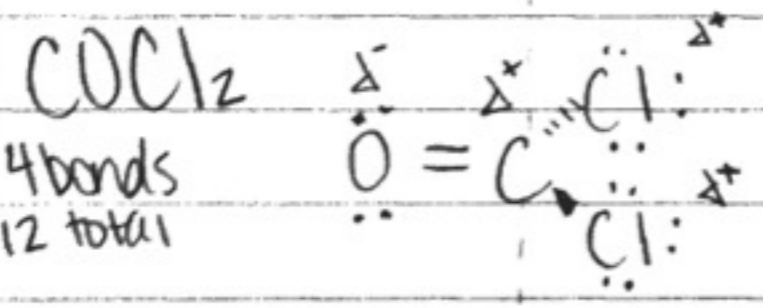


CHCl₃ - yes, C-Cl
- yes
- yes

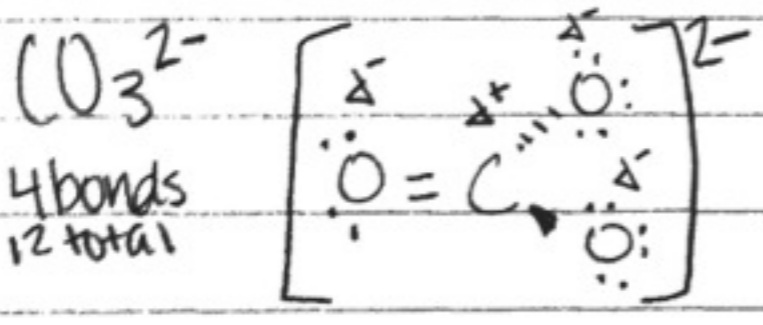
CCl₄ - yes, Cl-C
- no.
- no.



clicker



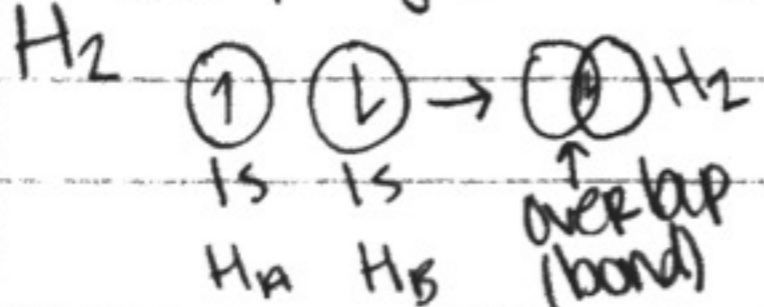
polar bonds, C-Cl, C-O
polar molecule (slightly).
small dipole moment.
trigonal planar.



polar bonds, C-O
nonpolar molecule.
no dipole moment
trigonal planar.

Atomic orbitals → molecular shapes

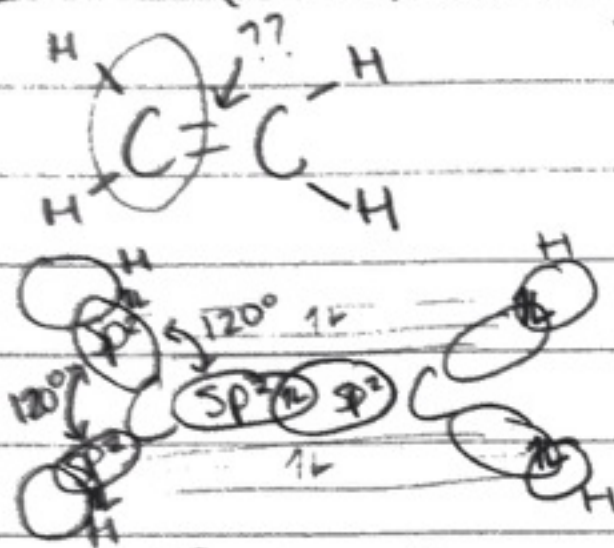
Overlapping orbitals make bonds



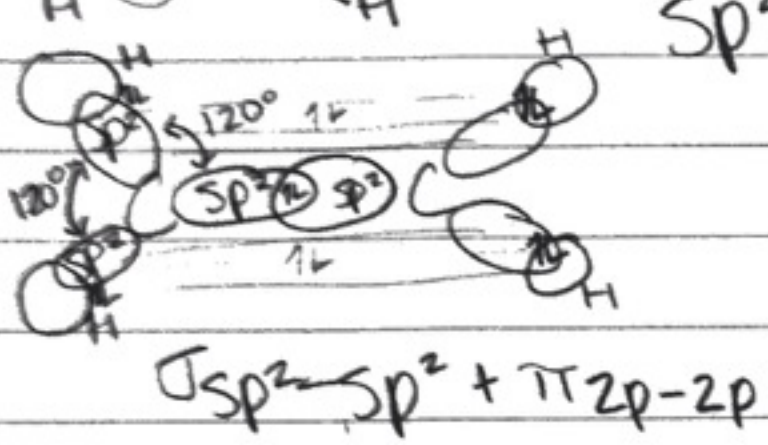
H-H bond comes from overlap on 1s and 1s.

* If it's trigonal planar $\rightarrow sp^2$
 $\sigma_{1s} - sp^2$

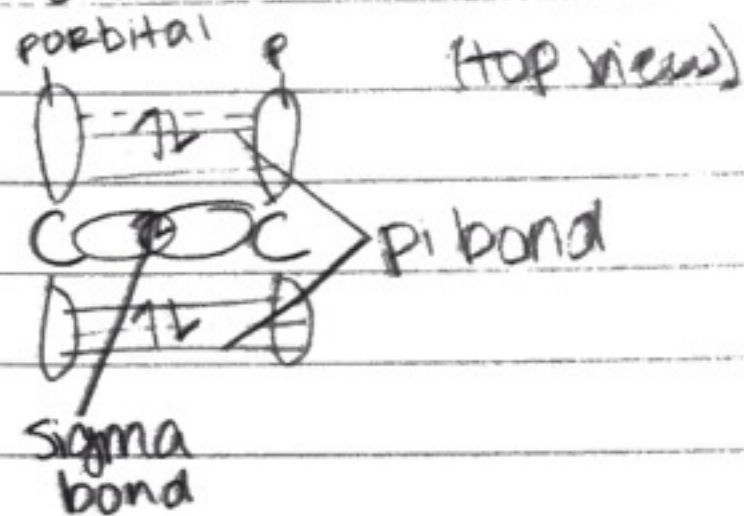
C_2H_4 (ethene)



3RHE D
 trigonal planar
 sp^2

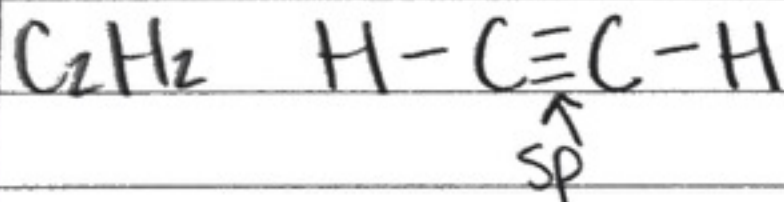


$\sigma_{sp^2-sp^2} + \pi_{2p-2p}$



π bond = shared electron from above & below
 p orbitals must be in the same plane!

* NO rotation around a double bond! (breaks bond)



to get to 5 & 6, add d orbitals!

How can a molecule have shape?

is a molecule polar or not? \leftarrow means is it dipole or not?

clicker question:

- tetrahedral electronic geometry \rightarrow trigonal planar is not possible.

Dipole Molecule

Polar \rightarrow means dipole $\neq 0$

how do you decide if its polar or nonpolar?

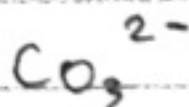
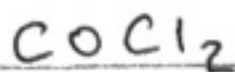
1. structure.
2. polarity of bonds \rightarrow difference in electronegativity
3. polarity of molecule \rightarrow ~~nonpolar~~ polar.

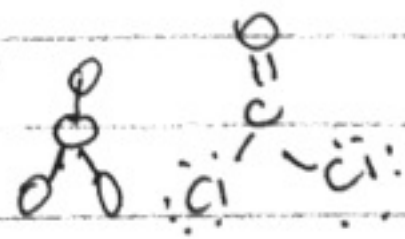
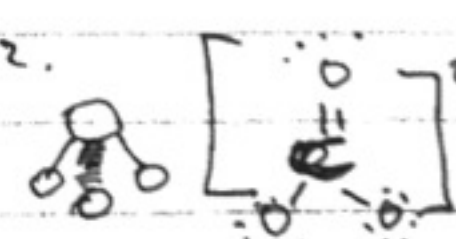
positive on 1 side, neg on 1 side = polar.

	CH_3Cl	CHCl_3	CCl_4
? polar bonds?	C-Cl	yes	yes
Polar mol?	yes	yes	no
dipole moment?			

\rightarrow even if there are polar bonds it can still be nonpolar.

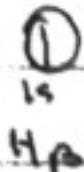
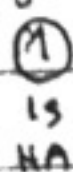
clicker.



1.  2. 
2. C-Cl yes 2. yes
3. polar \rightarrow 3. nonpolar.
- polar or nonpolar?
1. draw structure
 2. polar bonds
 3. shape
 4. asymmetric charge

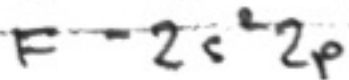
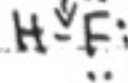
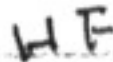
Atomic orbitals \rightarrow molecular shape

overlapping orbitals - make bonds



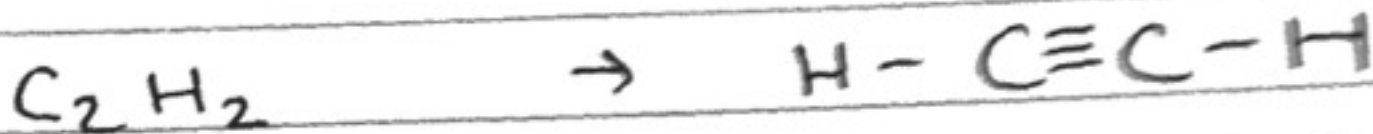
overlap bond

this bond comes from an overlap from the 1s of a hydrogen & 1s of a hydrogen



2 left over's
sp hybridization - 180°

how do you get there?



(super reactive (all those electrons cluster))