

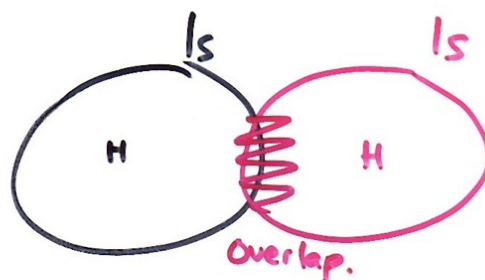
- Last ARIS HW!
 - Exam 4: FRI 9th
 Ch 8-10 \approx 75%
 Ch 1-7 \approx 25%
 - FINAL Exam: Wed 14th @ NOON
 Ch 1-10
- Maybe.... MON 12th
 - Review for FINAL.
 - TBA.

Chemical Bond

Lewis: Sharing pairs of e^- 's.

QM } overlap of 2 orbitals + $2e^-$.
 Pauling }

ex: H_2 $H: 1s^1$

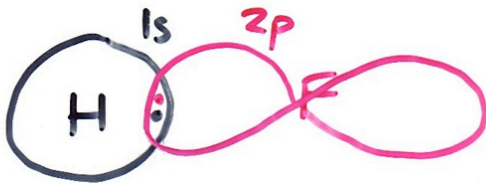
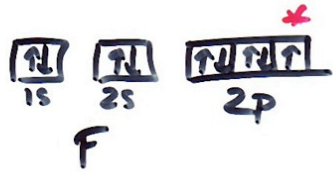


What about HF?

Lewis: $H - \ddot{F}:$

e^- config: H F
 $1s^1$ $1s^2 2s^2 2p^5$

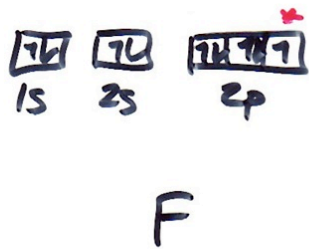
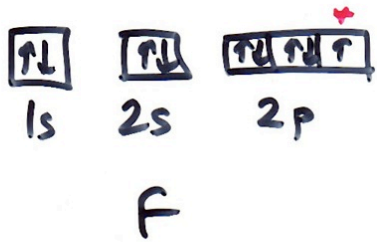
orbital diagram:



ex: F_2



F: $1s^2 2s^2 2p^5$



sigma-bond



Head-on overlap is more favorable!

OR



Side-on overlap is less favorable

pi-bond
 π -bond

σ -bond

side-on view



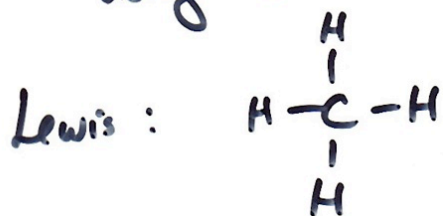
π -bond

side-on view

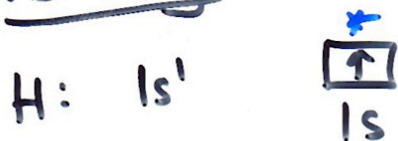


Hybridization of atomic orbitals

Q. How do we explain CH_4 using VB theory?



VB theory:

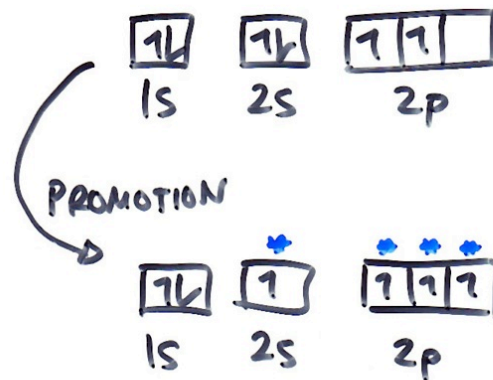


So, does this mean C can only make 2-bonds?

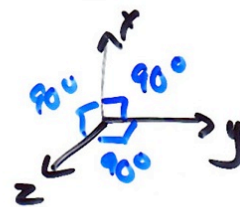
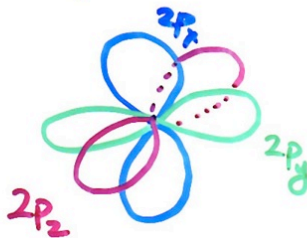
NO!

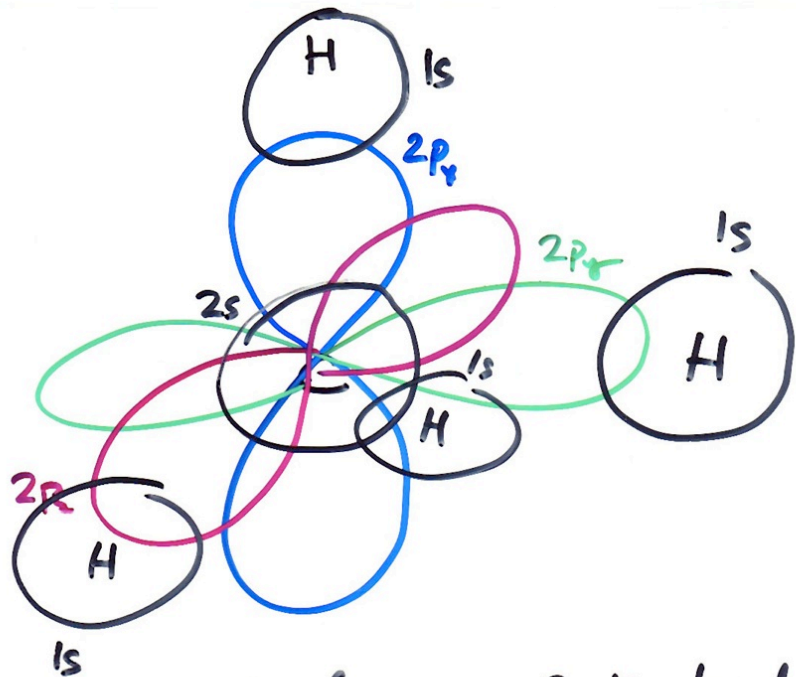
Linus Pauling:

We know all the bonds in CH_4 are tetrahedral...
way to get 4 bonds instead of 2...

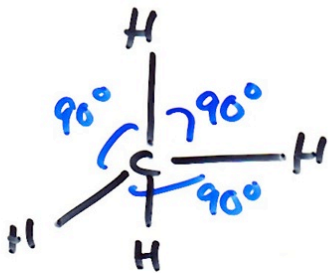


one problem is ... angles!





3 of our C-H bonds would be @ 90°!!

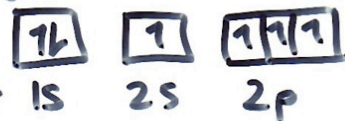


But...
XPTL angle
is $109\frac{1}{2}^\circ$!

Pauling

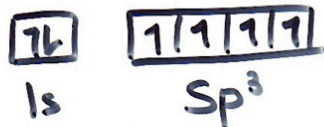


Promotion



Hybridize

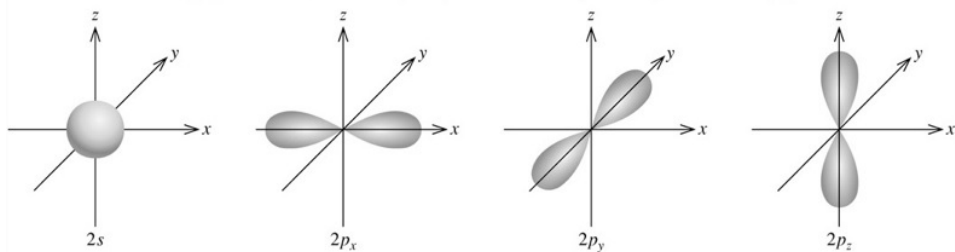
the 2s and the three 2p orbitals.



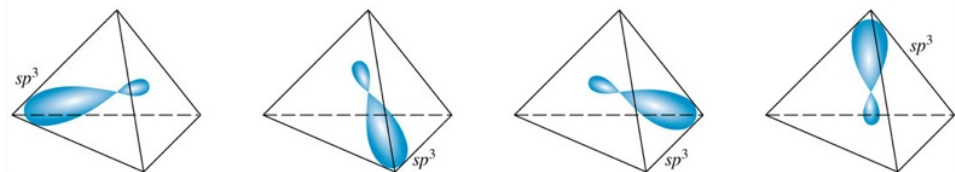
Sp³

1 part s
3 parts p

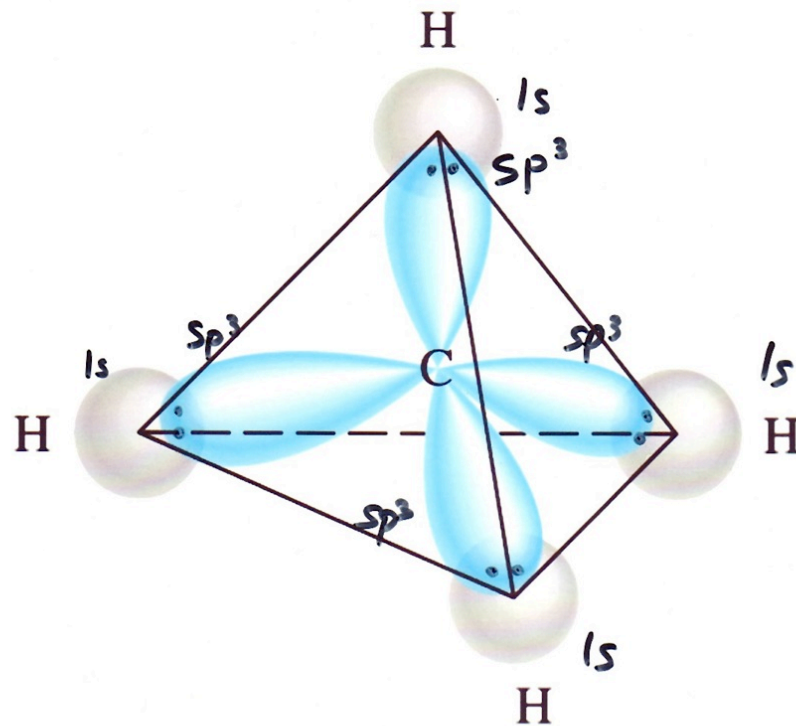
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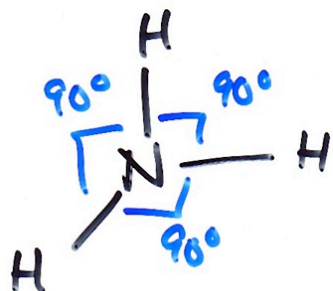
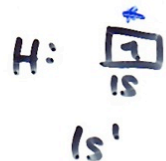
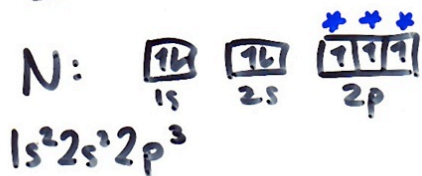


Hybridization

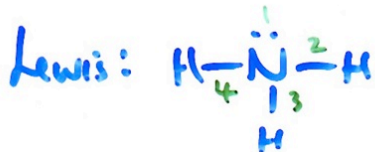


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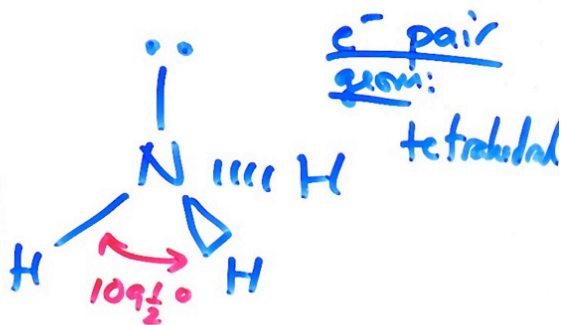


use p-orbitals
 \perp
 90°

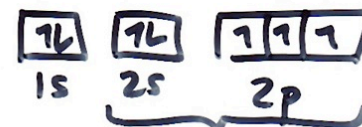
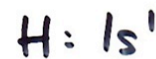


VSEPR:

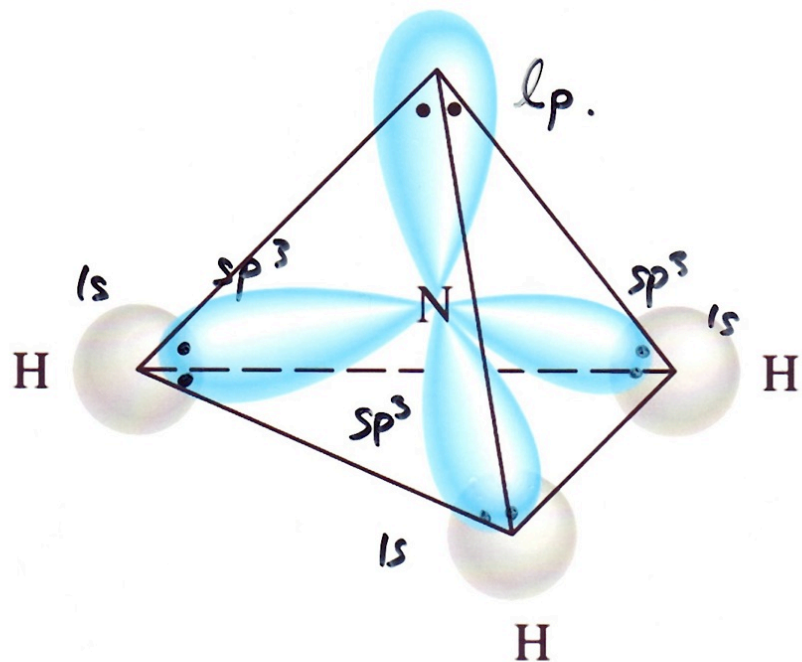
Mol. geom:
 trigonal pyramidal



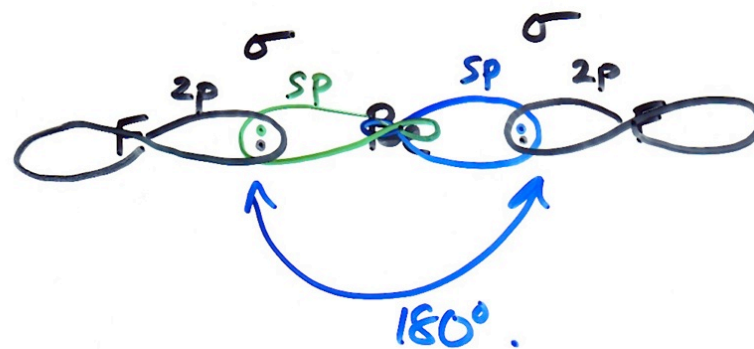
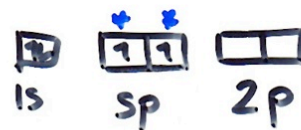
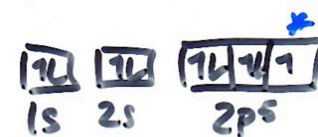
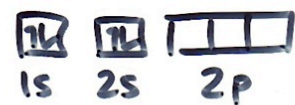
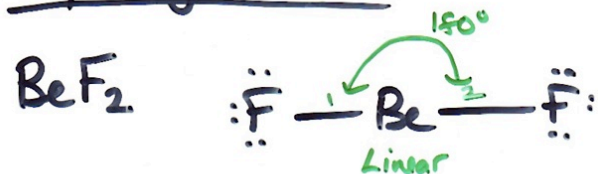
$109\frac{1}{2}^\circ$ angles! \Rightarrow cannot use p-orbitals (90°)
 \Rightarrow must use sp^3 hybrids



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sp hybridization



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