<u>Polar.ty</u> - electronegativity difference

Polar ⟹

$\underline{F}$ = 4.0 highest,
"Cs" lowest ~ 0.4

H ―― Ö ⤫
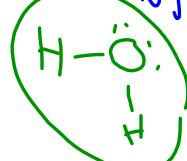
4 total sites
"Tetrahedral"

~~106°~~
104°

USEPR

POLAR BOND!
Polar Molecule.

O-H

H―Ö:
   |
   H

$\boxed{CH_4}$

2.2
H

2.2 H ―― C ― H
              2.6 2.2

H
2.2

ΔO.4 ⟹ POLAR BOND
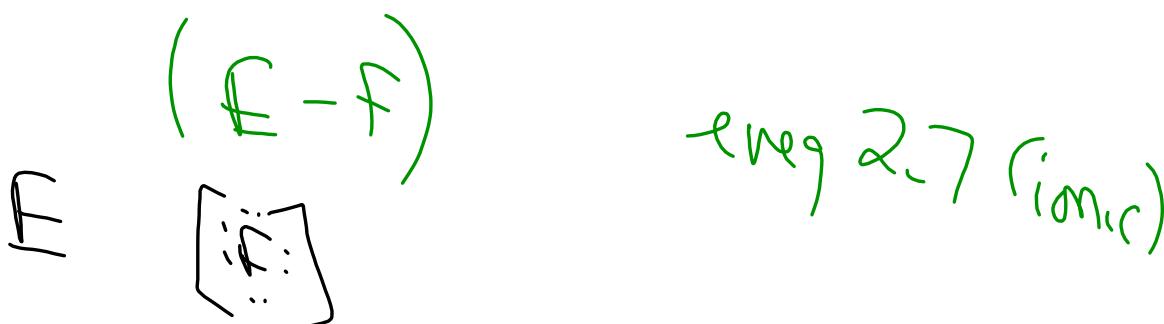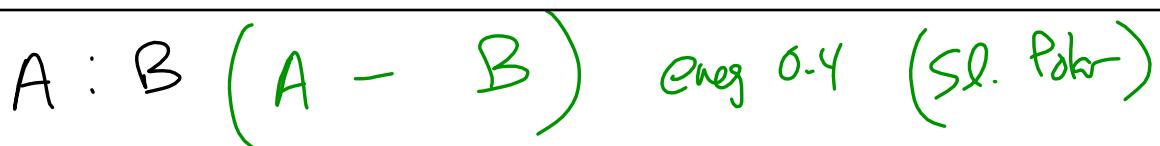
Tetrahedral
Perfectly Symmetrical
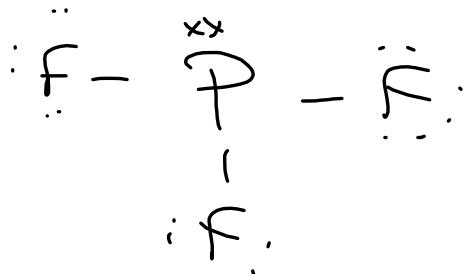
Polar Bond.

Molecule
is Non-Polar

CO_2

$4 + 2(6) = 16 - 4 = 12 - 12 = 0$

$:\ddot{O} - C - \ddot{O}:$

$:\ddot{O} = C = \ddot{O}:$ $\uparrow < 120$

Polar > 120

non Polar Molecule

A : B   (A — B)   eneg 0.4   (Sl. Polar)

C :D   (C — D)   eneg 1.3   (Polar)

(E — F)   eneg 2.7 (ionic)

F   :F:

8/48

PF_3

$5 + 3(7) = 26 - 6 = 20 - 18 = 2 - 2 = 0$

$FC = Val\ e^- - \left(\begin{array}{c} All \\ nb \\ e^- \end{array} + \frac{1}{2}\begin{array}{c} b \\ e^- \end{array} \right)$

$:\!\ddot{F} - \overset{xy}{\overset{\bullet\bullet}{P}} - \ddot{F}:$
$\quad\quad |$
$\quad\quad :\!\ddot{F}:$

$P = 5 - (2 + 3) = 0$

$F = 7 - (6 + 1) = 0$

Nov 15-8:11 AM

8/61 ①

N_3^-

$3(5) + 1 = 16 - 4 = 12 - 12 = 0$

$:\!\ddot{N} - \dot{N} - \dot{N}:$

$:\!\overset{1}{\ddot{N}} = \overset{2}{N} = \overset{3}{\ddot{N}}:$ $:\!\overset{1}{N} \equiv \overset{2}{N} - \overset{3}{\ddot{N}}:$

$\underline{N_1}\ \ 5 - (4 + 2) = -1$ $N_1 = 5 - (2 + 3) = 0$

$N_2\ \ 5 - (0 + 4) = +1$ $N_2 = 5 - (0 + 4) = +1$

$N_3\ \ 5 - (4 + 2) = -1$ $N_3 = 5 - (6 + 1) = -2$

Sl. Better

Nov 15-8:18 AM

13

Al

$\begin{bmatrix} \times \\ \cdot \end{bmatrix} H \end{bmatrix}$ -1

$\begin{pmatrix} \times \\ \cdot \end{pmatrix} H \end{pmatrix}$ -1

$\begin{bmatrix} \times \\ \cdot \end{bmatrix} H \end{bmatrix}$ -1
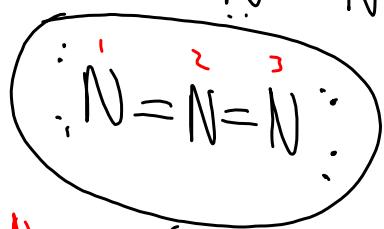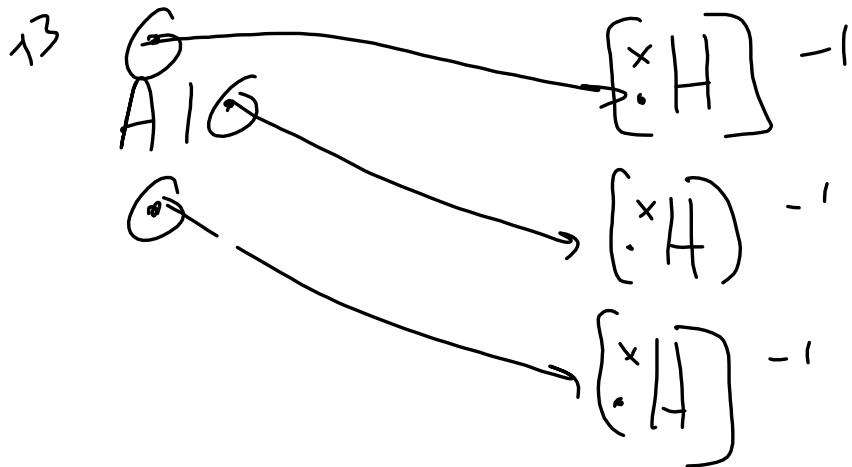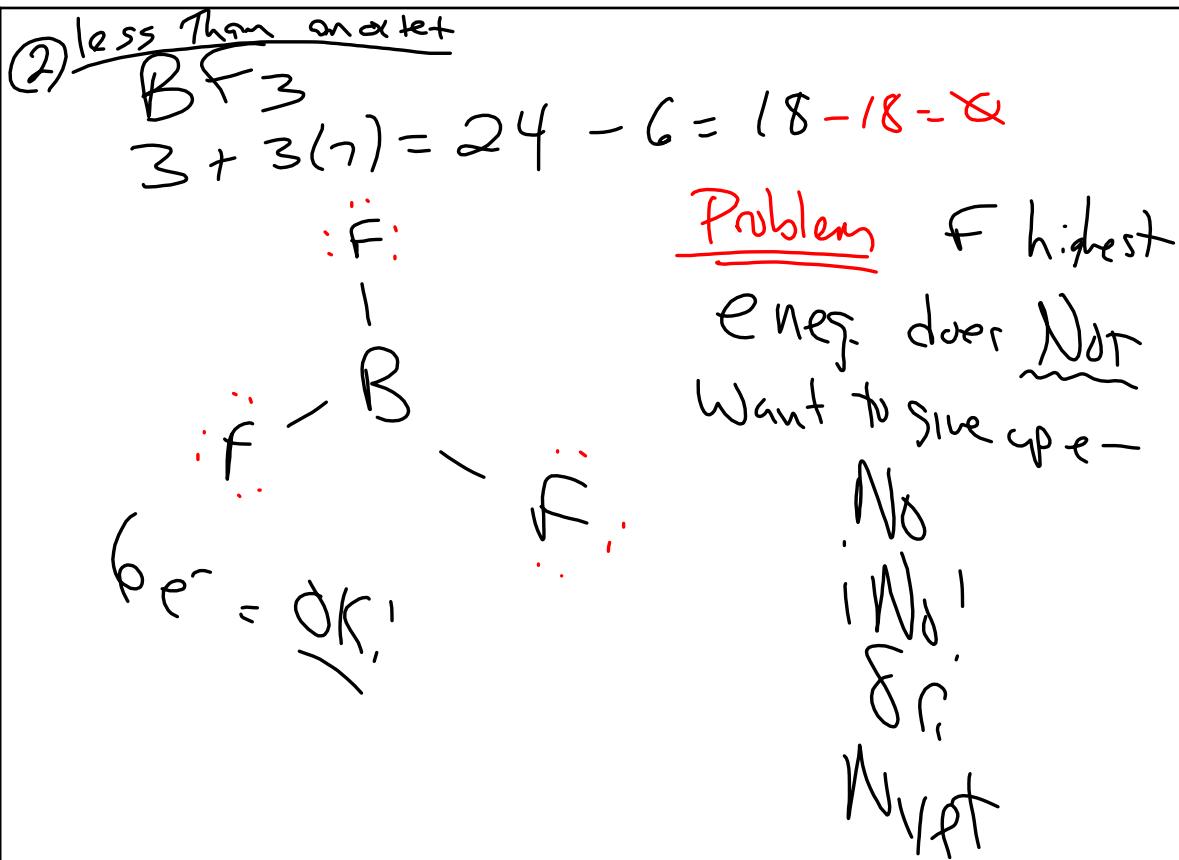
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Exceptions to octet Rule

✓
* ① Move Than rule → extras go on
                              central atom.

✓
* ② <u>Less</u> than an octet   ex: BF_3

* ③ Odd # e^- ex: NO.   higher energ
                            gets the extra e^-

Nov 15-8:24 AM

② <u>less Than an octet</u>

BF_3

$3 + 3(7) = 24 - 6 = 18 - 18 = 0$

$$:\overset{\cdot\cdot}{F}:$$
$$|$$
$$:\overset{\cdot\cdot}{F} - B \diagdown$$
$$\diagdown :\overset{\cdot\cdot}{F}:$$

6 e⁻ = OK!

<u>Problem</u> F highest
e neg. does <u>Not</u>
want to give up e⁻
No
!No!
8r:
Nvet
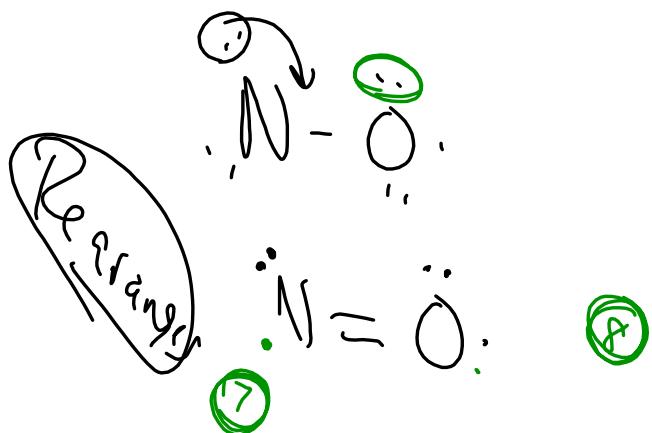
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③ <u>Odd # e⁻</u>

N O

$5 + 6 = 11 - 2 = 9 - 9 = 0$

$:\overset{\cdot\cdot}{N} - \overset{\cdot\cdot}{O}:$

Rearange

$:\overset{\cdot\cdot}{N} = \overset{\cdot\cdot}{O}:$
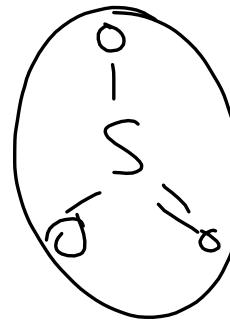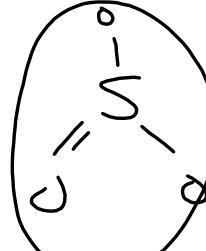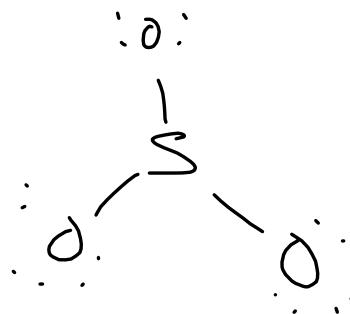
O greater eneg
EA, IE
gets more e⁻

Nov 15-8:35 AM

Resonance

SO_3

$6 + 3(6) = 24 - 6 = 18 - 18 = 0$
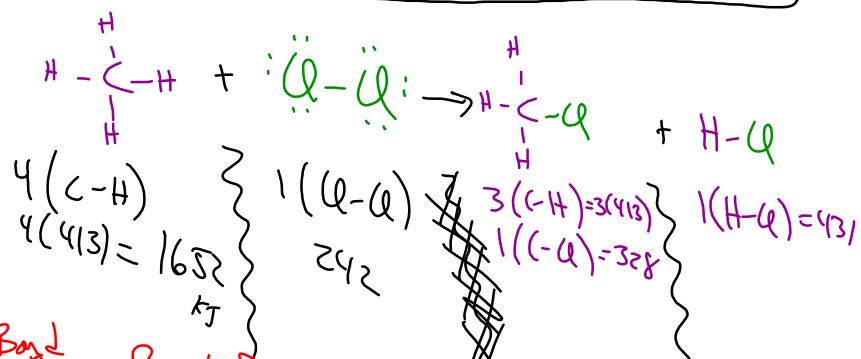
Blend Resonance

Nov 15-8:39 AM

p 325 →
Bond Enthalpies (energy)

$$CH_4 + Cl_2 \Rightarrow CH_3Cl + HCl$$

$4(C-H)$ $1(Cl-Cl)$ $3(C-H) = 3(413)$
$4(413) = 1652$ 242 $1(C-Cl) = 328$ $1(H-Cl) = 431$
kJ

Bond
enthalpy = Bonds Broken   —   Bonds Formed.
of rxn
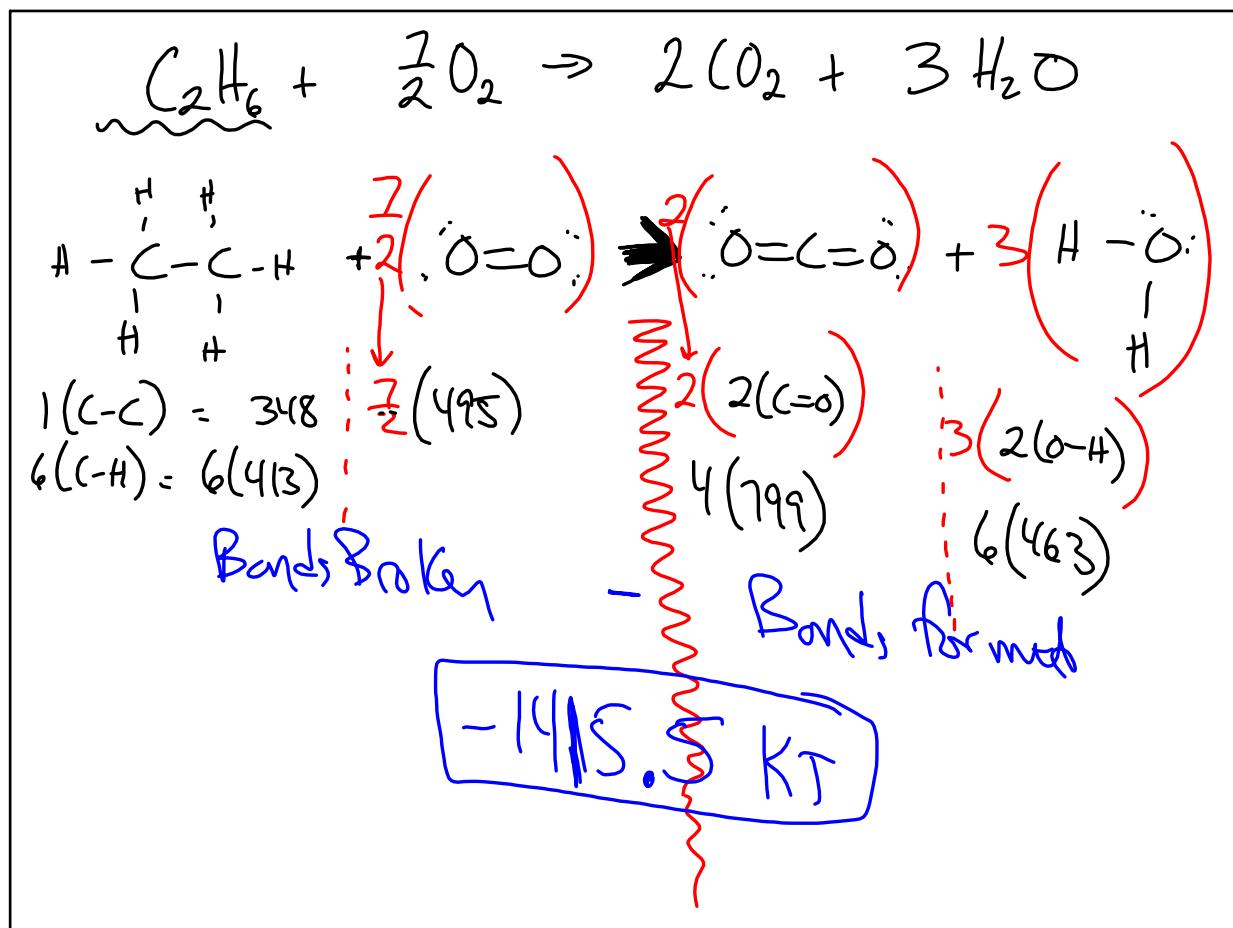
1894 kJ   — 1998 kJ
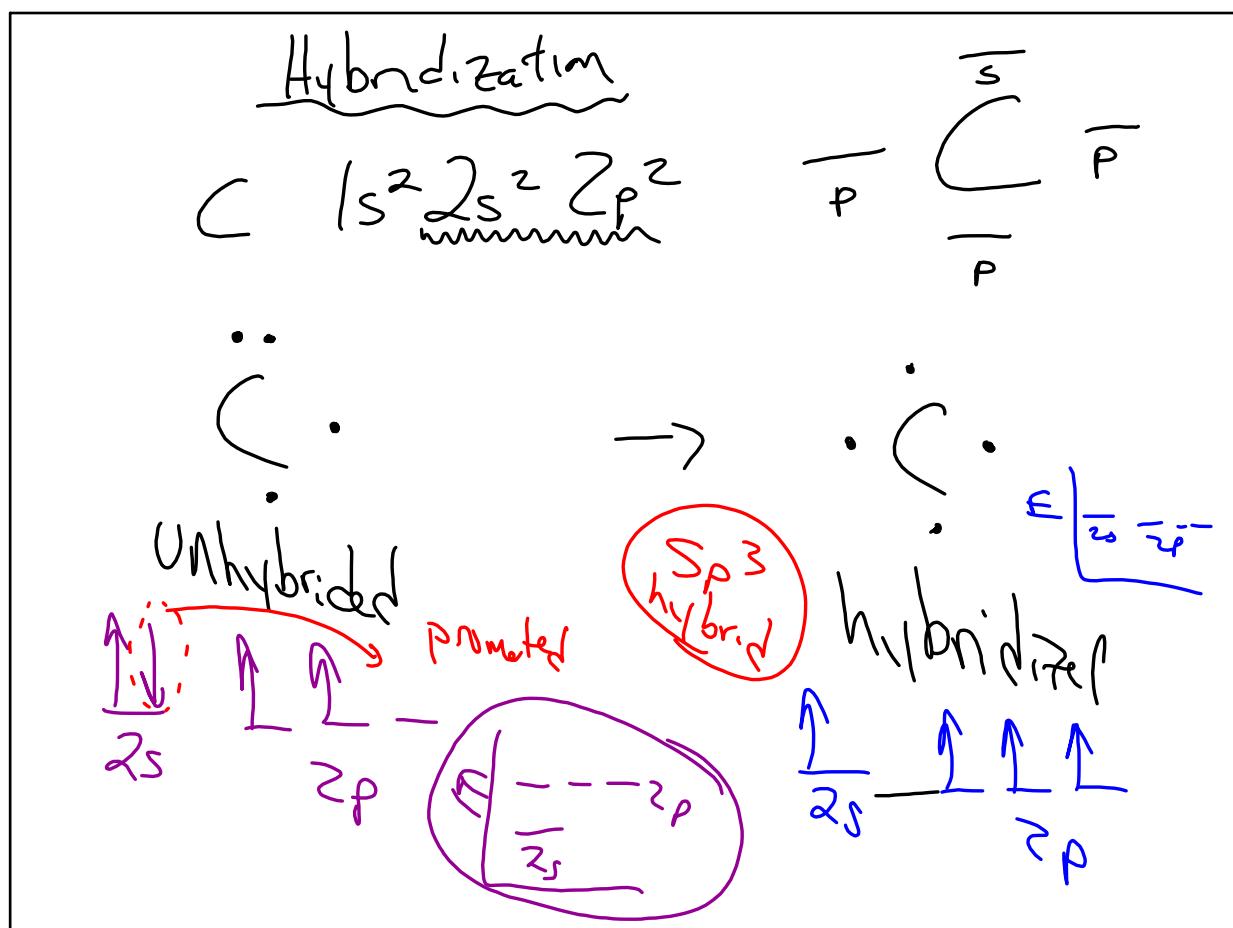
$(-104$ kJ$)$ Exo   More Stable

Nov 15-8:43 AM

$$C_2H_6 + \frac{7}{2}O_2 \Rightarrow 2CO_2 + 3H_2O$$

$$H-\underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}}-\underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}}-H + \frac{7}{2}\left(\ddot{O}=\ddot{O}\right) \Rightarrow 2\left(\ddot{O}=C=\ddot{O}\right) + 3\left(H-\underset{\underset{H}{|}}{\ddot{O}}\right)$$

$1(C-C) = 348$ $\frac{7}{2}(495)$ $2(2(C=O))$ $3(2(O-H))$

$6(C-H) = 6(413)$ $4(799)$ $6(463)$

Bonds Broken   —   Bonds formed

-1415.5 KJ

Hybridization

$C \quad 1s^2 2s^2 2p^2$

Unhybrided $\quad$ Promoted $\quad$ Sp³ hybrid $\quad$ hybridized

$2s \quad 2p$ $\qquad$ $2s \quad 2p$
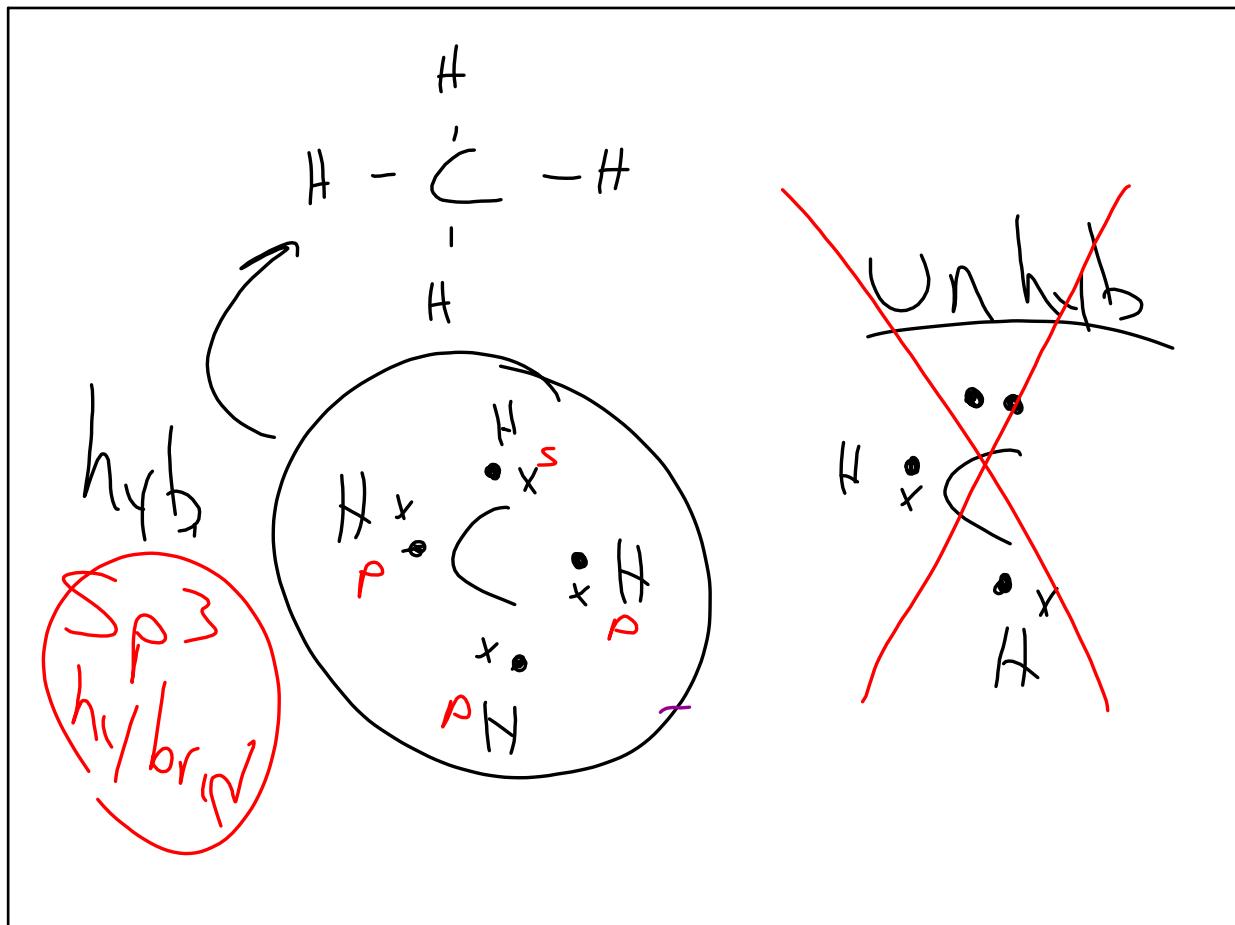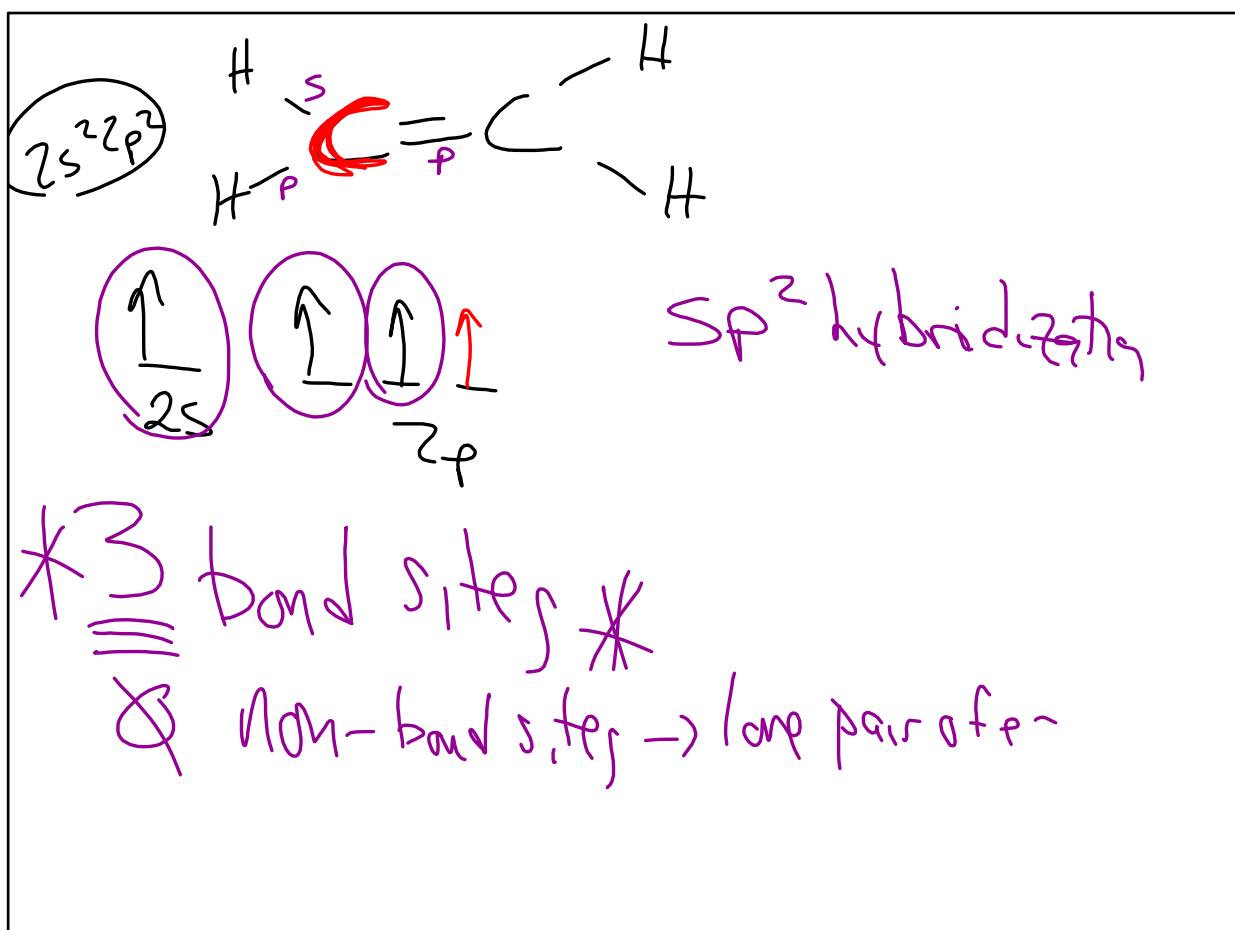
Nov 15-9:07 AM

Nov 15-9:09 AM

H $-$ C $\equiv$ C $-$ H

(2 bond & non-bond)

2 π bt 1

Sp hybrid

NH_3

H $-$ N $-$ H
       |
       H

3 bond
1 lone pr
‾‾‾‾‾‾
4

‾ ‾ ‾ ‾
s   p

Sp3
hybrid

SF_4
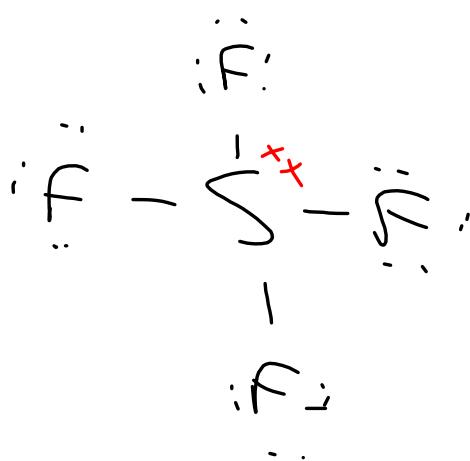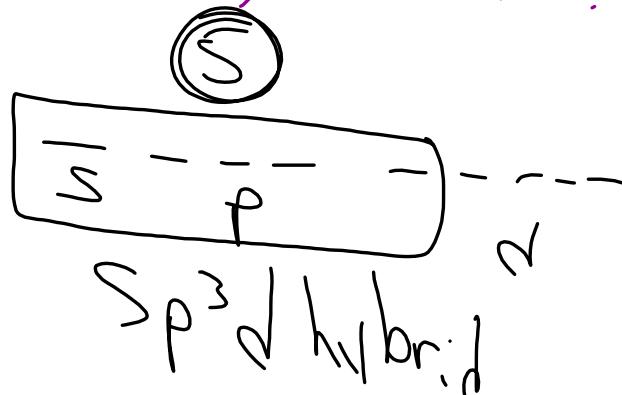
$6 + 4(7) = 34 - 8 = 26 - 24 = 2$

4 bond, 1 non bond

:F:

:F — S** — F:
      |
     :F:

Sp^3d hybrid

S	P				

Nov 15-9:13 AM