General Chemistry

Wednesday 11/4/15

Today: Molecular Shapes
Unusual Lewis Structures
Polarity
Expanded Octet

Thursday: No Review Session

Friday: Lab worksheets due
A closer look at hybridization

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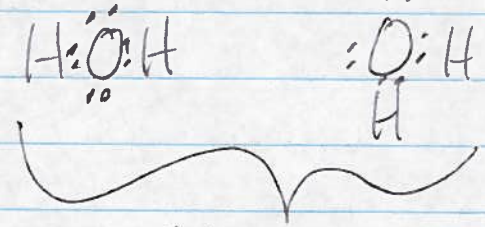
1) Lewis Dot Structure

2) ABE

ABE → shape, angles, polarity



AB_2E_2

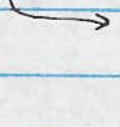
109°

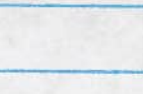
bent

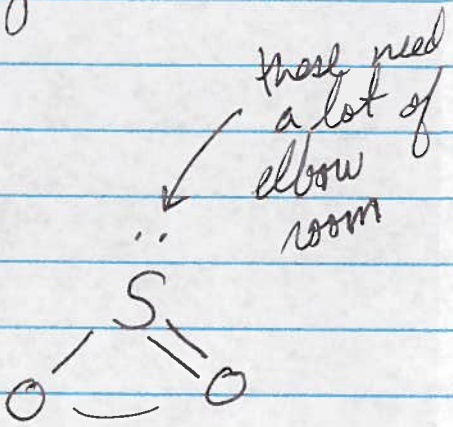
ABE formulas

2 groups AB_2 sp hybrid $\angle 180°$ linear

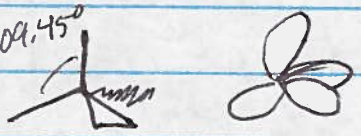
3 groups AB_3, AB_2E, ABE_2 } sp^2 hybrid



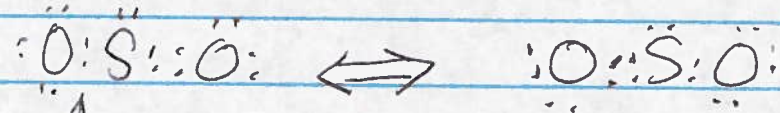




4 groups AB_4, AB_3E, AB_2E_2 } sp^3 hybrid



Resonance



snap-on Oxygen

two different "arrangements"

Octet species

$:\ddot{O}::C::\ddot{O}:$ Is the molecule polar?

(Polarity doesn't matter with ionics)

NH_4 ClO_4^-

For covalent molecules only:

Use + compare electronegativity

"All" AB_2 AB_3 A_4 are nonpolar

3.5 2.5 3.5

$:\ddot{O}=C=\ddot{O}:$ nonpolar (polar bonds) $\Rightarrow AB_2$

δ^+ δ^-

$:\ddot{S}=C=O:$ 1 polar bond $\Rightarrow ABB'$

2.5 2.5 3.5 polar

C–H

2.5 2.1 If $\Delta EN < .5$, then it's functionally non-polar

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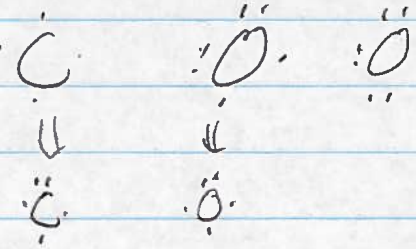
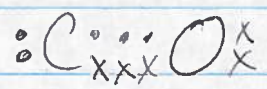
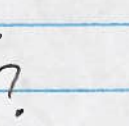
CO

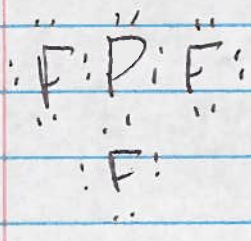




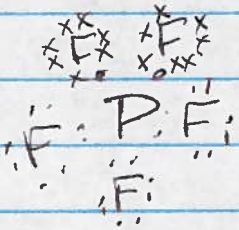
Expanded Octets

Only happens for $n \geq 3$ ($n=2$ not BC NO F)
when B groups are F, Cl, O

PF_3 



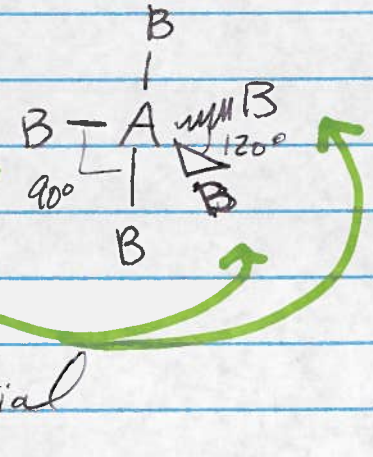
PF_5 E → 2B groups
groups



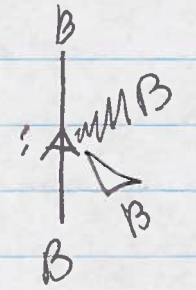
P has 10e⁻
↳ Expanded octet

AB_5 trigonal bipyramid

top view



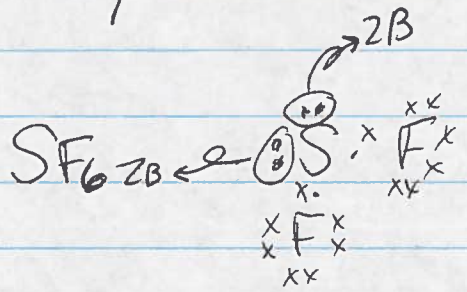
✱ 6× 90° 3× 120° 1× 180°

AB_4E  $\lesssim 90$ $\lesssim 120$ $\lesssim 180$ Seesaw!

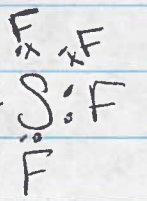
AB_3E_2 T-shaped $\lesssim 90$ $\lesssim 180$ no 120°

AB_2E_3 linear Exactly 180°

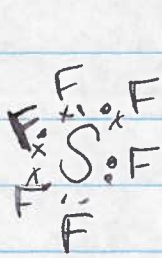
nonpolar

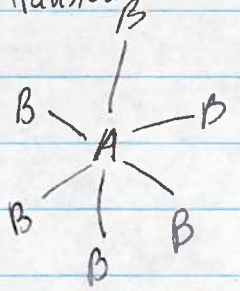
AB_6 SF_6 

SF_2 AB_2E_2



SF_4 AB_4E

 SF_6 AB_6 → in transformers



90°

180°

Nonpolar if Bare same