This Class

3.2 VSEPR

3.3 Molecular Polarity

Next Class

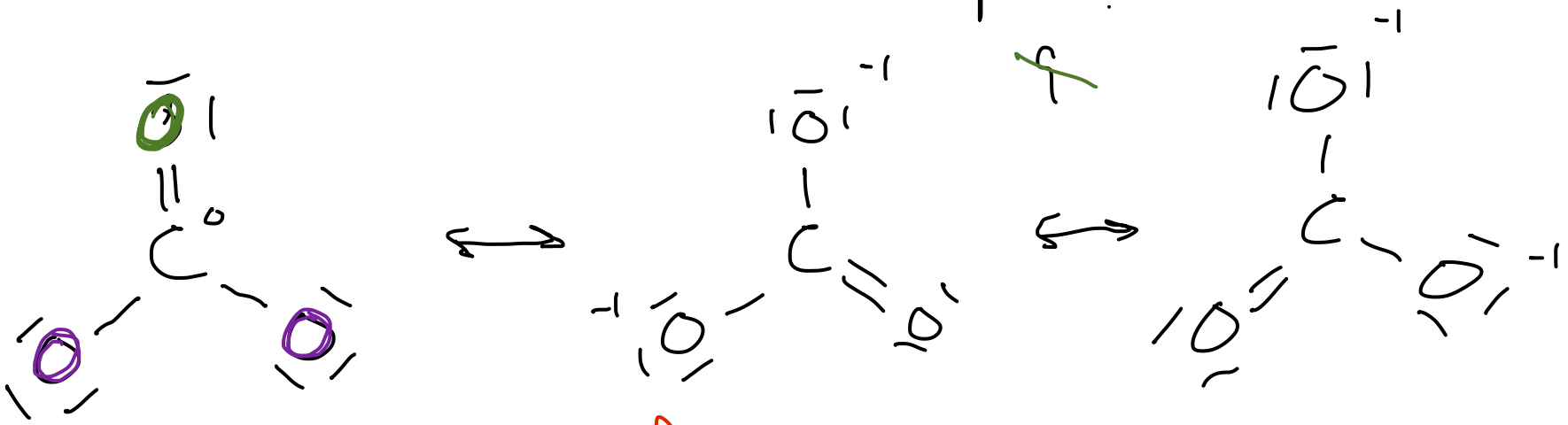
4.1 Symmetry elements and Operations

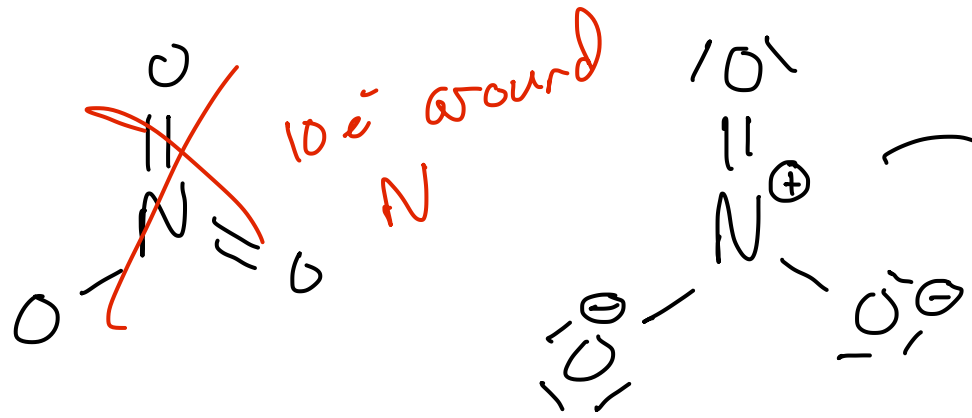
a chain of O atoms or O atoms around C atoms

4 bond so it's a central atom

$[CO_3]^{2-}$ $4 + 3(6) + 2 = 24\ e^-$

$= 12$ pair





$5 - 4 = +1$

$FC_i = 4 - 4 = 0$ $\quad 6 - 6 = 0$

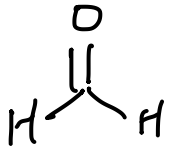
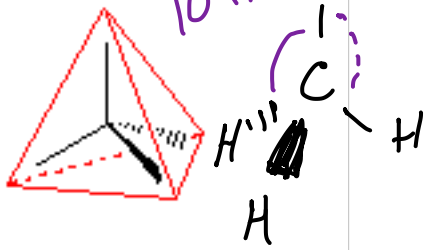
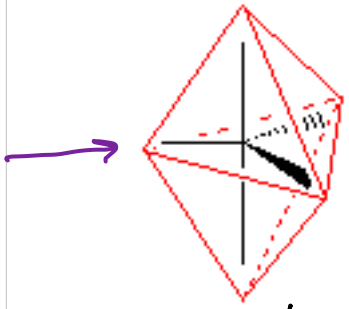
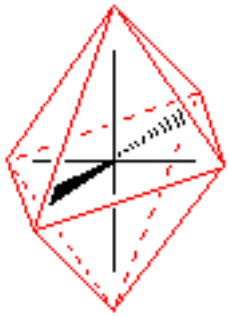
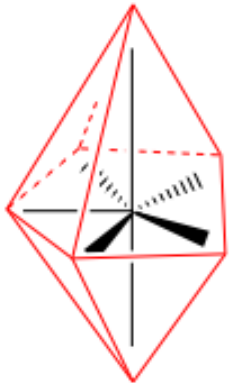
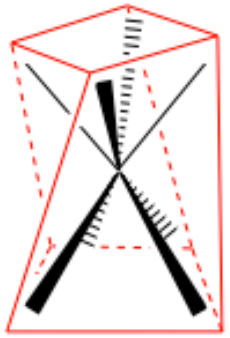
$6 - 7 = -1$

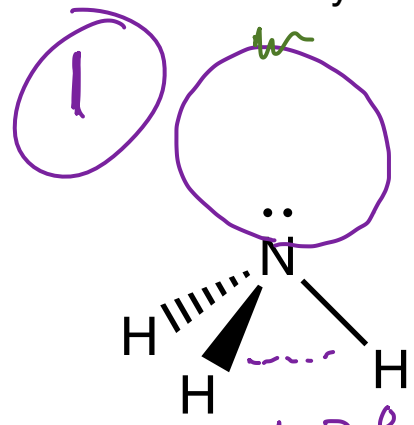
isoelectronic

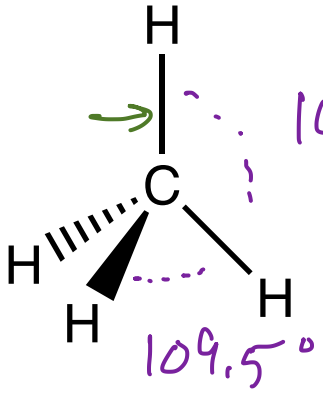
$[NO_3]^-$

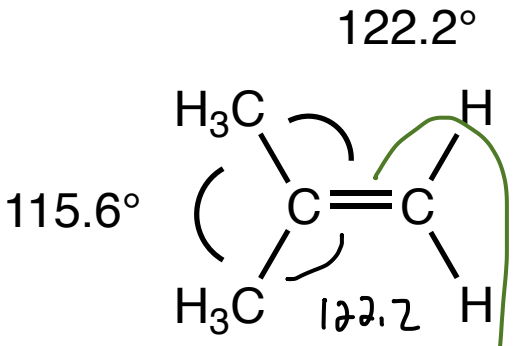
$5 + 3(6) + 1 = 24$

a.k.a. steric number

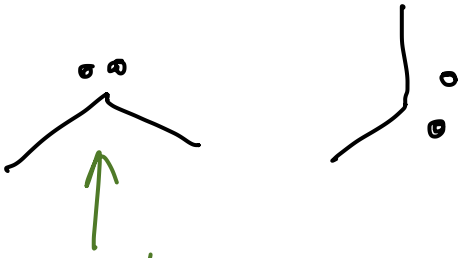
1	2	3	4
1 set of electrons H – H	these e⁻'s 180° O=C=O repel these e⁻ linear	  "ideal" is 120° trigonal planar	109.5  tetrahedral
5	**6**	**7**	**8**
 trigonal bipyramidal	 octahedral	 pentagonal bipyramidal	 antiprismatic


1
lone pair e⁻'s take up more space
N
H
H
H
107°
all H-N-H angles


H
C
H
H
H
109.5°
109.5°


122.2°
H3C
H
115.6°
C
C
H3C
122.2
H
2
π bonds take up more space

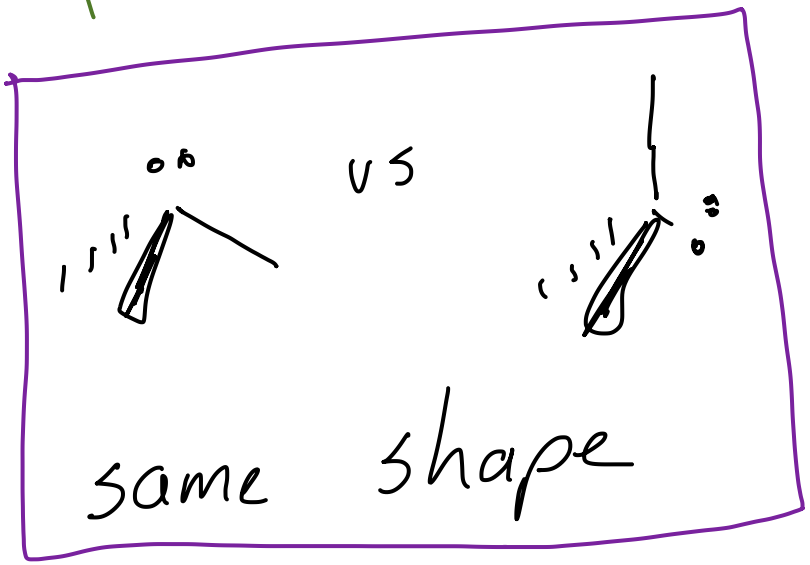
eneg elements pull e⁻ towards themselves & bonds take up less space
3
more e⁻ density pushes C-H bonds apart
F
108.5°
C
H
112.8°
H
F
less e⁻ density here
as compared to here
can be pushed closer together because less e⁻ dens



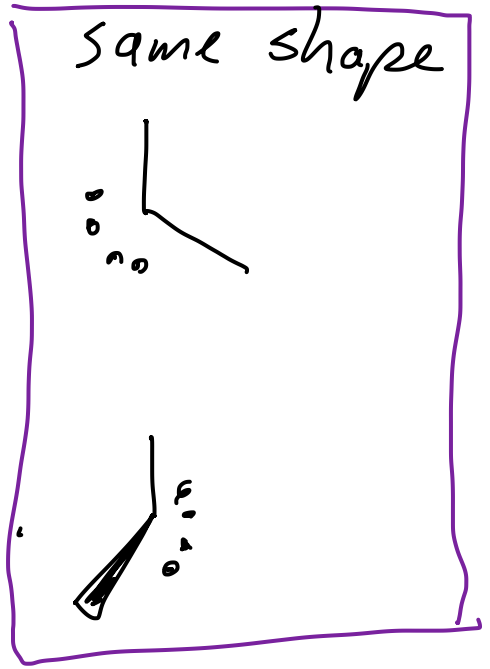
smaller than 120

v-shape

In these cases it doesn't really matter which position the lp e⁻'s occupy

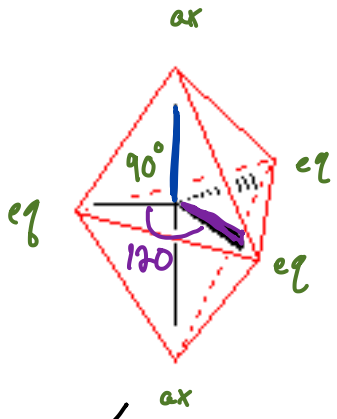


pyramidal



bent

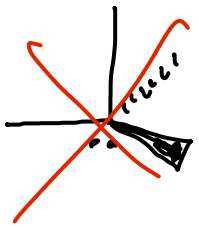
The position of the lone-pair e^-'s in this shapes is important.



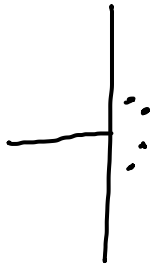
this bond has neighbors at 120, 120, 90, & 90

this bond has neighbors at 90, 90, & 90°

more $e^- - e^-$ repulsion here



lp e^- need more space. Not put in axial positions

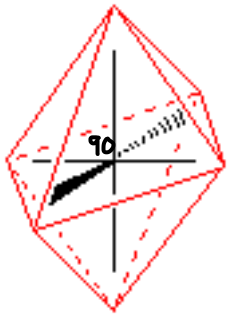


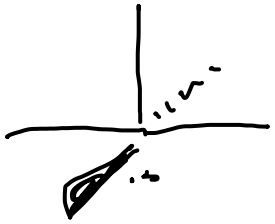
T-shaped

linear

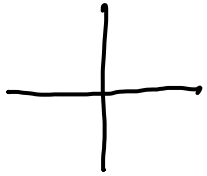
Make predictions when comparing lp e^-'s + σ bonds

π vs σ





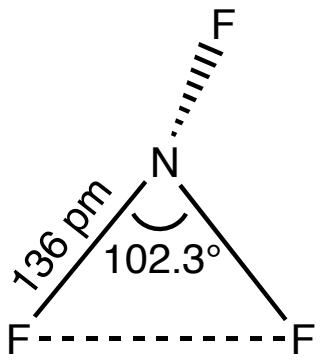
square pyramidal



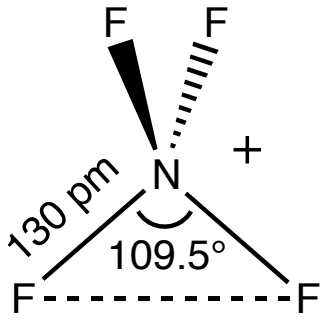
square planar

see-saw

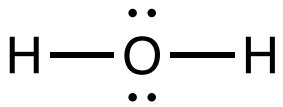
σ eneg vs σ epos



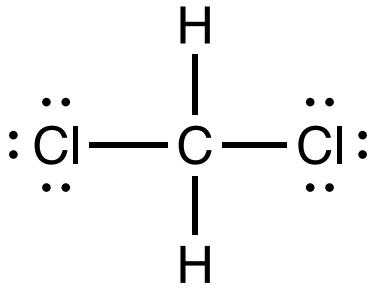
NF_3



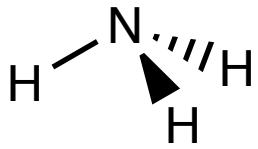
NF_4^+



polar
1.85 D



polar
1.6 D

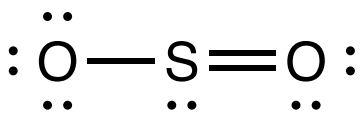


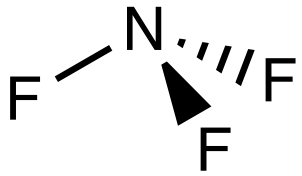
polar
1.47 D

Draw Lewis Structure

Predict Shape

Find polar bonds

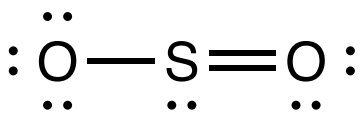


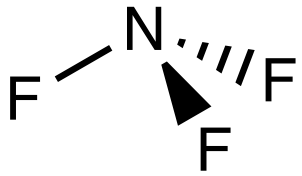


Draw Lewis Structure

Predict Shape

Find polar bonds



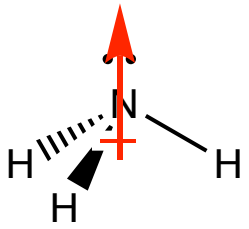


Draw Lewis Structure

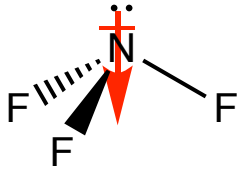
Predict Shape

Find polar bonds

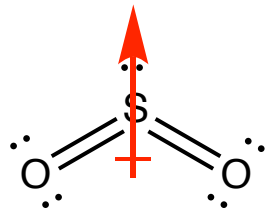
Do prediction based on polar bonds match the position of the lone-pair e^- ?



1.47 D



0.23 D



1.63 D