

Notes 01/11

Friday, January 11, 2008
9:59 AM



Notes 0111

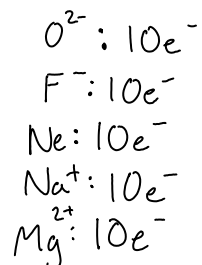
Audio recording started: 10:00 AM Friday, January 11, 2008

- Continuing from last lecture's question - Ranking size of the following:

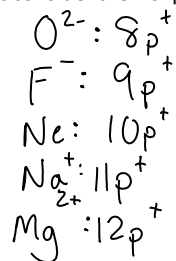


Negative ions are larger than element
Positive ions are smaller than element.

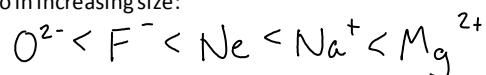
Let's consider electrons in ions/elements:



Let's consider the # of protons:



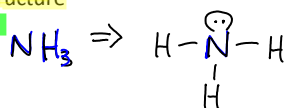
So in increasing size:



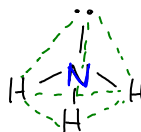
This is an isoelectronic series since they all have same number of electrons

- Determining Structure

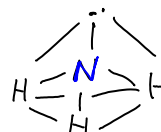
Example:



Lewis Structure



Electron Domain Structure



polyhedral

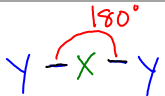
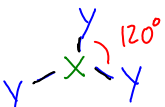
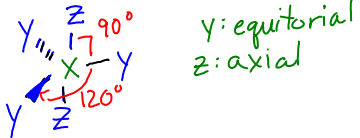
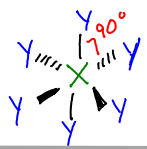


Ball and Stick



space-filling model

o Geometry

# of e ⁻ domains	Geometry	Angle	Example
1	Rod 		N ₂
2	Linear 	180	CO ₂
3	Triangular 	120	
4	Tetrahedron 	109.5	
5	Trigonal bipyramidal  Lone pairs, double bonds, or bulky ligands placed on the Y position	90, 120	
6	Octahedral 	90	

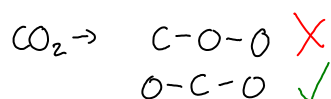
o Steps to determine structure:

- # of valence electrons

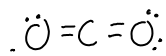
$$\text{CO}_2: 4 + 2(6) = 16e^-$$

- Assign a geometry

- High symmetry is preferred



- Octet Rule

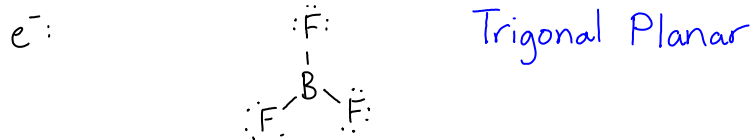


- Cover lone pairs and determine shape

linear

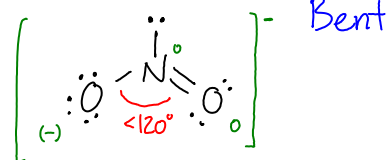
o Example: BF₃

- Be, B can have less than 8 valence electrons



o Example: NO₂⁻

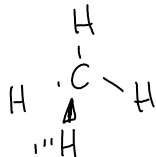
$$e^-: 5 + 2(6) + 1 = 18e^-$$



Bent

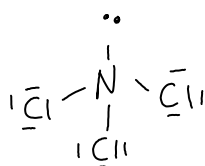
- There can be several seemingly correct structures. Formal Charge helps us determine which is correct.

- Example: CH_3



Tetrahedral

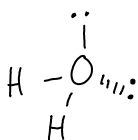
- Example: NCl_3



trigonal pyramidal

- Example: H_2O

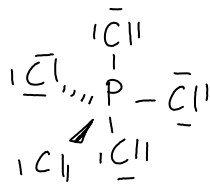
$$2(1) + 6 = 8e^-$$



Bent

- Example: PCl_5

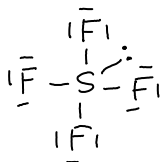
$$5 + 5(7) = 40e^-$$



trigonal bipyramidal

- Example: SF_4

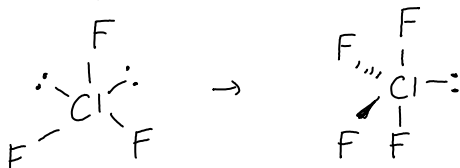
$$6 + 4(7) = 34e^-$$



See-saw

- Example: ClF_3

$$7(1) + 3(7) = 28e^-$$



T-shaped

Loan pairs are being put into equatorial because they are bulkiest