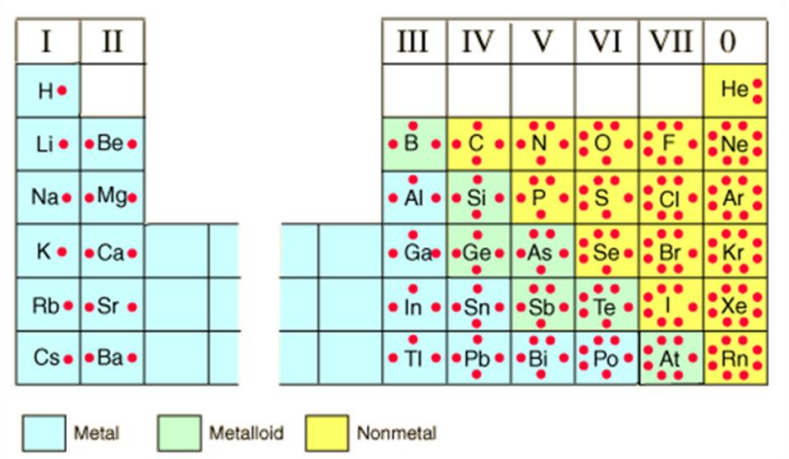
Lewis Dot Formulas

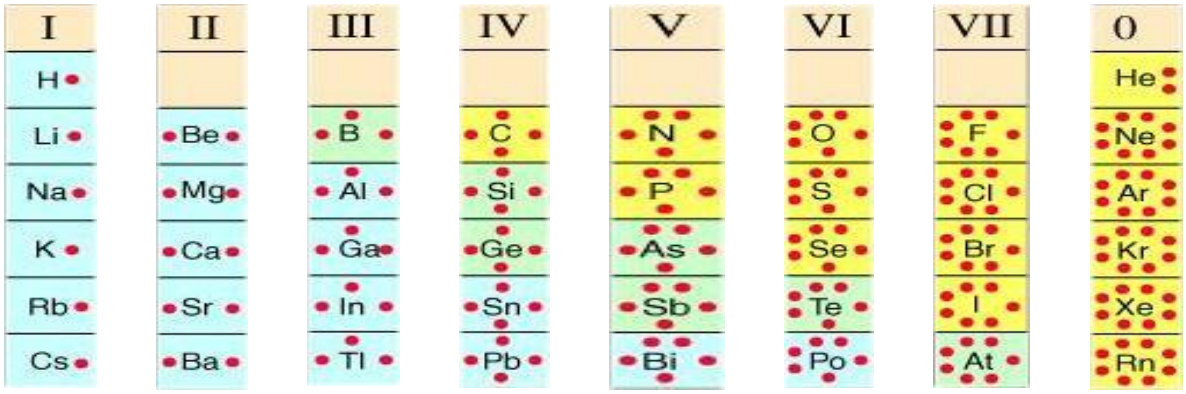
Gilbert Lewis (1916)
Valence electrons represented by dots around a core
Elements have "A" group number of valence electrons

Tool for explaining bonding between atoms



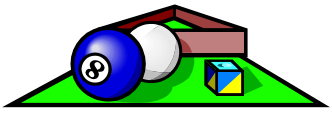
Members of a Chemical Family have same Lewis Dots

Start with element symbol
Add electrons present in outer (valence) shell



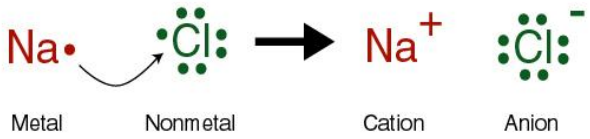
Octet Rule

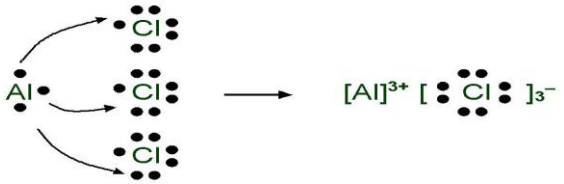
Eight valence electrons, ns^2np^6, is especially stable
Noble gases do not tend to form compounds
To reach stability of the octet:
Atoms lose or gain (transfer) electrons (for ionic compounds)
Atoms share electrons (for molecular or covalent bonded compounds)

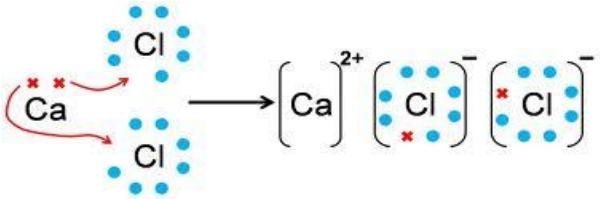


Product: both atoms with "inert configuration"

Electron Moves (is taken by) To the non-metal: metals loses electrons

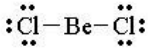
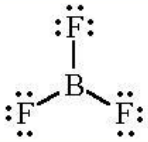
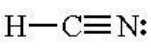
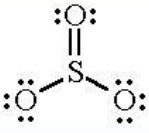
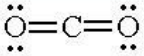
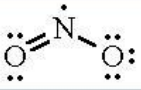
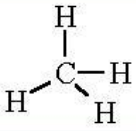
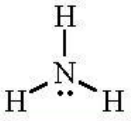
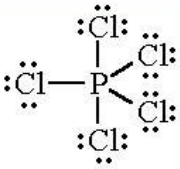
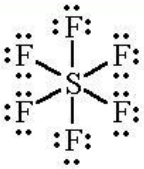






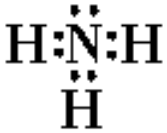
Nomenclature – Line for pair

Examples

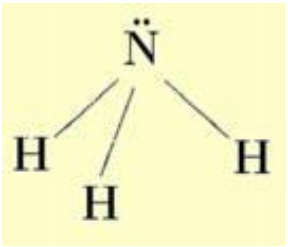
molecule	Lewis structure	# regions of high electron density	molecule	Lewis structure	# regions of high electron density
$BeCl_2$		2	BF_3		3
HCN		2	SO_3		3
CO_2		2	NO_2		3
CH_4		4	NH_3		4
PCl_5		5	SF_6		6

Lewis Dot Formulas

Useful for simple ions
Rapidly becomes tedious
Does Not Provide Stereochemistry



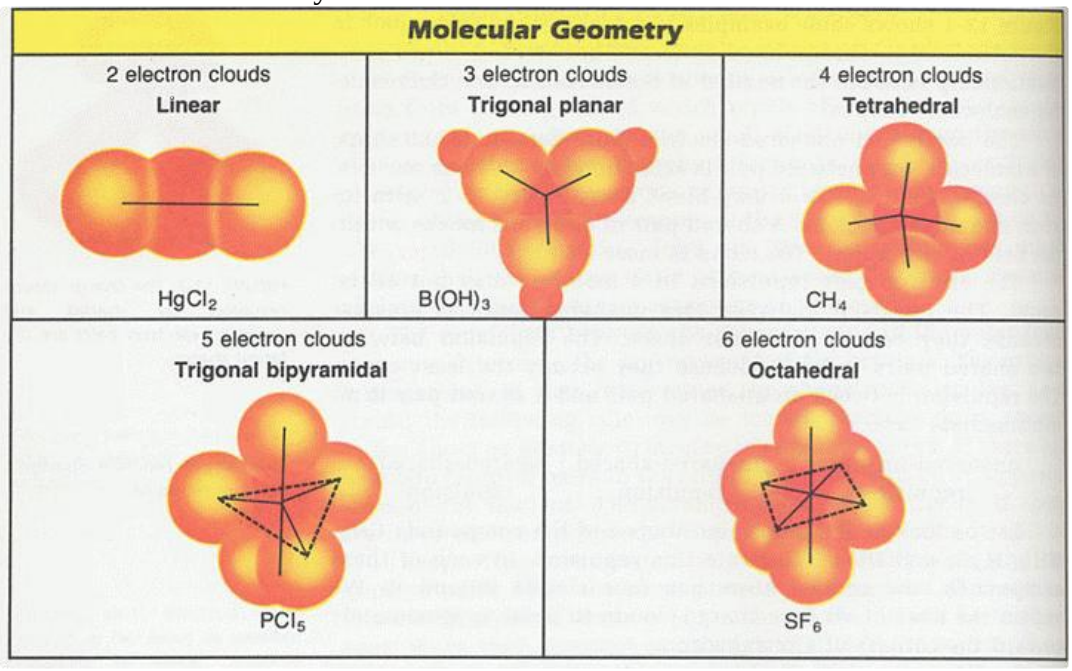
Ammonia



Chemistry is a 3-D Phenomenon
2-D thinking limits horizons & understanding

Valence Shell Electron-Pair Repulsion (VSEPR)

Unshared Pairs Repel – maximize distance between pairs
Creates Molecular Geometry

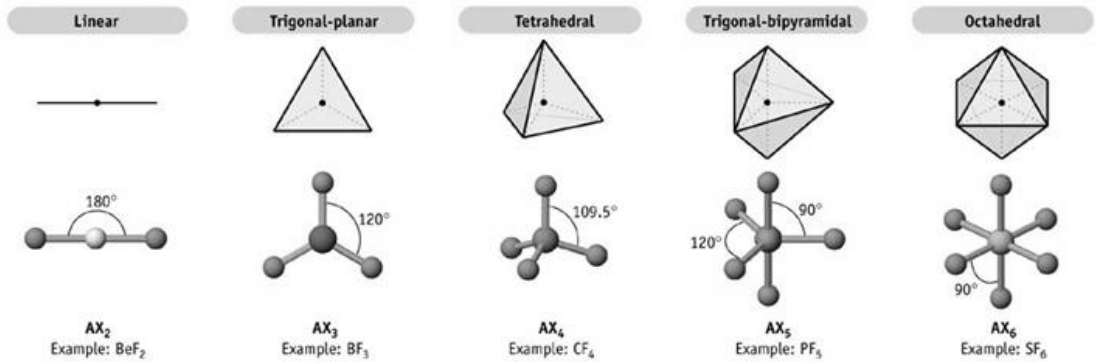


Valence Shell Electron Pair Repulsion (VSEPR)

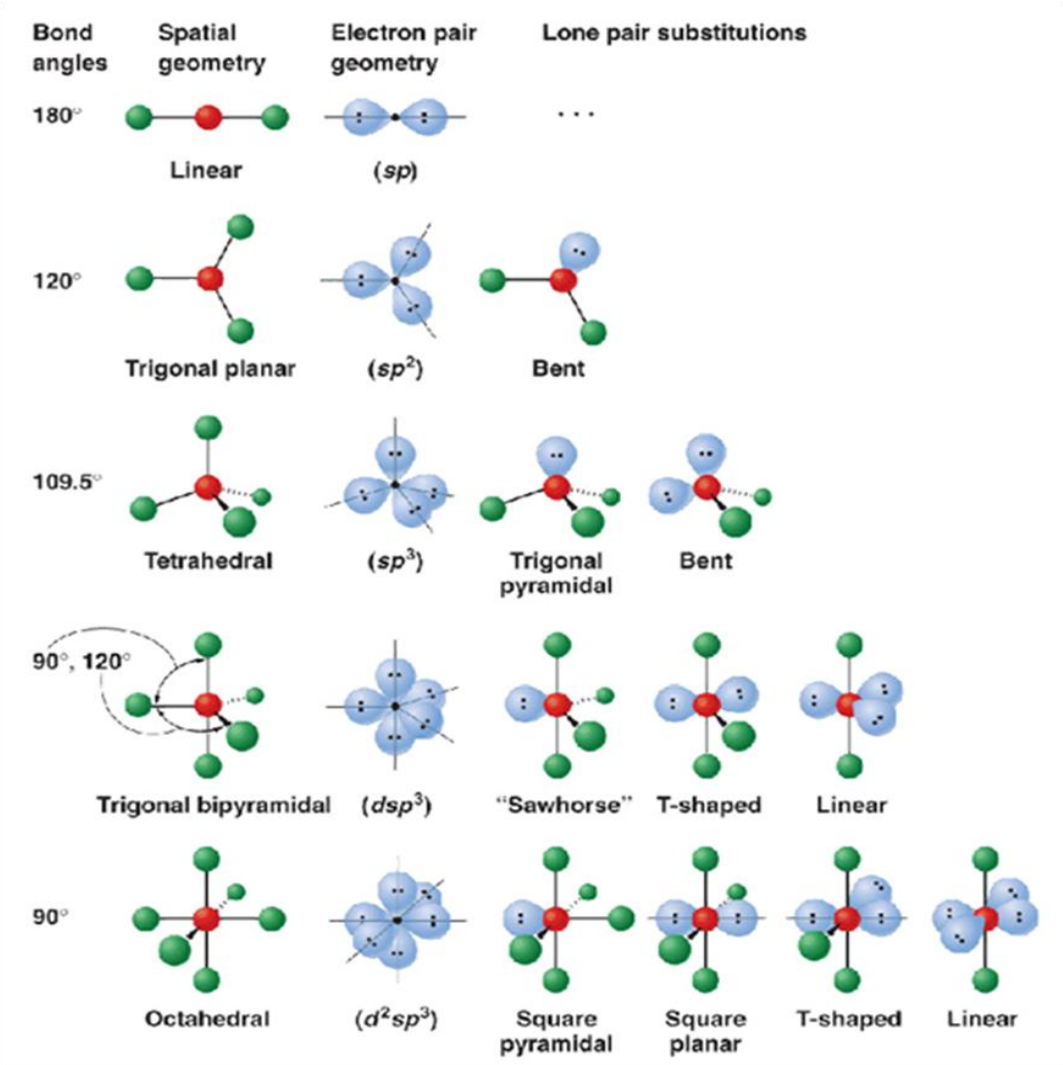
Central Atom Bonding Determines Molecular Shape

Number of electron bonding groups:

2 3 4 5 6



VSEPR Dictated Molecular Shapes



Assignment

Start Taking Unit 9 Practice Test

The Practice Quiz is very similar to the Unit Exam

Success on Unit exam is directly related to practice exam experience

Be able to draw Lewis Dot Formulas for the Common Elements