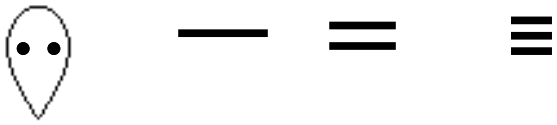
Molecular Shapes--V.S.E.P.R.

V.S.E.P.R. Theory says--"Sets" of electron density around a central atom repel each other, and therefore, get as far apart as possible.

One "set" = a lone pair, or a single, a double, or a triple bond.



Central Atom ●

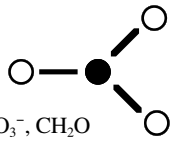
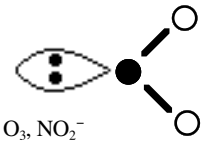
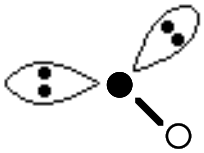
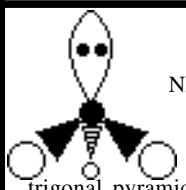
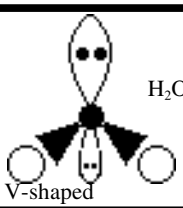
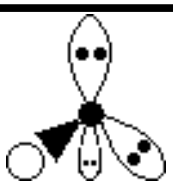
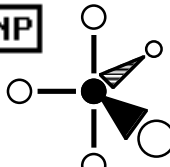
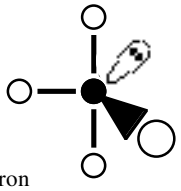
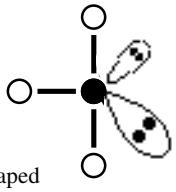
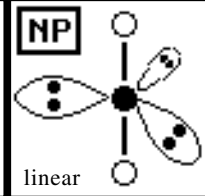
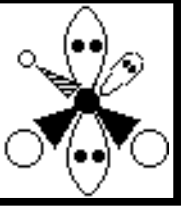
Surrounding Atoms ○

Nonpolar as long as all ○'s are the same. NP

$$\text{Sets} = \frac{G + H - C - N}{2}$$

G = Group # of Central Atom
H = Surrounding Halogens + Hydrogens
C = Charge (including sign)
N = Surrounding Nitrogens

's = Sets - ○'s

# of sets hybridization bond angle electronic geometry	No	1	2 'S	3 'S
2 sets sp 180° linear	NP  $BeCl_2$, CO_2, HCN linear	 linear		
3 sets sp^2 120° trigonal planar	NP  BF_3, NO_3^-, CH_2O trigonal planar	 O_3, NO_2^- V-shaped	 linear	
4 sets sp^3 109.5° tetrahedral	NP  CCl_4 CH_4 NH_4^+ $POCl_3$ tetrahedral	 NH_3, PCl_3 trigonal pyramid	 H_2O, OCl_2 V-shaped	 HCl linear
5 sets sp^3d 90°/120° trigonal bipyramid	NP  PCl_5 trigonal bipyramid	 $TeCl_4$ irregular tetrahedron	 ClF_3 T-shaped	NP  XeI_2 I_3^- linear
6 sets sp^3d^2 90° octehedral	NP  SF_6 octehedral	 IF_5 square pyramid	NP  IBr_4^- square planar	 XeF_3^- T-shaped

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