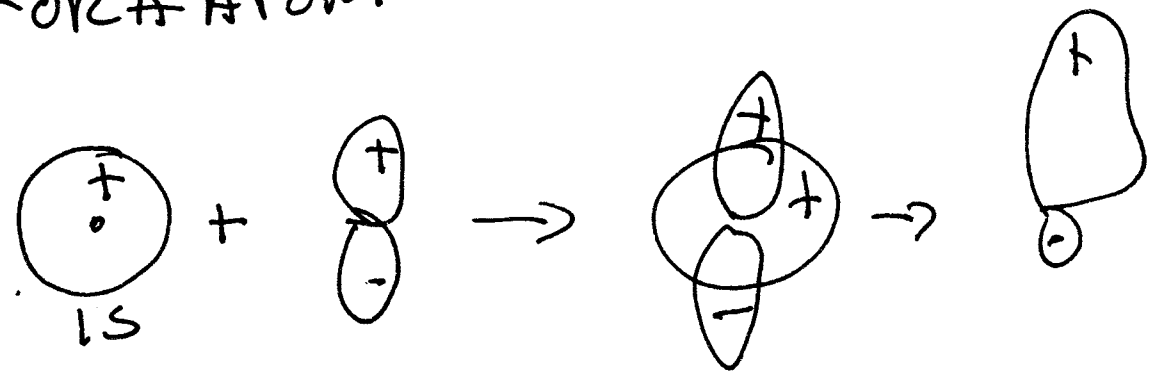
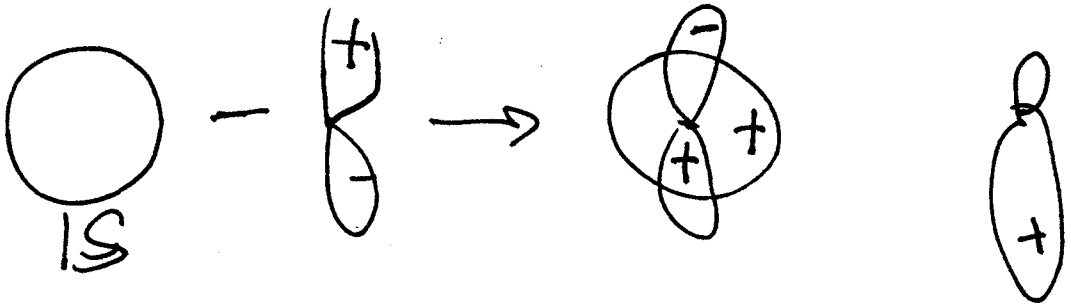
Valance Electron

FOR A ATOM

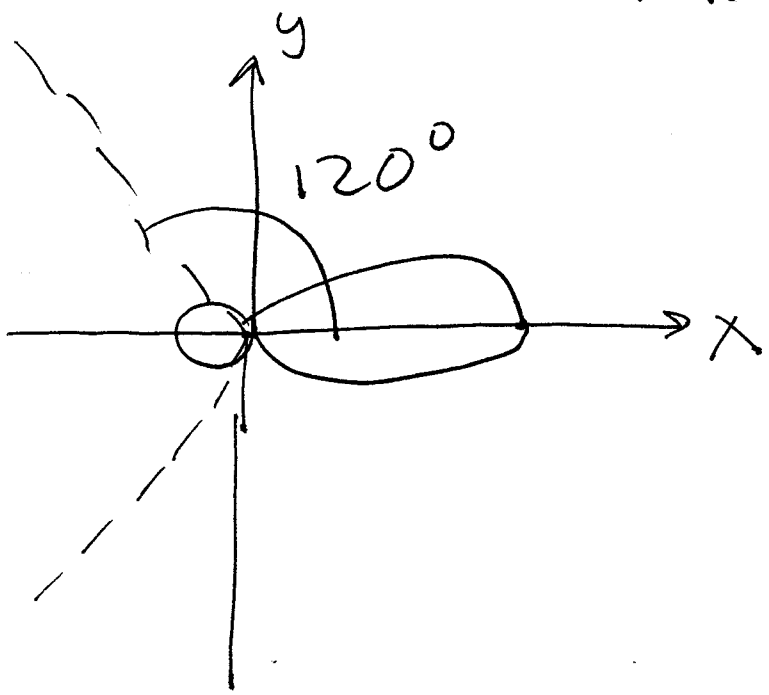




SP → 2 orbitals (atomic)

⇒ LINEAR MOLECULES

sp^2 (s, p_x, p_y) TRIGONAL PLANAR

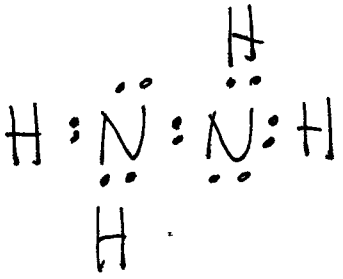


sp^3 TETRAHEDRAL

$\measuredangle$ 109.5°

HYDRAZINE (sp^3)

H_2NNH_2



TRIATOMIC $\leq 16\ e^- \rightarrow$ LINEAR

$17 \leq \# \leq 20 \rightarrow$ BENT

TRIATOMIC

LINEAR CO_2, N_2O, OCS, and NO_2^+

BENT NO_2, O_3, NF_2, and NO_2^-

LINEAR A – B – C

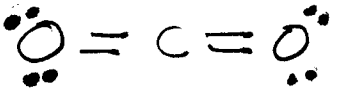
OUTER ATOMS (A, C) → OCCUPIED S ORBITAL ONLY p's ORBITALS

CENTRAL ATOM (B) → SP ORBITALS (P_z)

σ → BONDS ⇒ SP AND P_z

EACH ATOM ⇒ P_x, P_y ORBITALS

CO_2 → $8e^-$ FOR π bonding



NONLINEAR

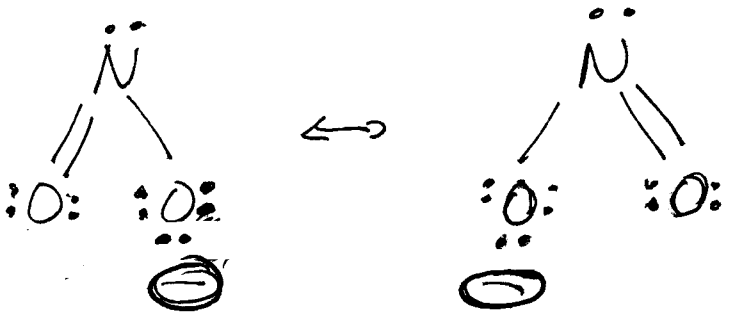
CENTRAL ATOM → sp^2 (sP_xP_y) plane xy

$P_z \rightarrow \pi$ bonding

OUTER ATOMS → P_x or $P_y \rightarrow \sigma$ bond
(NO S ORBITAL)

$P_z \rightarrow \pi$ bonding

NO_2^- (18 e^-)



4 $e^- \rightarrow \pi$ bonding

2 $e^- \rightarrow$ 2S (O)
2 $e^- \rightarrow$ 2P (non bonding) } localized O

2 $e^- \rightarrow$ lone pair in 3rd sp^2

4 $e^- \rightarrow \pi$ bonding → bonding / nonbonding