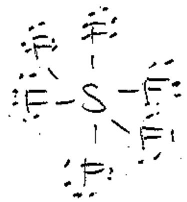
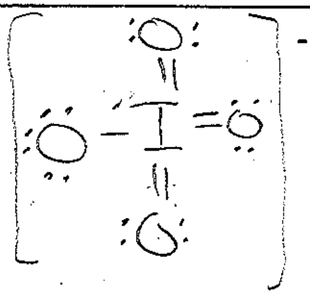
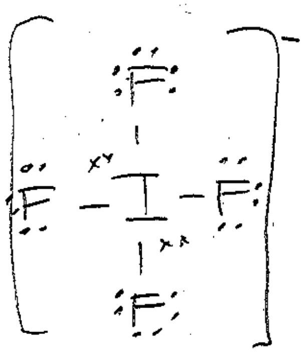
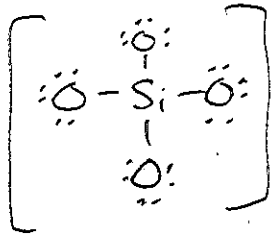
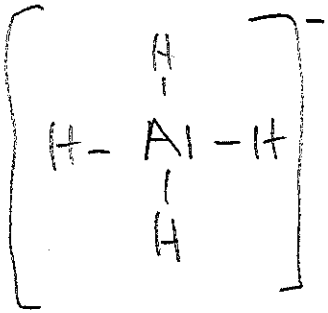
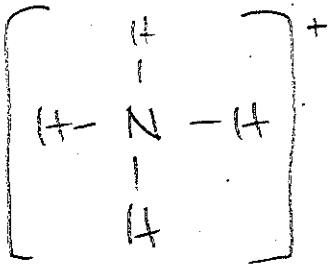
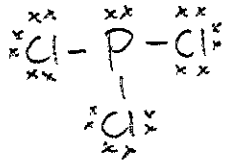
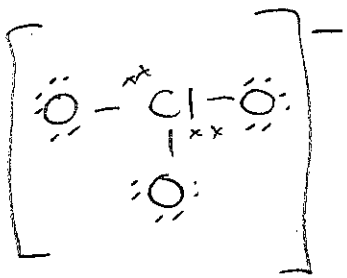
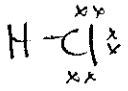
Compound	Lewis	"Pure" orbitals	hybridization
NCl	N ≡ Cl	N : [He] 2s ↑↓ 2p ↑ (↑)(↑) (hybridize: 2s, 2p ↑; first circled p: req. p for triple bond; second circled p: req. p for double bond)	N : [He] 2sp ↑↓ ↑ 2p ↑ ↑
		Cl : [Ne] 3s ↑↓ 3p ↑↓ (↑↓)(↑) 3d _ _ _ _ _ (circled ↑↓: for triple bond; circled ↑: for double bond; arrows into 3d — 3rd energy level has access to d-orbitals) =	Cl : [Ne] 3spd ↑↓ ↑ ↑ 3p ↑ ↑
$AlCl_3$	Cl – Al – Cl, with a third Cl below Al	Al : [Ne] 3s ↑↓ 3p ↑ _ _ =>	Al : [Ne] $3sp^2$ ↑ ↑ ↑
		Cl : [Ne] 3s ↑↓ 3p ↑↓ ↑↓ ↑ =>	Cl : [Ne] $3sp^3$ ↑↓ ↑↓ ↑↓ ↑
CF_4	F above C, F – C – F, F below C	C : [He] 2s ↑↓ 2p ↑ ↑ _ =>	C : [He] $2sp^3$ ↑ ↑ ↑ ↑
		F : [He] 2s ↑↓ 2p ↑↓ ↑↓ ↑ =>	F : [He] $2sp^3$ ↑↓ ↑↓ ↑↓ ↑

Compound	Lewis	"Pure Orbitals"	hybridization
SF_6		S: [Ne] 3s ↑↓ 3p ↑↓ ↑ ↑ 3d _ _ _ _ _ (↑ has access to d orbitals) F: [He] 2s ↑↓ 2p ↑↓ ↑↓ ↑	S: [Ne] $3sp^3d^2$ ↑ ↑ ↑ ↑ ↑ ↑ F: [He] $2sp^3$ ↑↓ ↑↓ ↑↓ ↑
IO_4^-		I: [Kr] $4d^{10}$ 5s ↑↓ 5p ↑↓ ↑↓ ↑ 5d _ _ _ _ _ written out of order so valence orbitals are all together ↳ have to keep the three 5p orbitals for double bonds O: [He] 2s ↑↓ 2p ↑↓ ↑ ↑ ↑ only single bond O: [He] 2s ↑↓ 2p ↑↓ ↑ ↑ ↳ keep back for double bond ↑ w/ double bond	I: [Kr] $4d^{10}5sd^3$ ↑ ↑ ↑ ↑ 5p ↑ ↑ ↑ O: [He] $2sp^3$ ↑↓ ↑↓ ↑ ↑ O: [He] $2sp^2$ ↑↓ ↑↓ ↑ 2p ↑
IF_4^-		I: [Kr] $4d^{10}$ 5s ↑↓ 5p ↑↓ ↑↓ ↑ 5d _ _ _ _ _ F: [He] 2s ↑↓ 2p ↑↓ ↑↓ ↑	I: [Kr] $4d^{10}5sp^3d^2$ ↑↓ ↑ ↑ ↑ ↑ ↑ F: [He] $2sp^3$ ↑↓ ↑↓ ↑↓ ↑

Compound	Lewis	Pure Orbitals	hybridization
SiO_4^{4-}		Si: [Ne] 3s ↿⇂ 3p ↿ ↿ ↿ O: [He] 2s ↿⇂ 2p ↿⇂ ↿ ↿	Si: [Ne] $3sp^3$ ↿ ↿ ↿ ↿ O: [He] $2sp^3$ ↿⇂ ↿⇂ ↿ ↿
AlH_4^-		Al: [Ne] 3s ↿⇂ 3p ↿ _ _ H: 1s ↿	Al: [Ne] $3sp^2$ ↿ ↿ ↿
NH_4^+		N: [He] 2s ↿⇂ 2p ↿ ↿ ↿ H: 1s ↿	N: [He] $2sp^3$ ↿⇂ ↿ ↿ ↿
PCl_3		P: [Ne] 3s ↿⇂ 3p ↿ ↿ ↿ Cl: [Ne] 3s ↿⇂ 3p ↿⇂ ↿⇂ ↿	P: [Ne] $3sp^3$ ↿⇂ ↿ ↿ ↿ Cl: [Ne] $3sp^3$ ↿⇂ ↿⇂ ↿⇂ ↿
ClO_3^-		Cl: [Ne] 3s ↿⇂ 3p ↿⇂ ↿⇂ ↿ 3d _ _ _ _ _ O: [He] 2s ↿⇂ 2p ↿⇂ ↿ ↿	Cl: [Ne] $3sp^3d$ ↿⇂ ↿⇂ ↿ ↿ ↿ O: [He] $2sp^3$ ↿⇂ ↿⇂ ↿ ↿

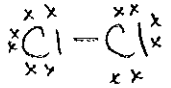
HCl



Cl: [Ne] 3s↿⇂ 3p ↿ ↿ ↿

H: 1s ↿

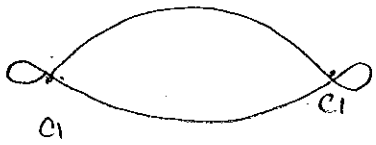
Cl: [Ne] 3sp³ ↿⇂ ↿⇂ ↿⇂ ↿

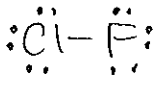
Cl_2 

Cl: [Ne] 3s↿⇂ 3p ↿ ↿ ↿

Cl: [Ne] 3sp³ ↿⇂ ↿⇂ ↿⇂ ↿

Cl: [Ne] 3sp³ ↿⇂ ↿⇂ ↿⇂ ↿



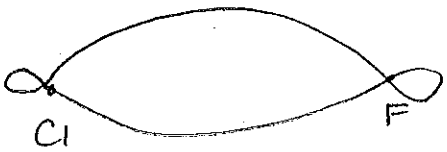
ClF 

Cl: [Ne] 3s↿⇂ 3p ↿ ↿ ↿

F: [He] 2s↿⇂ 2p ↿ ↿ ↿

Cl: [Ne] 3sp³ ↿⇂ ↿⇂ ↿⇂ ↿

F: [He] 2sp³ ↿⇂ ↿⇂ ↿⇂ ↿



$BeCl_2$

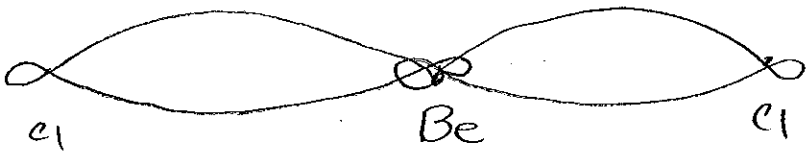
Cl: [Ne] 3s ↿⇂ 3p ↿⇂ ↿ ↿

Be: [He] 2s ↿⇂ 2p – – –

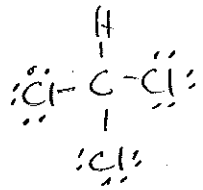
Cl: [Ne] $3sp^3$ ↿⇂ ↿⇂ ↿⇂ ↿

Be: [He] 2sp ↿ ↿

Cl: [Ne] $3sp^3$ ↿⇂ ↿⇂ ↿⇂ ↿



$CHCl_3$



C: [He] 2s ↿⇂ 2p ↿ ↿ –

Cl: [Ne] 3s ↿⇂ 3p ↿⇂ ↿⇂ ↿

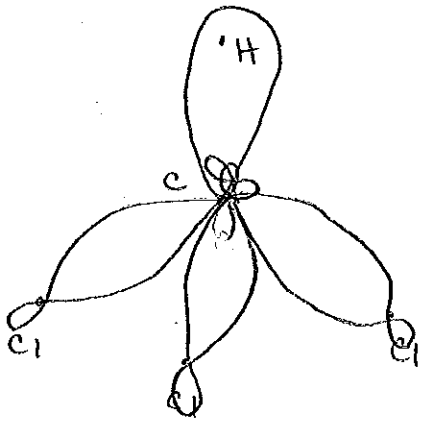
Cl: [Ne] $3sp^3$ ↿⇂ ↿⇂ ↿⇂ ↿

H: 1s ↿

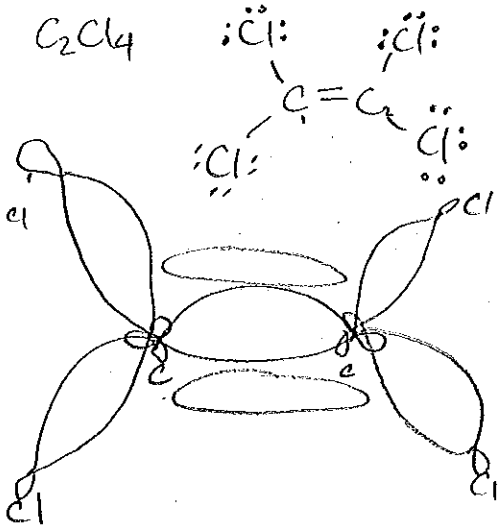
C: [He] $2sp^3$ ↿ ↿ ↿ ↿

Cl: [Ne] $3sp^3$ ↿⇂ ↿⇂ ↿⇂ ↿

Cl: [Ne] $3sp^3$ ↿⇂ ↿⇂ ↿⇂ ↿



C_2Cl_4



C: [He] 2s ↿⇂ 2p ↿ ↿ –

Cl: [Ne] 3s ↿⇂ 3p ↿⇂ ↿⇂ ↿

Cl: [Ne] $3sp^3$ ↿⇂ ↿⇂ ↿⇂ ↿

Cl: [Ne] $3sp^3$ ↿⇂ ↿⇂ ↿⇂ –

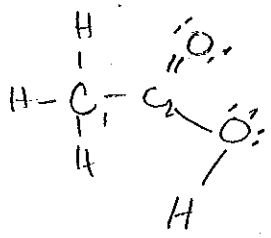
C_1: [He] $2sp^2$ ↿ ↿ ↿ 2p –

C_2: [He] $2sp^2$ ↿ ↿ ↿ 2p ↿

Cl: [Ne] $3sp^3$ ↿⇂ ↿⇂ ↿⇂ ↿

Cl: [Ne] $3sp^3$ ↿⇂ ↿⇂ ↿⇂ ↿

CH_3COOH



C: [He] 2s ↑↓ 2p ↑ ↑ –

O: [He] 2s ↑↓ 2p ↑↓ ↑ ↑

H: 1s ↑

H: 1s ↑

H: 1s ↑

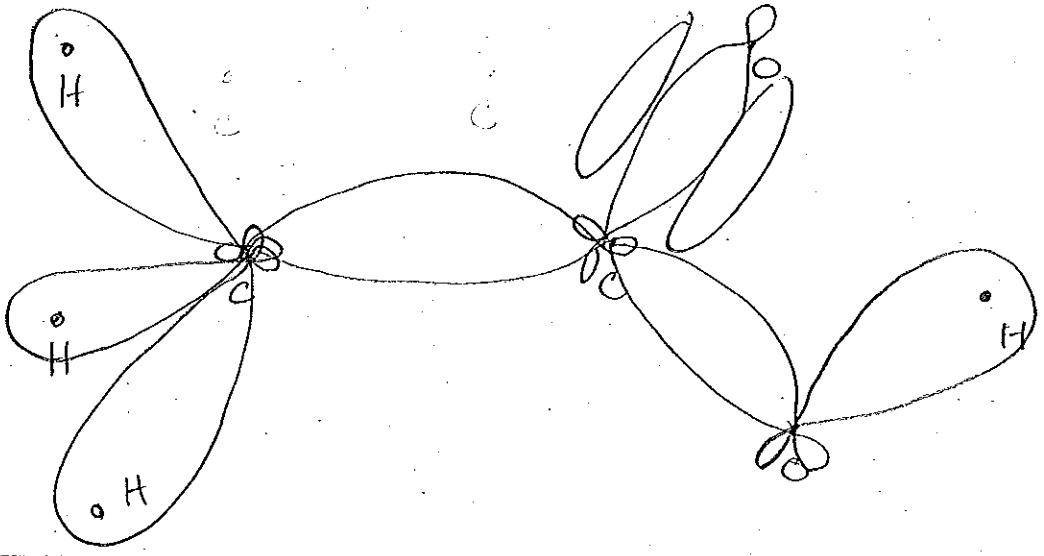
C_1: [He] $2sp^3$ ↑ ↑ ↑ ↑

C_2: [He] $2sp^2$ ↑ ↑ ↑ 2p ↑

O: [He] $2sp^2$ ↑↓ ↑↓ 2p ↑

O: [He] $2sp^3$ ↑↓ ↑↓ ↑ ↑

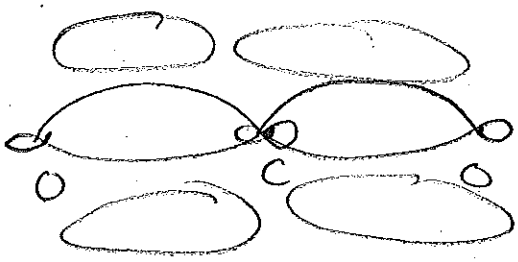
H: 1s ↑



CO_2 $\ddot{O}=C=\ddot{O}$

C: [He] 2s ↑↓ 2p ↑ ↑ –

O: [He] 2s ↑↓ 2p ↑↓ ↑ ↑

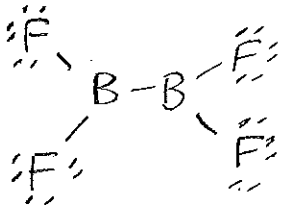


O: [He] $2sp^2$ ↑↓ ↑↓ ↑ 2p ↑

C: 2sp ↑ ↑ 2p ↑ ↑

O: [He] $2sp^2$ ↑↓ ↑↓ ↑ 2p ↑

B_2F_4



B : [He] 2s 2p

F : [He] 2s 2p

F : [He] $2sp^3$

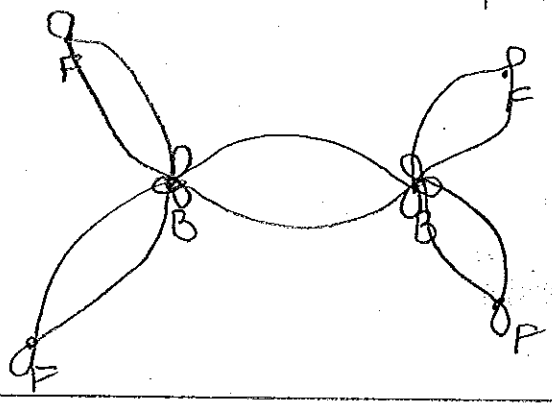
F : [He] $2sp^3$

B : [He] $2sp^2$

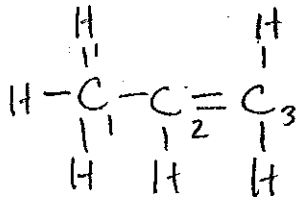
B : [He] $2sp^2$

F : [He] $2sp^3$

F : [He] $2sp^3$



$CH_3CH=CH_2$



C : [He] 2s 2p

H : 1s

H : 1s

H 1s

C_1 : [He] $2sp^3$

C_2 [He] $2sp^2$

C_3 [He] $2sp^2$

2p

2p

H 1s

H : 1s

H : 1s