

Announcements – Lecture XVII – Tuesday, June 16th

1. Fifth Lab:

Today, ISB 155 B

(The last set of Lab Owls)

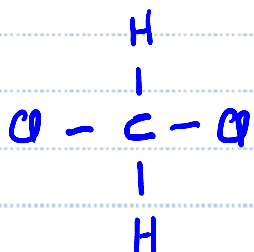


Quiz 13

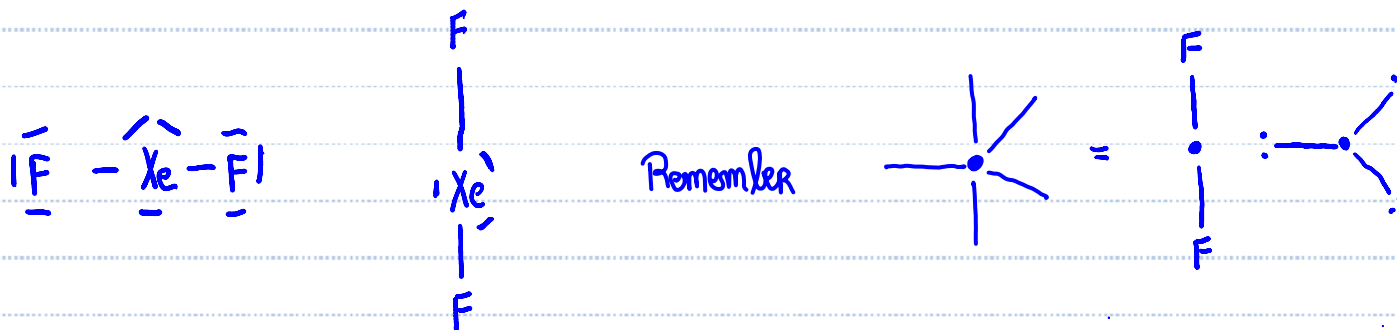
Class #: _____

Last Name: _____

1. Label the following molecules as **polar** or **nonpolar**



a) CH_2Cl_2 Polar



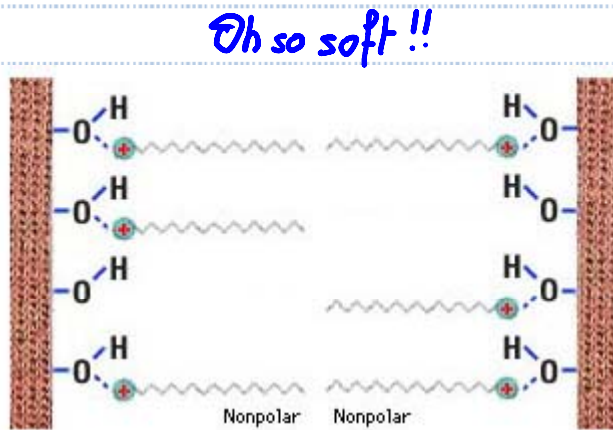
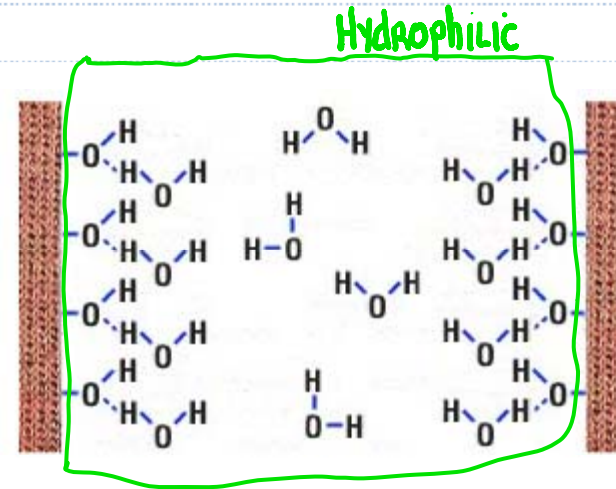
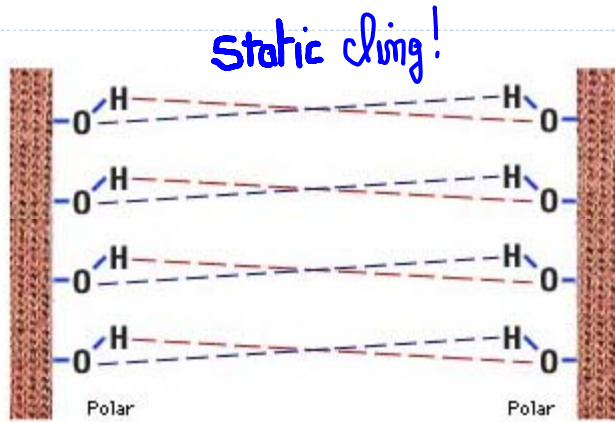
b) XeF_2 Non polar



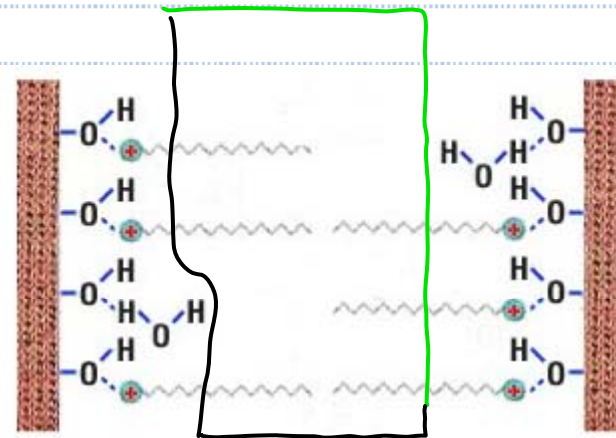
8.6

Molecular Polarity

Some Consequences of Molecular Polarity – Fabric Softener



Fabric softener

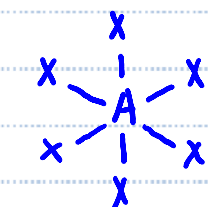
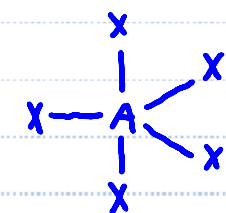
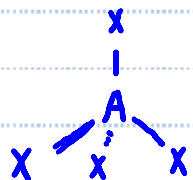
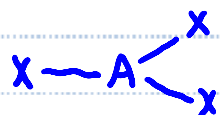


We use lotions for ?

9.2 Hybrid Orbitals

A: Hybridization

Electron Pair
Geometry



Equivalent
Orbitals Needed

2

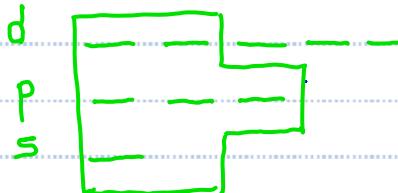
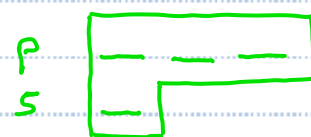
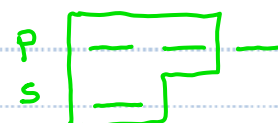
3

4

5

6

Valence Orbitals
Available



Hybrid Orbitals

2 x sp orbitals

3 x sp^2 orbitals

4 x sp^3 orbitals

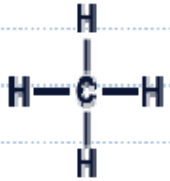
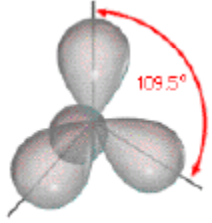
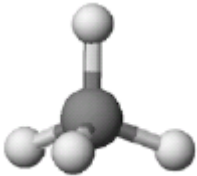
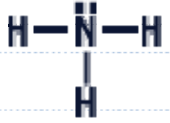
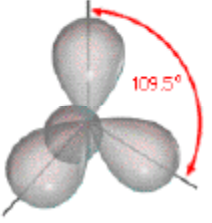


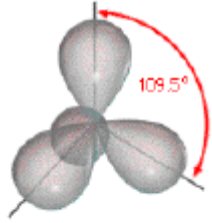
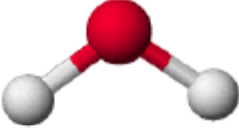
5 x sp^3d orbitals

6 x sp^3d^2 orbitals



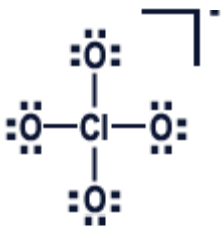
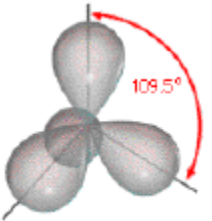
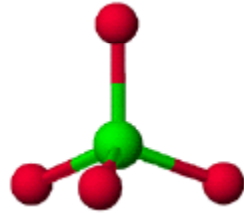
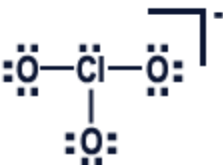
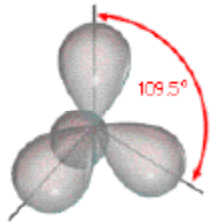
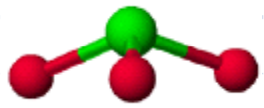
9.2 Hybrid Orbitals

B: sp^3 Hybridization

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Hybridization
CH_4 	AX_4E_0	 <p>Tetrahedron</p>	 <p>Tetrahedron</p>	sp^3
NH_3 	AX_3E_1	 <p>Tetrahedron</p>	 <p>Trigonal pyramid</p>	sp^3
H_2O 	AX_2E_2	 <p>Tetrahedron</p>	 <p>Bent/Angular 109°</p>	sp^3

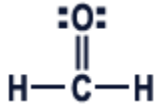
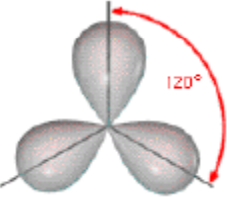
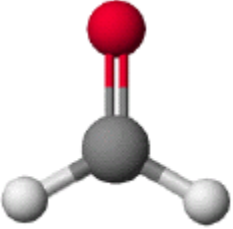
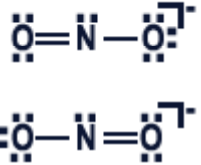
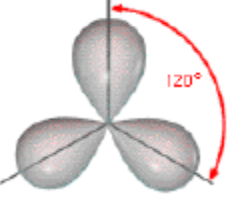
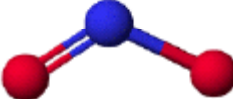
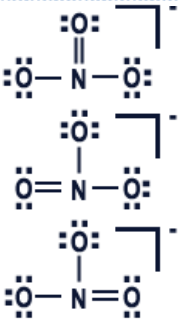
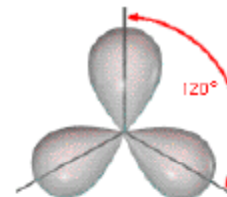
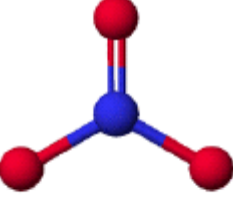
9.2 Hybrid Orbitals

B: sp^3 Hybridization

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Hybridization
ClO_4^- 	AX_4E_0	 Tetrahedron	 Tetrahedron	sp^3
ClO_3^- 	AX_3E_1	 Tetrahedron	 Trigonal pyramid	sp^3

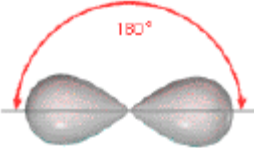

9.2 Hybrid Orbitals

C: sp^2 Hybridization

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Hybridization
H_2CO 	AX_3E_0	 <p>Trigonal Planar</p>	 <p>Trigonal Planar</p>	sp^2
NO_2^- 	AX_3E_1	 <p>Trigonal Planar</p>	 <p>Bent/Angular 120°</p>	sp^2
NO_3^- 	AX_3E_0	 <p>Trigonal Planar</p>	 <p>Trigonal Planar</p>	sp^2


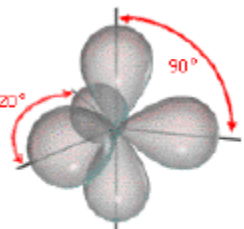

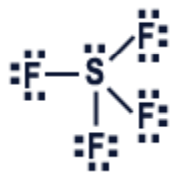
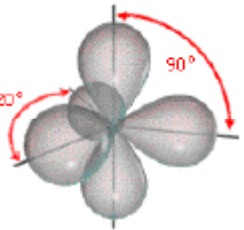

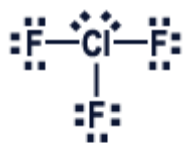
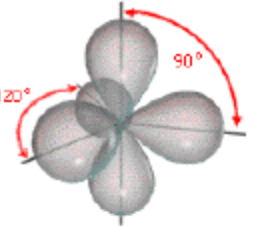
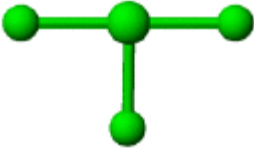
9.2 Hybrid Orbitals

D: sp Hybridization

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Hybridization
HCN H—C≡N:	AX₂E₀	 Linear	 Linear	sp


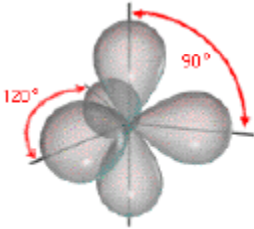

9.2 Hybrid Orbitals

E: sp^3d Hybridization

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Hybridization
PF_5 	AX_5E_0	 <p>Trigonal Bipyramid</p>	 <p>Trigonal Bipyramid</p>	sp^3d
SF_4 	AX_4E_1	 <p>Trigonal Bipyramid</p>	 <p>Seesaw</p>	sp^3d
ClF_3 	AX_3E_2	 <p>Trigonal Bipyramid</p>	 <p>T-shaped</p>	sp^3d


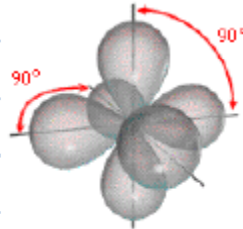
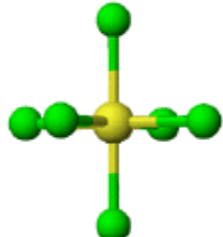

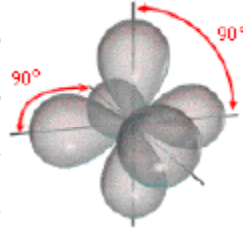
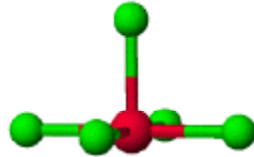

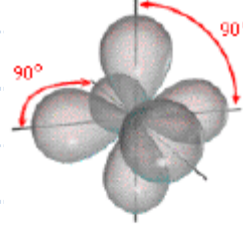

9.2 Hybrid Orbitals

E: sp^3d Hybridization

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Hybridization
XeF_2 	AX_2E_3	 Trigonal Bipyramid	 Linear	sp^3d

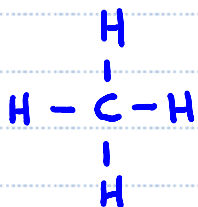
9.2 Hybrid Orbitals

F: sp^3d^2 Hybridization

Lewis Structure	Class	Electron Pair Geometry	Molecular Geometry	Hybridization
SF_6 	AX_6E_0	 Octahedron	 Octahedron	sp^3d^2
BrF_5 	AX_5E_1	 Octahedron	 Square Pyramid	sp^3d^2
XeF_4 	AX_4E_2	 Octahedron	 Square Planar	sp^3d^2

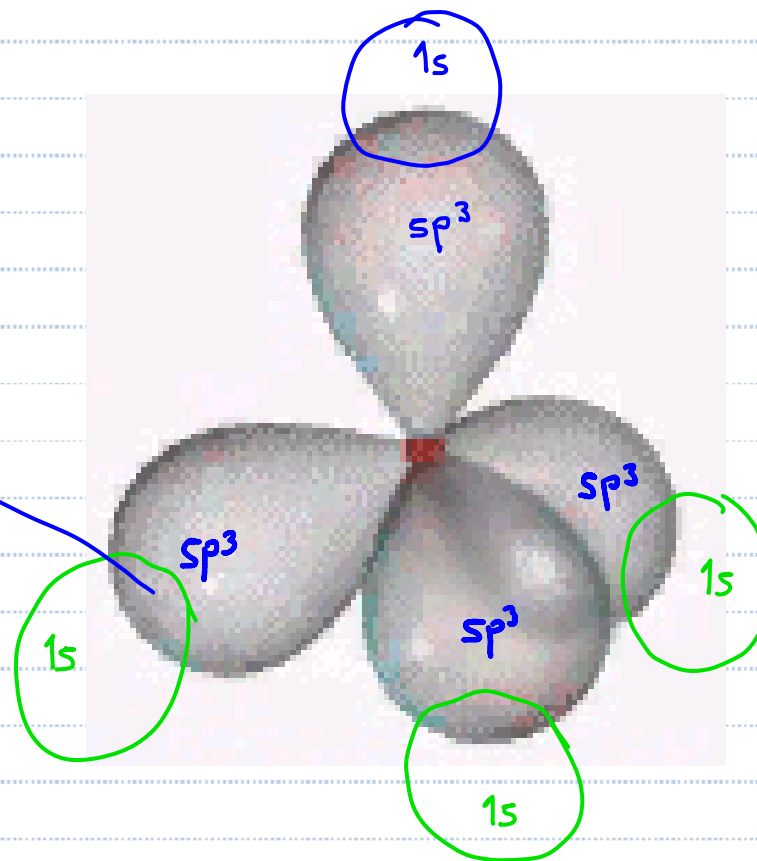
9.3 Pi Bonds

Sigma Bonds – CH₄



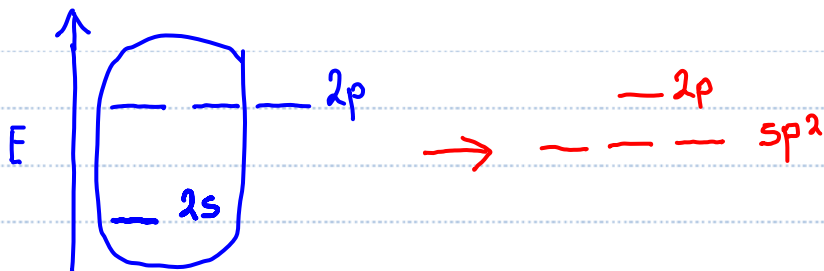
AX₄E₀ sp³ hybrid orbitals

Sigma bond formed by the overlap of an sp³ hybrid orbital on C with the 1s orbital on H.

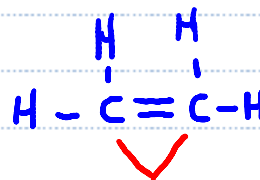


9.3 Pi Bonds

B: Sigma Bonds - C₂H₄

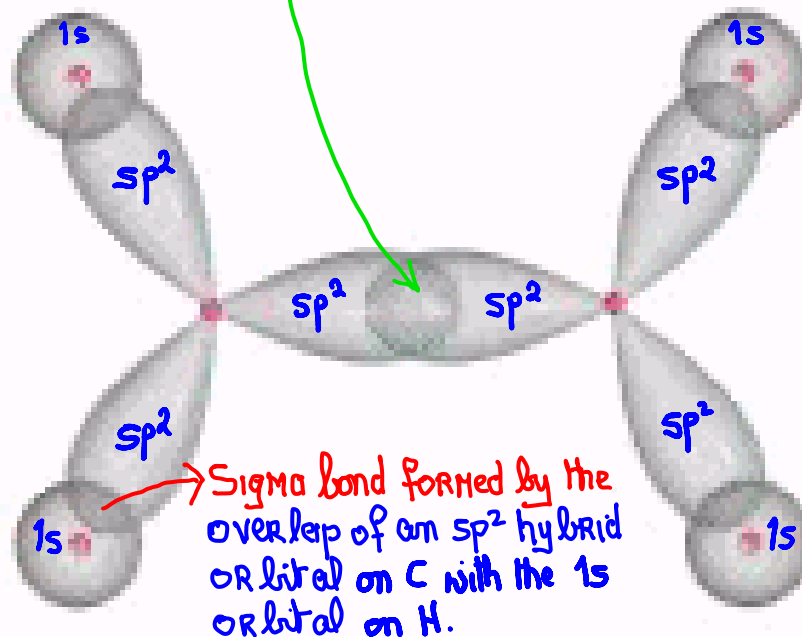


For both carbon atoms



AX₃E₀ ... Trigonal planar ... sp²

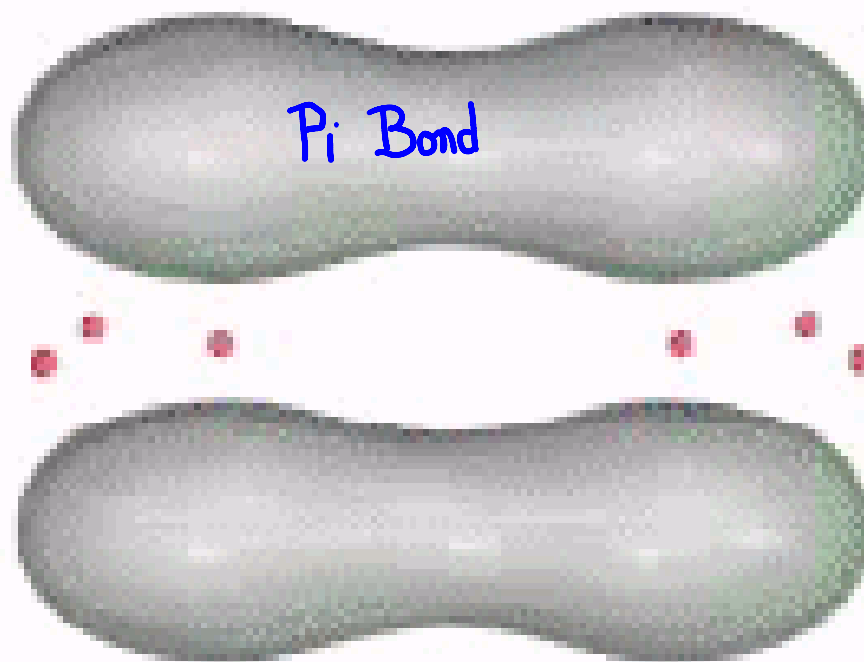
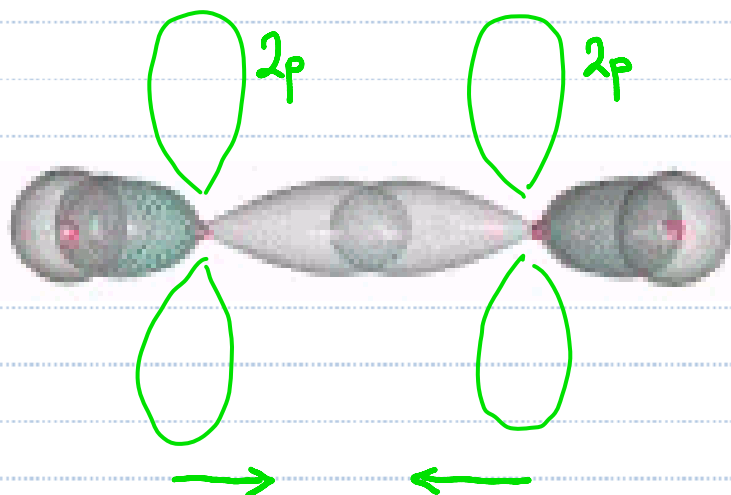
Sigma bond formed by the overlap of an sp² hybrid orbital on each of the carbon atoms.



Sigma bond formed by the overlap of an sp² hybrid orbital on C with the 1s orbital on H.

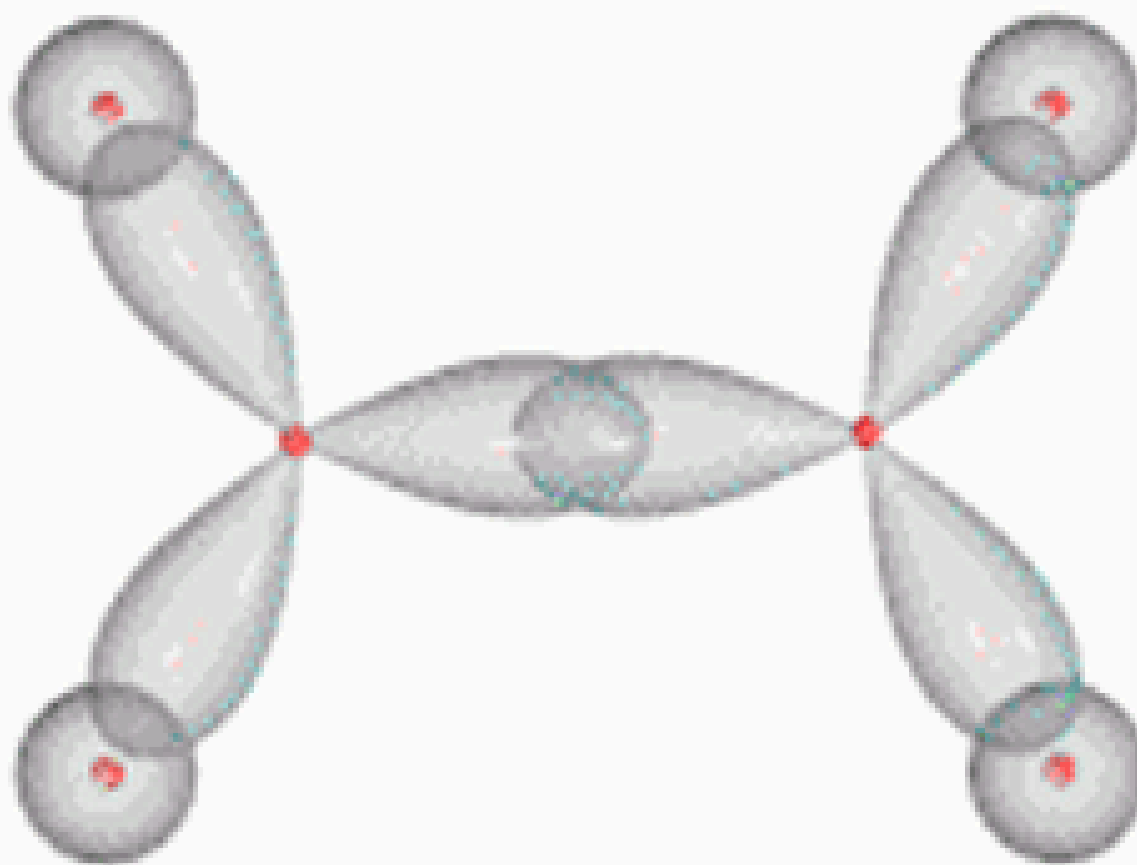
9.3 Pi Bonds

B: Pi Bonds – C₂H₄



9.3 Pi Bonds

B: Sigma and Pi Bonds – C₂H₄



Sigma Bonds Only