

Name: _____

Lab Section: 1 2 3 4 5 6 7 8

Report: The Hybrid and Molecular Orbital Models

Hybrid Orbital Model

1. Draw a Lewis structure for each compound. On the structure, indicate the **bond types** (σ , π) for each bond. Identify the **shape** of the molecule (*e.g.* bent) and state the **bond angles** (*e.g.* 109.5°). Then identify the atomic or hybrid **orbitals** (s , p , sp , sp^2 , sp^3) on each atom.

a. CH_3F

Shape: _____

Bond angle(s): _____

Orbital(s) on C: _____

Orbital(s) on H: _____

Orbital(s) on F: _____

b. COCl_2

Shape: _____

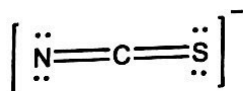
Bond angle(s): _____

Orbital(s) on C: _____

Orbital(s) on O: _____

Orbital(s) on Cl: _____

c. NCS^- (label bond types only)



Shape: _____

Bond angle(s): _____

Orbital(s) on N: _____

Orbital(s) on C: _____

Orbital(s) on S: _____

Molecular Orbital Model

3. Draw the molecular orbital energy level diagram for the following substances, and complete the table entries for the ground state molecular orbital electron configuration, bond order, and magnetism.

Molecule	Energy Level Diagram (including each atom's energy levels)		
a. N_2			
Molecular orbital electron config.:			
Bond Order:		Paramagnetic or diamagnetic?	

b. N_2^+			
Molecular orbital electron config.:			
Bond Order:		Paramagnetic or diamagnetic?	

- d. Based on the bond orders of N_2 and N_2^+ , which has the stronger bond? _____

Molecule	Energy Level Diagram (including each atom's energy levels)		
c. Ne_2			
Molecular orbital electron config.:			
Bond Order:		Paramagnetic or diamagnetic?	

f. Based on the bond order, is the Ne_2 molecule likely to exist? Circle the correct answer.

Yes, it should exist

No, it probably does not exist

g. CN^-			
Molecular orbital electron config.:			
Bond Order:		Paramagnetic or diamagnetic?	