

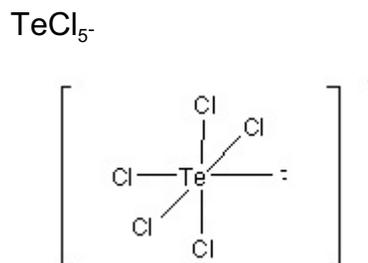
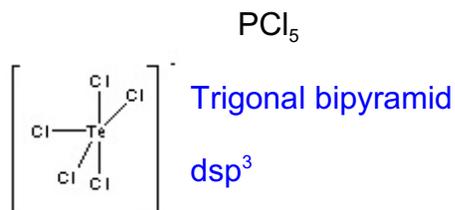
Name: _____

(4 points)

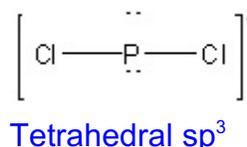
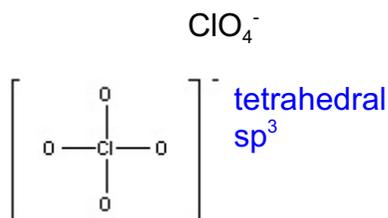
Chemistry 114 First Hour Exam

Remember- Show all work for partial credit. Each problem is worth 12 points.

1. Below are four compounds. For each compound: A.) Write a Lewis structure. B.) Give the electron geometry around the central atom, and. C.) Give the hybridization of the central atom.



Octahedral d^2sp^3
 PCl_2^-



(For clarity 3 lone pairs of electrons on each outer atoms are not shown)

2. Below is the structure of Prednisolone.

A.) Complete this structure by showing all lone pairs of electrons.

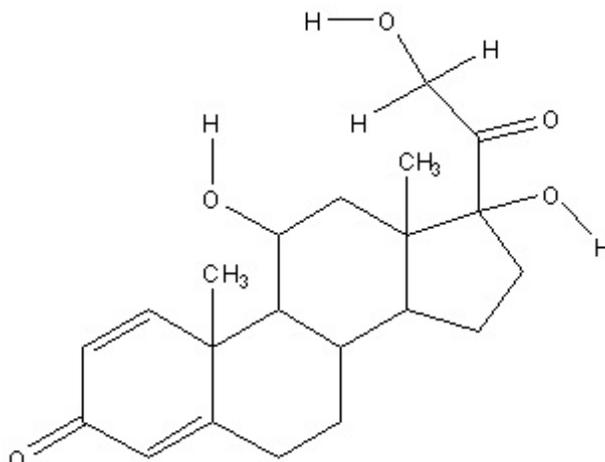
Each oxygen should have 2 lone pairs of electrons

B.) How many carbons in this structure are sp hybridized? 0

C.) How many carbons in this structure are sp^2 hybridized? 6

D.) How many carbons in this structure are sp^3 hybridized? 15

E.) Is this compound polar or nonpolar? Non-polar

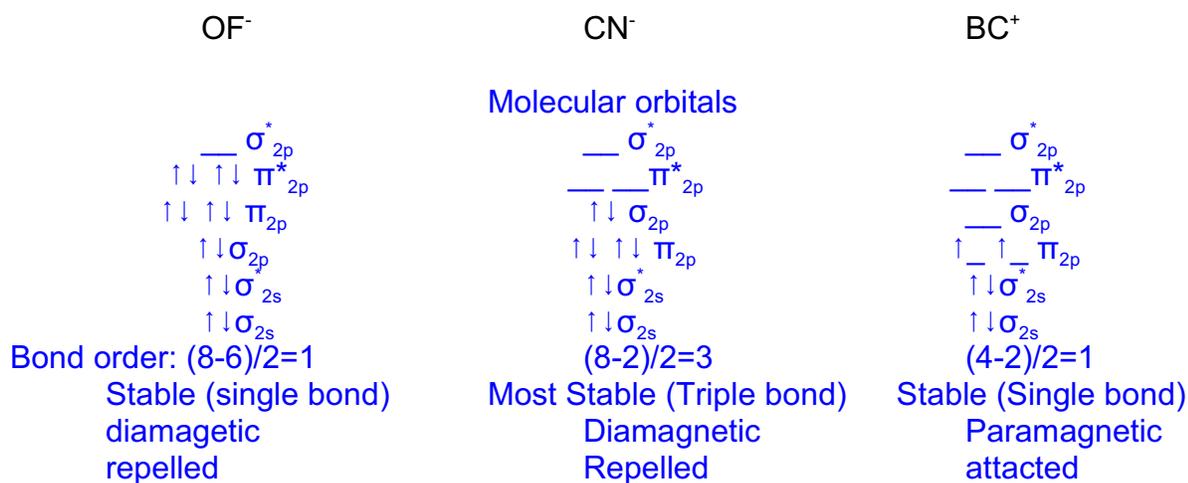


3. Below are some diatomic molecules that may or may not exist. Use the molecular orbital theory to:

A.) Calculate bond order.

B.) Predict relative stability.

C.) Predict is if the compound is attracted to or repelled from a magnetic field.



4. Define the following terms:

Diamagnetic Not attracted to a magnetic field because all electrons are paired.

Anti-bonding orbital An orbital that, when occupied, destabilizes a molecules.

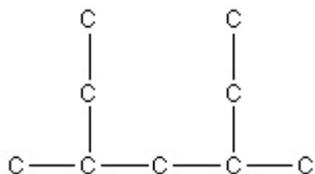
Sigma (σ) bond A bond where the electron region is along a line that connects the atoms.

Bond order $(\# \text{ bonding electrons} - \# \text{ non bonding electrons})/2$
A simple calculation that determines the relative strength of a molecular orbital.

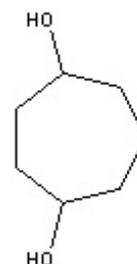
dsp³ hybridized orbital A set of 5 orbitals arranged in a trigonal bipyramid that arises when an s, 3 p and 1 d atomic orbitals are fused together.

5. Below are the names of four organic molecules. Draw the structures of these molecules. Double check the names. If the names are incorrect give the proper name for this molecule.

2,4-Diethylpentane



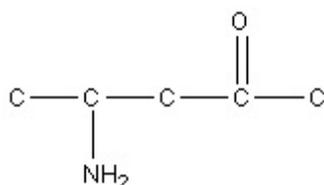
1,5-Dihydroxycycloheptane



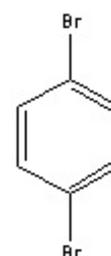
3,5-Dinethylheptane

1,4-Dihydroxycycloheptane

2-Amino-4-pentanone



p-Dibromobenzene

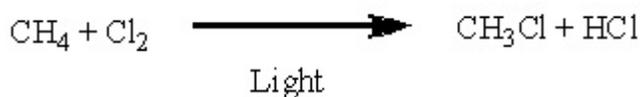


4-Amino-2-pentanone

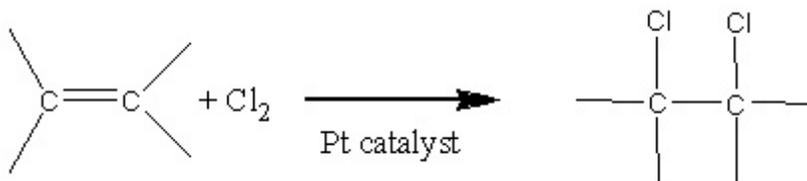
1,3-Dibromobenzene

6. Show the chemical reaction (including reactants or catalysts) used to make:

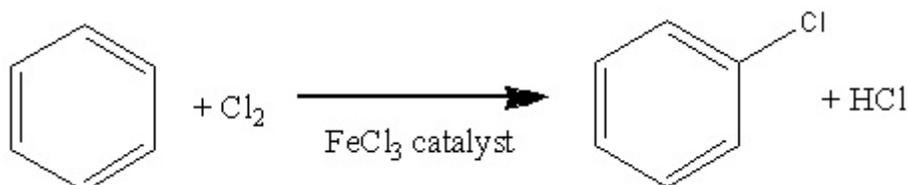
CH₃Cl from CH₄



CH₂Cl-CH₂Cl from C₂H₄

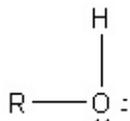


C₆H₅Cl from C₆H₆

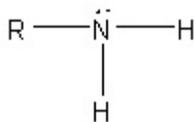


7. Draw a Lewis structure (including lone pairs of electrons) for each of the following functional groups

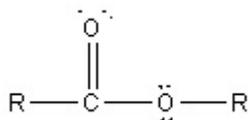
Alcohol



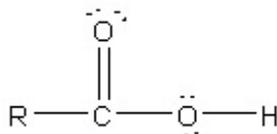
Amine



Ester



Carboxylic Acid



8. Define the following terms:

Structural isomer

Two compounds with the same empirical formula but different structures and physical properties.

Polymers

Large complicated molecules composed of smaller repeated units called monomers.

Addition reaction

A reaction where two or more atoms are added to a molecule to replace a double (or triple) bond.

PAH

Polycyclic Aromatic Hydrocarbon

Unsaturated Hydrocarbon

A hydrocarbon that contains double or triple bonds.

HDPE

High Density PolyEthylene