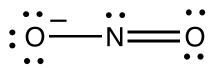
Name ____________________________ | Test 1
PHYS 0203 (Organic) | Fall 2005

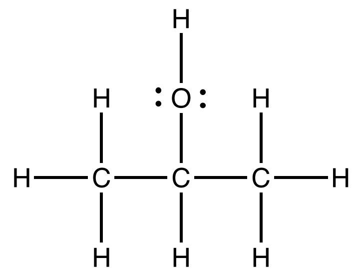
1. ______
2. ______
3. ______
4. ______
5. ______
6. ______
7. ______
8. ______
9. ______

1. (6 pts. ea.) Draw Lewis structures for the following molecules

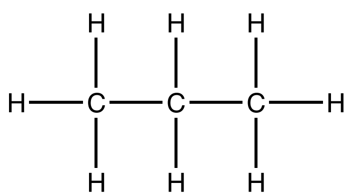
a. NO_2^- (include formal charges)



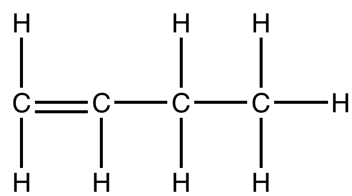
b. $CH_3C(OH)HCH_3$



c. $CH_3CH_2CH_3$

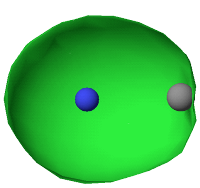


d. $H_2CCHCH_2CH_3$



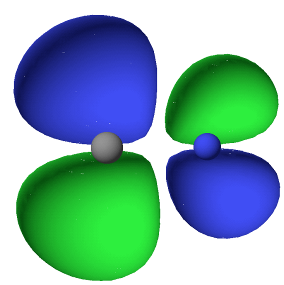
2. (4 pts. ea.) Determine (a) the symmetry of the following orbitals (σ or π) and (b) whether the orbitals are bonding or antibonding.

i.



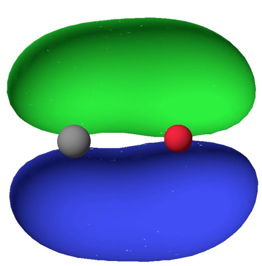
σ bonding

ii.



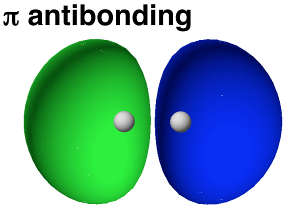
π antibonding

iii.



π bonding

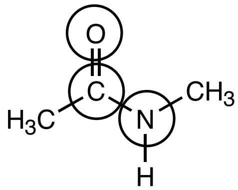
iv.



σ antibonding

3. (12 pts.) Determine the hybridization of each of the circled atoms.

a.

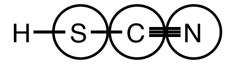


O **sp^2**

C **sp^2**

N **sp^3**

b.



S **sp^3**

C **sp**

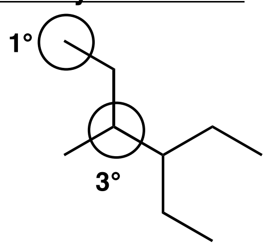
N **sp**

4. a. (8 pts.) Determine the IUPAC name for each of the following molecules

b. (8 pts.) Determine whether the circled C atoms are 1°, 2°, or 3°.

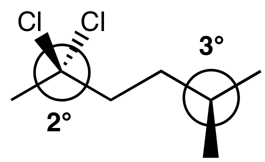
i.

3-ethyl-4-methylhexane



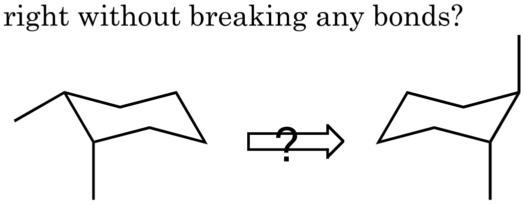
ii.

2,2-dichloro5-methylhexane



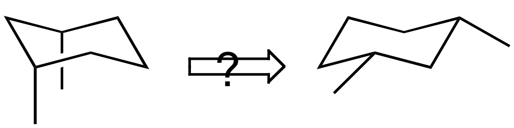
5. (8 pts.) Can the dimethylcyclohexane on the left be converted to the dimethylcyclohexane on the right without breaking any bonds?

a.



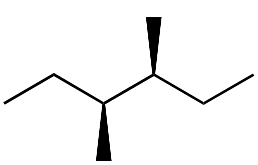
NO

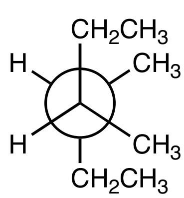
b.



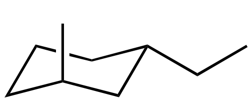
YES

6. (6 pts.) Draw a Newman projection down the C_3 to C_4 bond of the 3,4-dimethylhexane drawn below.

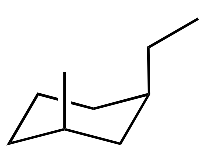




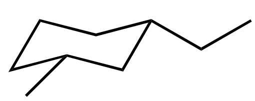
7. (8 pts.) Order the following disubstituted cyclohexanes in order of increasing stability.



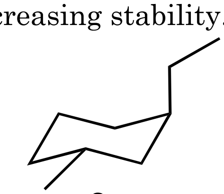
3



1

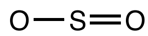


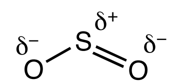
4



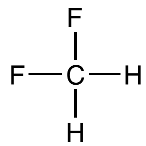
2

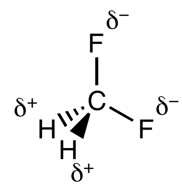
8. a. (3 pts. ea.) Draw three dimensional representations (wedge and dash structures) for the following molecules, (b. 2 pts. ea.) indicate the presence of polar bonds using the δ^+ and δ^- notation, and (c. 2 pts. ea.) determine which, if any, of the molecules is polar. Kekulé structures are provided.

a. 

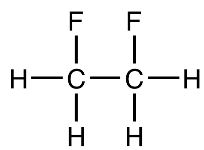


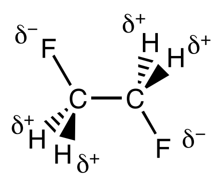
polar

b. 

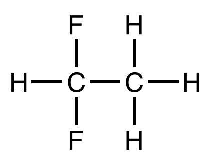


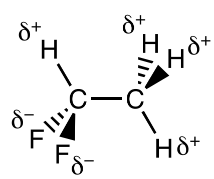
polar

c. 



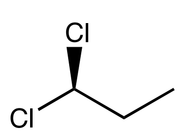
non-polar

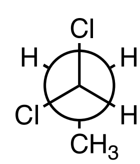
d. 



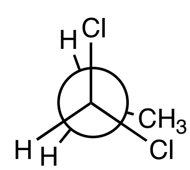
polar

9. (10 pts.) Draw Newman projections for the lowest and highest energy structures of 1,1-dichloropropane.





lowest



highest