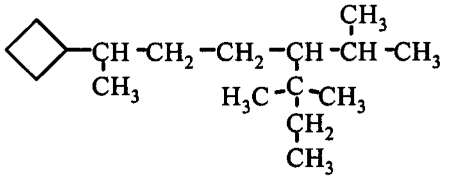
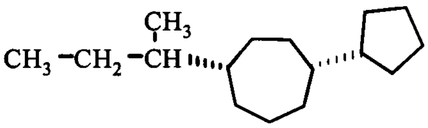
Ch 334 - Exam 1
October 23, 2002 Name (please print)________________________________

Note: An abbreviated periodic chart and selected electronegativities are given on the last page.

1. (12) Give acceptable names for the following, including cis/trans labels where appropriate.

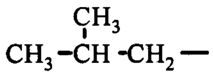
a) 

b) 

a)________________________________

b)________________________________

2. (6) Name the following alkyl group two ways.



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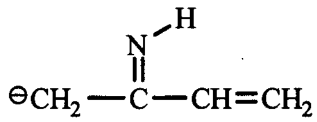
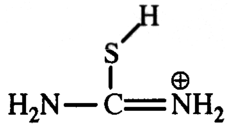
3. (10) Give Lewis structures for the following, including formal charges where appropriate. Ignore resonance possibilities.

a) O_3 (ozone)

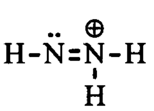
b) LiH_2PO_4 (lithium dihydrogen phosphate)

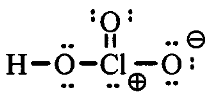
4. (12) Complete the following Lewis structures by *adding unshared electrons* (if any), then write all other *reasonable resonance structures* (if any). Use *electron pushing* to interconnect them and use the resonance arrow.

a) 

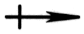
b) 

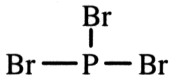
5. (10) Clearly sketch the geometric shapes of the species whose Lewis structures are given. Give the names of the shapes created *by the atomic nuclei*. There may be more than one place that needs naming.

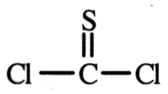
a) 

b) 

5. a) (4) Using the *electronegativity values on the next page*, indicate (using the arrow/cross symbol shown below) all bonds that are polarized *to any degree*. (Unshared electrons and correct geometry are not shown.)



i) 

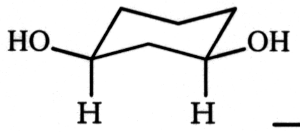
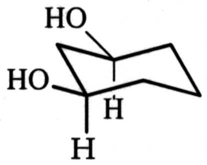
ii) 

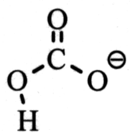
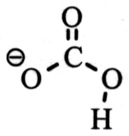
b) (4) Indicate whether or not the molecule has a *net dipole moment.*

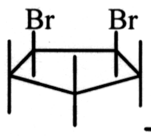
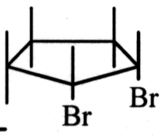
i) yes _____ no _____ ii) yes _____ no _____

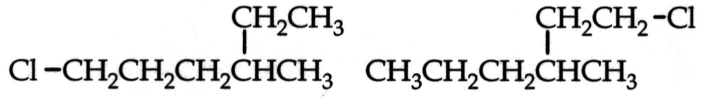
7. (12) Using partially condensed formulas of the type shown in problem 1a, show all of the structural isomers of $C_5H_{11}F$.

8. (8) Four pairs of related structures are given below. Indicate the relationship within each pair as either A, B, C, D, E or F, representing one of the following: A = structural isomers B = resonance forms C = conformational isomers D = stereoisomers E = identical F = none of these

 _____ 

 _____ 

 _____ 

 _____

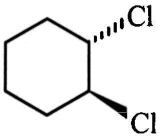
9. (8) In the spaces below, sketch the arrangement of orbitals around an atom corresponding to the degree of hybridization indicated *Label the orbitals* in your drawings, and do not show any electrons. Your drawings should show the geometry of the orbitals clearly.

sp^2 hybridized

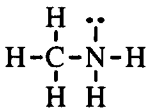
sp hybridized

10. a) (2) The tetrahedral arrangement of four single bonds around a carbon atom is referred to as its ______________________________. b) (2) Mad cow disease and related human diseases are thought to result when a certain protein molecule flexes to change the arrangement of its parts without changing the connectivity pattern of its covalent bonds. This kind of change is called a change in ________________________________.

11. (8) Carefully draw the *most stable chair form* of the molecule shown below. Draw only one form. Clearly show *all bonds* on the ring, including the C-H bonds in their correct orientation.

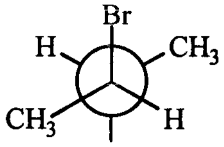


12. (9) A molecule like CH_3–NH_2 can have staggered and eclipsed rotational isomers because the bond angles about nitrogen are close to the tetrahedral angle. Assuming that the unshared pair of electrons on nitrogen behaves like a bonding pair (see below), draw the indicated rotational isomers of this molecule.



dash/wedge staggered	sawhorse staggered	sawhorse eclipsed

13. (9) One of the conformers of CH_3CHBr-$CHBrCH_3$ is shown below in Newman projection. In spaces a) and b), redraw the *same conformer* as a dash/wedge structure and in sawhorse projection. In space c), draw *any different* conformer of this same molecule (sawhorse).



a) dash/wedge	b) sawhorse	c) sawhorse

Selected Electronegativities

H 2.1						
Li 1.0	**Be** 1.5	**B** 2.0	**C** 2.5	**N** 3.0	**O** 3.5	**F** 4.0
Na 0.9	**Mg** 1.2	**Al** 1.5	**Si** 1.8	**P** 2.1	**S** 2.5	**Cl** 3.0
K 0.8						**Br** 2.8
						I 2.5