First Exam

Name (PRINT) _____
LAST, First

Chemistry 3331

Signature _____

September 21, 2007

ID# _____

PLEASE CIRCLE CLASS TIME!!!!!!!!!!!!!!!!!!!!

10:00 AM

1:00 PM

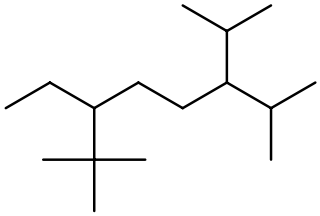
4:00 PM

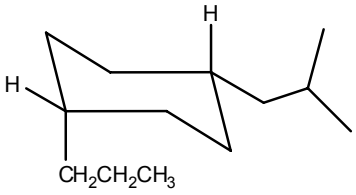
Page #	Score	
1. 16 pts.		
2. 26 pts.		
3. 22 pts.		
4. 16 pts.		
5. 20 pts.		

Total: _____

NOTE: Present your student ID when you return the exam booklet.

1. Give an acceptable IUPAC name for each of the compounds in a-c. Draw the structure of the compound in d. Be sure to indicate **stereochemistry** where appropriate. (16 points)

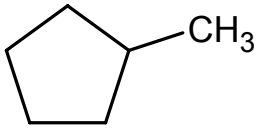
a. 

b. 

c. $(CH_3CH_2)_2CH(CH_2)_4C(CH_2CH_3)_3$

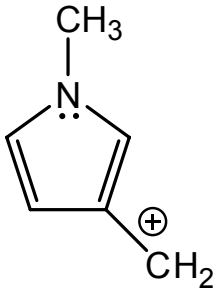
d. 4-methyl-5-tert-pentylnonane

2. Draw all structural and geometric (cis/trans) isomers resulting from the monochlorination of methylcyclopentane (shown below). Place geometric isomers next to each other and circle them. (NOTE: There must be TWO structures in any circles drawn.) You will be penalized for duplicate structures. (14 points)

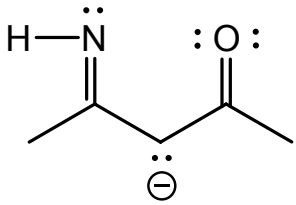


3. For each structure given, draw the important resonance contributors. Circle the major contributor.
(12 points)

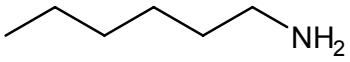
a.



b.



4. Place the following compounds in order of increasing boiling point. (1=lowest, 3=highest)(6 points)



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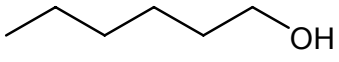

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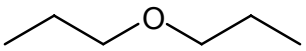

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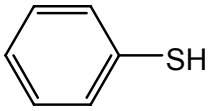
5. Place the following compounds in order of increasing acidity. (1=least acidic, 3=most acidic)(6 points)



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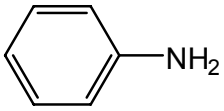

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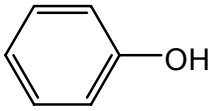

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6. Label the molecules below as polar (P) or nonpolar (N). (4 points)

$Be(OH)_2$

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CF_3Br

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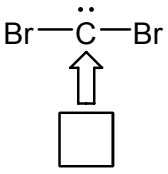
7. Calculate the formal charges for the indicated atoms (6 points)



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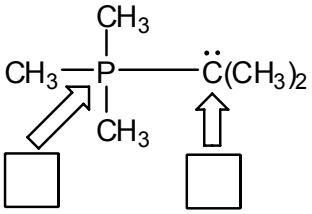

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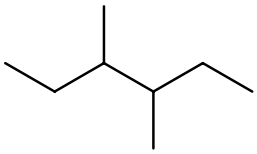
8. Viewing the molecule along the C3-C4 bond, construct the Newman projection of the least stable confirmation of 3,4-dimethylhexane. Calculate the strain energy of this conformation using the values given. (6 points)

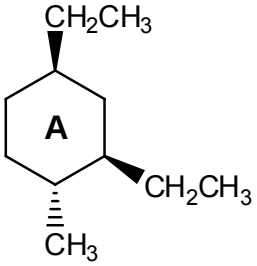


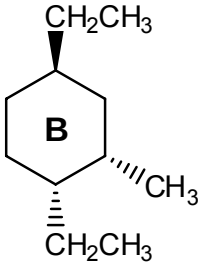
Newman projection:

strain energies:
H,H eclipsing = 1.0 kcal/mol
CH_3, H eclipsing = 1.3 kcal/mol
CH_3,CH_3 eclipsing = 3.0 kcal/mol
CH_3CH_2, CH_3CH_2 eclipsing = 4.0 kcal/mol
CH_3CH_2, CH_3 eclipsing = 3.5 kcal/mol
CH_3CH_2, H eclipsing = 1.7 kcal/mol
CH_3,CH_3 gauche = 0.9 kcal/mol
CH_3CH_2, CH_3CH_2 gauche = 1.3 kcal/mol
CH_3CH_2, CH_3 gauche = 1.1 kcal/mol

calculation:

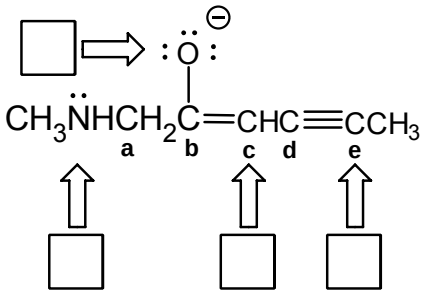
9. a. Draw the more stable chair confirmation for each of the diethylmethylcyclohexanes shown below. (8 points)





b. Which isomer is more stable? A or B? (2 points)

10. Consider the structure below and answer the following questions.

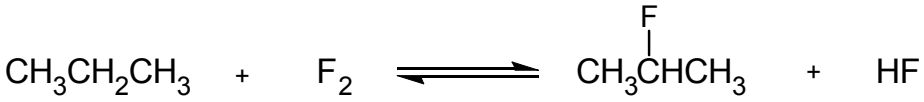


a. Write the hybridization of each atom indicated by an arrow in the box provided. (8 points)

b. What is the C_c-C_d-C_e bond angle? (2 points)

c. The sigma bond between the atoms labeled **a** and **b** is formed by the overlap of what kinds of orbitals. Be specific. (2 points)

11. Consider the following reaction:



a. Given the bond dissociation energies given in the table at the end of the exam, calculate the overall ΔH° in the box provided. You must show you work. (6 points)

b. Are the products or reactants favored at equilibrium? (2 points)