

Chemistry 116 Sec. A (8:00-8:50)
Exam No. 1
“Structure and Functionality”
September 28, 2001

Instructions: You will have 50 min. to complete the exam. At the 50 min. mark, I will request that all remaining test takers cease writing, turn their exams over, and pass them to their rightmost isle. If you finish within 45 min. you may turn in the exam at the front of the room prior to leaving. If you finish in the final 5 min. of class, please turn your exam over and remain seated until I call for the remaining exams to be turned in. *In fairness to all, anyone still working on the exam after “time” is called will receive a grade of zero!*

Be sure to read the instructions for each question. It may be helpful to skim the entire exam and solve the easier questions first.

Exam Agreement: I, _____, have read and agree to

(Please print)

abide by the instructions above. On my honor, I have neither given nor accepted any help during this exam.

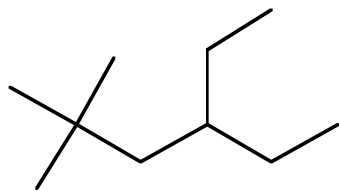
Signature: _____

College: _____

**DO NOT OPEN THIS EXAM UNTIL
INSTRUCTED TO DO SO**

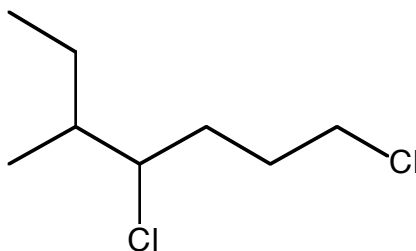
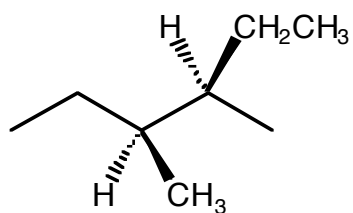
1) Provide names or structures as indicated below:

Condensed Structural Formula (6 points)



Name the molecule shown above (4 points)

Draw the most stable **Newman Projection** of the molecule below viewed down the most appropriate bond. (6 points)

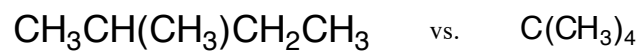


Provide a name (IUPAC or common) for the molecule shown above (6 points)

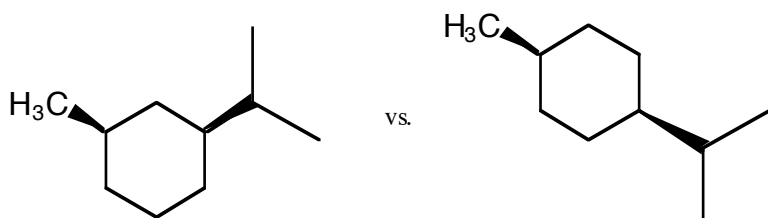
2) For each pair of molecules shown below, select the one that best fits the accompanying description by circling it. Provide a concise but thorough rationale for each of your decisions using pictures *and* words. (8 points each)

Rationale

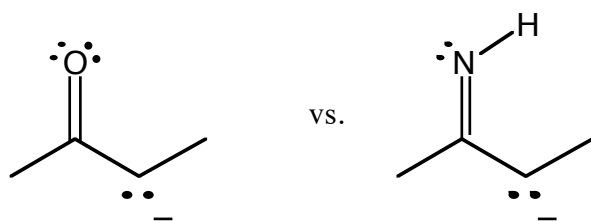
The molecule with the highest boiling point?



The lower energy molecule?

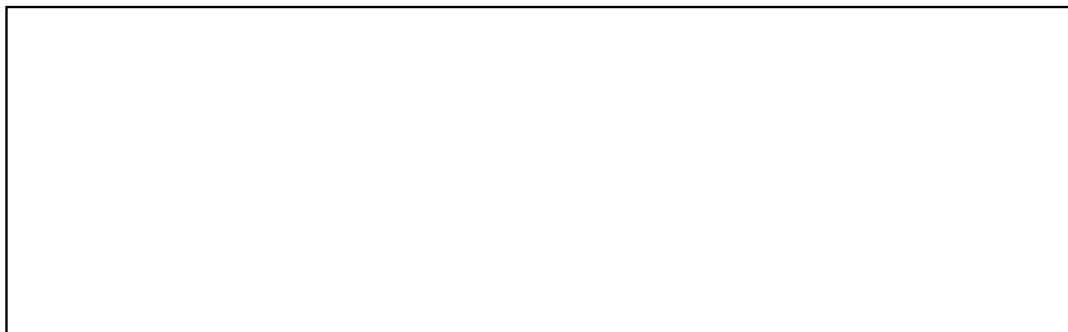


The strongest base?




- 3) Draw all valid resonance structures (ones in which the overall net charge equals zero) for CH_2NNH_2 in the box provided. Then answer the questions that follow.

Resonance Structures for CH_2NNH_2 (8 points)



A) Circle the major contributor to the resonance hybrid. (4 points)

B) Draw the *orbital picture* for the major contributor in the box below. For full credit, label all orbitals, bond types, and bond angles. You will be judged on the 3-dimensional accuracy of your drawing. (8 points)



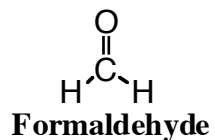
C) How many H-bond donor sites exist in the major resonance contributor? _____ (3 points)

D) How many H-bond acceptor sites exist in the major resonance contributor? _____ (3 points)

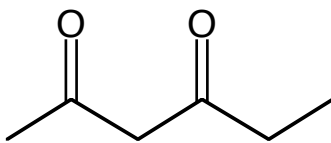
E) Which of the following descriptions apply to the major resonance contributor? Circle all that apply. (8 points)

- | | |
|---------------------------|--------------------------------|
| i) contains a 1° carbon | ii) contains a 2° carbon |
| iii) contains a 3° carbon | iv) contains a methylene group |
| v) is insoluble in water | vi) is soluble in water |
| vii) can act as an acid | viii) can act as a base |

- 4) Draw the MO energy diagram for formaldehyde. Be sure to label all orbitals (hybridized, atomic, and molecular). Place your *final MO picture* below. Do all work on the back of the previous page. (10 points)



- 5) Identify the most acidic proton(s) on the molecule below. Provide a rationale for your selection. Your rationale must use pictures and words to receive full credit. (10 points)



Grading Summary

Page	Point Value	Points Earned
2	22	
3	24	
4	34	
5	20	
	Total Score =	