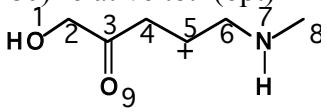
JASPERSE CHEM 350 TEST 1 VERSION 1 Organic Chemistry I - Jasperse
Intro and Review
Structure and Properties of Organic Molecules
Structure, Nomenclature, and Conformation/Stereochemistry of Alkanes

1. Draw the correct Lewis structure of CH_3CN. (Needn't show 3-D geometry) (3pt)

2. Draw the correct Lewis structure for $HOCH_2CHO$. (Needn't show 3-D geometry). (3pt)

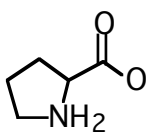
3. Draw a 3-dimensional picture for the atoms in $CH_3CO_2CH_2NHCH_3$, using the hash-wedge convention. (You needn't specify lone pairs, and orbitals need not be shown). (5pt)

4. For the structure shown, what is the hybridization, electron-pair geometry, and approximate bond angle (90, 109, 120, or 180) relative to: (6pt)

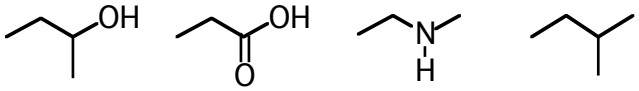


	hybridization	electron-pair geometry	bond angle		hybridization	electron-pair geometry	bond angle
O-1				C-5			
C-2				N-7			
C-3				O-9			

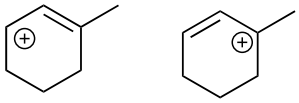
5. Assign any formal charges to any apropriate atoms for proline, given the structure shown (one of the body's 20 monomers from which protein and enzyme biopolymers are constructred). (3pt)

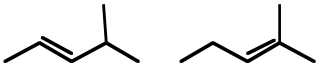


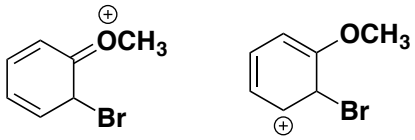
6. Rank the acidity of the following, from 1 (most) to 4 (least). (4pt)



7. Which of the following represent pairs of resonance structures? (4pt)

a. 

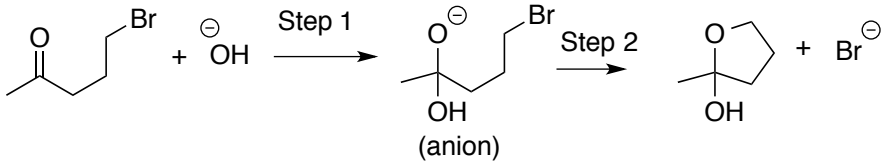
b. 

c. 

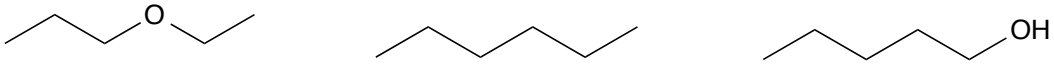
d. Both a and c

e. a, b, and c are all resonance structures.

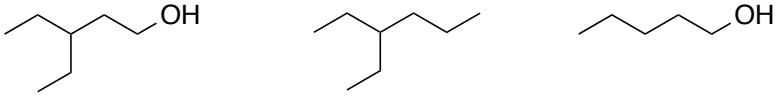
8. Draw arrows to show electron-movement in the following two steps (draw arrows for <u>each</u> step). Draw a <u>circle</u> around the atom that functions as nucleophile in step 1, and a <u>square</u> around the atom that functions as nucleophile in step 2. (5pt)



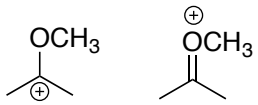
9. Rank the series on the basis of <u>boiling point</u>, 1 having highest boiling point, 3 having lowest. (3pt)

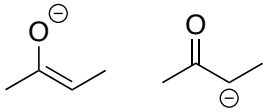


10. Rank the series on the basis of <u>water solubility</u>, 1 having highest solubility, 3 having lowest. (3pt)



11. For each of the following pairs of resonance structures, circle the one that would make a greater contribution to the actual resonance hybrid. (4pt)

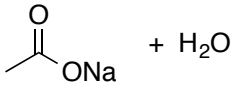


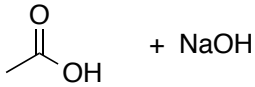


(anions)

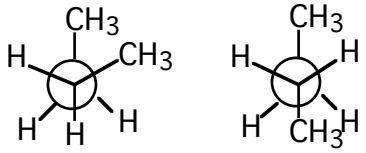
12. Cyclopropane is much more "strained" than cyclopentane. Why? (Short!) (3pt)

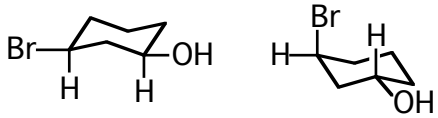
13. For the following acid-base reaction,
a. put a box around the weakest base in the reaction
b. put a circle around the weakest acid
c. draw an arrow to show whether the equilbrium goes to the right or left. (4pt)



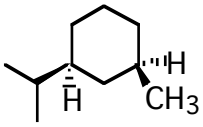


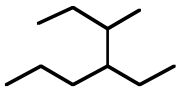
14. Classify the relationship between the pairs of molecules as either: (8pt)
same compound structural isomers resonance structures
geometric isomers not isomers (different molecular formulas)



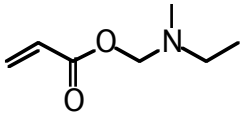


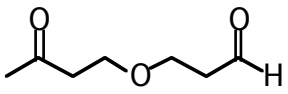
15. Give the name for the following. (7pt)





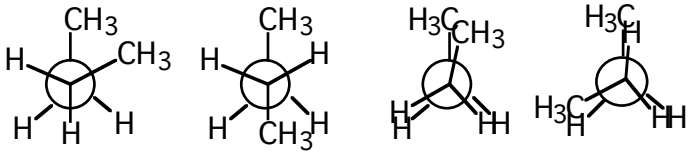
16. Identify all the funtional groups in the following molecules. (Do not include "alkane", since that isn't "functional".) (6pt)





17. Which of the following pair will have the larger rotation barrier, relative to the bonds indicated? (3pt)

18. For the following Newman projections, rank them in stability from 1 to 4, 1 being most stable. Identify the "anti" conformation, the "gauche" conformation, and the "totally eclipsed" conformation. (6pt)



19. Draw the Newman projection for the most stable conformation of 1,2-dichloroethane. (3pt)

20. Draw the two chair conformations of cis-1-ethyl-4-methylcyclohexane. (You don't have to draw all the hydrogens). (5pt)

21. Which is more stable, cis- or trans-1-t-butyl-2-methylcyclohexane? Draw the best conformation of the more stable isomer. (4pt)

22. Draw as many structural isomers as you can for C_6H_{14}. Be careful not to draw the same isomer twice! I will take off points for duplicating! (6pt)