

Chemistry 333

Final Examination

December 17, 2007

Professor Charonnat

Name: _____

Be certain that your examination has eight (8) pages including this one.

Put your name on **each** page of this examination booklet.

By putting your name on this examination booklet you agree to abide by California State University, Northridge policies of academic honesty and integrity.

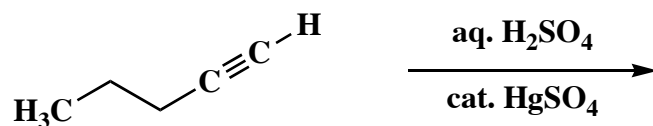
Molecular models are allowed for this examination. All electronic devices, including calculators, are unnecessary and are not allowed.

Name: _____

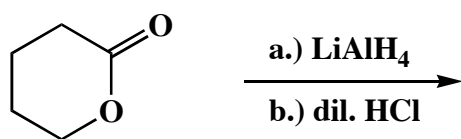
1. (50 points)

Draw the structure of the expected major organic product for each of the following ten (10) questions. Clearly specify stereochemistry, if relevant.

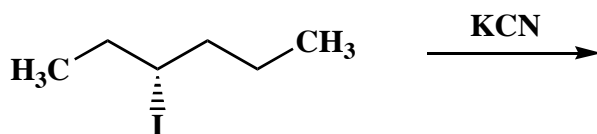
A.



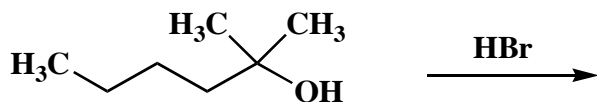
B.



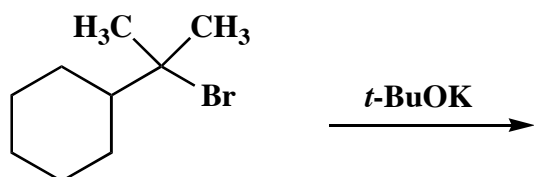
C.



D.



E.



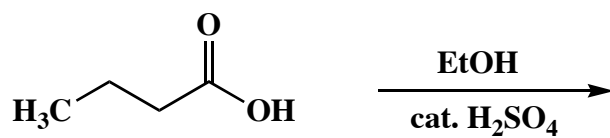
Name: _____

1. (continued)

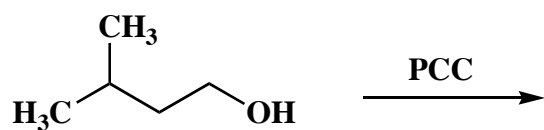
F.



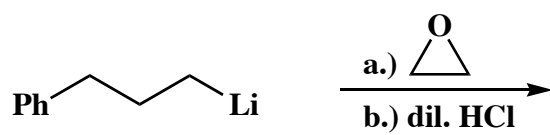
G.



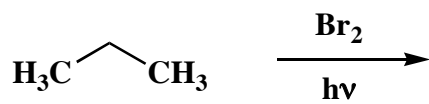
H.



I.



J.

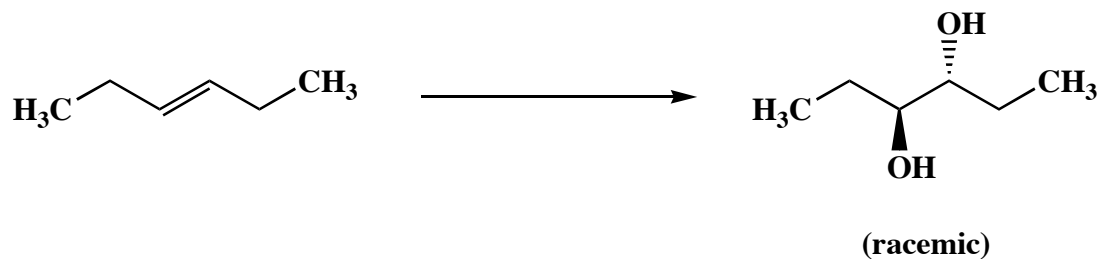


Name: _____

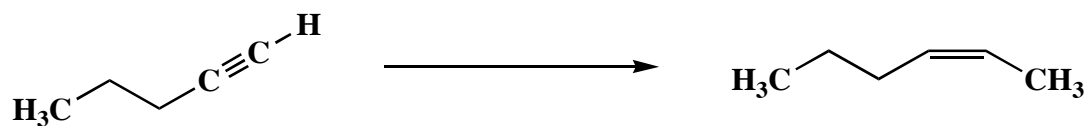
2. (35 points)

Draw the specific reagent(s) necessary to effect each of the following three (3) transformations. If more than one reaction is involved in an answer, be certain to distinguish the individual steps clearly. Specify the relative stoichiometry of all reagents, also.

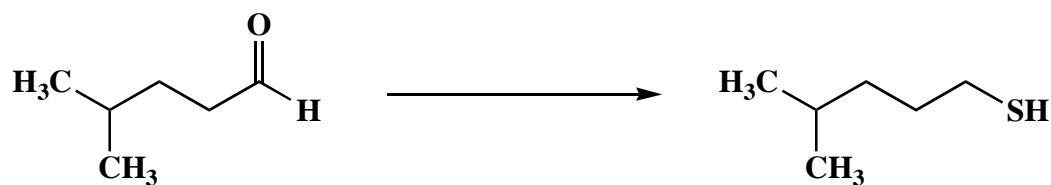
A.



B.



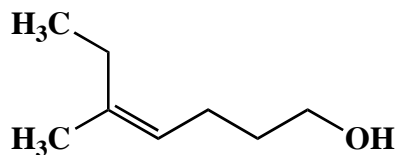
C.



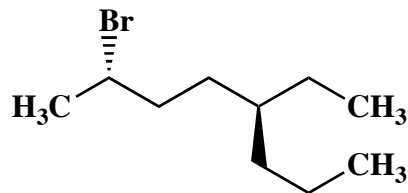
3. (20 points)

Use IUPAC nomenclature to write the systematic names of the following two (2) compounds.

A.



B.



Name: _____

4. (30 points)

Circle the number that corresponds to the correct answer for each of the following six (6) questions.

A. E2 eliminations preferentially occur via

1. a syn coplanar pathway
2. an anti coplanar pathway
3. a multistep pathway involving carbocations

B. How many N-H infrared absorptions are seen for secondary amines?

1. one
2. two
3. three

C. (2*R*,5*R*)-2,5-dibromoheptane and (2*S*,5*R*)-2,5-dibromoheptane are

1. regioisomers
2. enantiomers
3. diastereomers

D. Which of the following compounds has a D₂O-exchangeable proton?

1. H₃CCH₂CH₂CH₂Br
2. H₃CCH₂CH₂CH₂OCH₃
3. H₃CCH₂CH₂CH₂OH

E. Which of the following bonds has the strongest infrared absorption?

1. alkyl C-H
2. alkyl C-C
3. alkyl halide C-Br

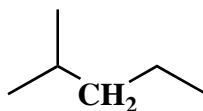
F. The mass spectrum of an alkane has an M+1 peak that is 17.6% of the molecular ion's intensity.

1. The alkane contains ten carbons.
2. The alkane contains sixteen carbons.
3. The alkane contains eighteen carbons.

Name: _____

5. (20 points)

Use letters to label all the sets of chemically equivalent protons in the following alkane. Then draw an annotated tree diagram to show the multiplicity of the highlighted methylene group. Specify, but do not quantify all appropriate coupling constants in the tree diagram.



6. (20 points)

Answer both of the following two (2) questions clearly, concisely and with correct grammar.

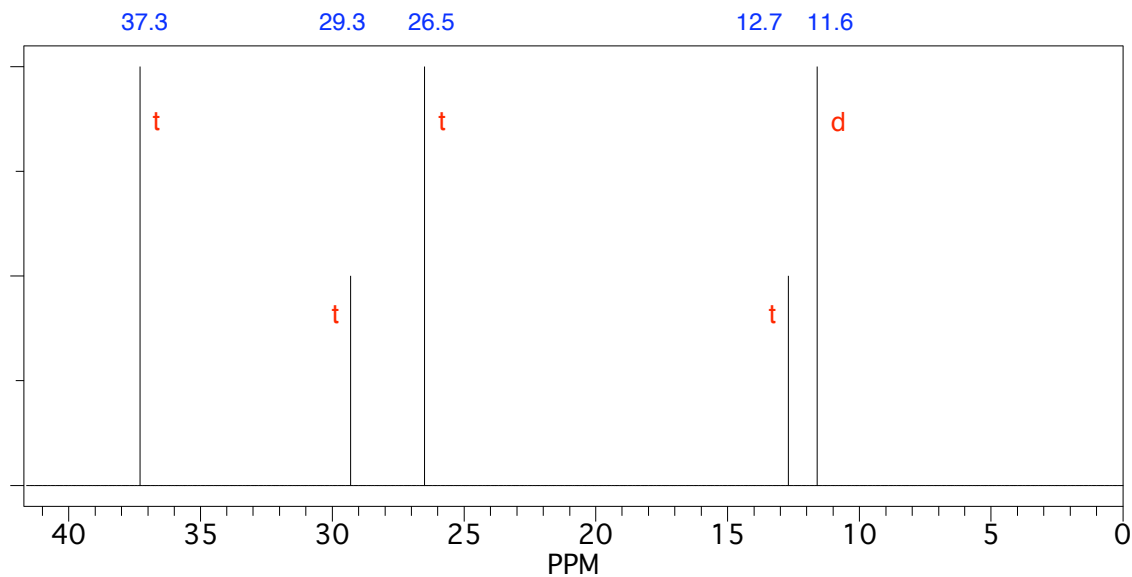
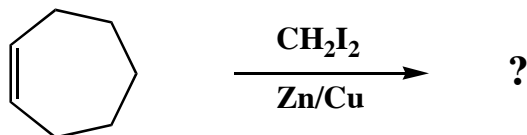
A. Why are ^{13}C NMR spectra not integrated?

B. Why do mass spectra of tertiary alcohols typically not show a molecular ion?

Name: _____

7. (25 points)

Draw the major organic product that is formed from the following reaction. The broadband proton-decoupled ^{13}C NMR spectrum of the product is shown below. The labels next to each of the resonances signify the multiplicities observed in the corresponding off-resonance proton-decoupled ^{13}C NMR spectrum (d = doublet, t = triplet). Use this spectroscopic evidence to identify the compound. Make clear assignments of all resonances to explain your reasoning. (A ^{13}C NMR correlation table is included separately.)



Name: _____

7. (continued)



^{13}C NMR assignments:

chemical shift (ppm)

assignment

explanation of multiplicity

Congratulations!

1	/50
2	/35
3	/20
4	/30
5	/20
6	/20
7	/25
Total:	<hr/> /200