

Chemistry 333

Examination #3

July 13, 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. (25 points)

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

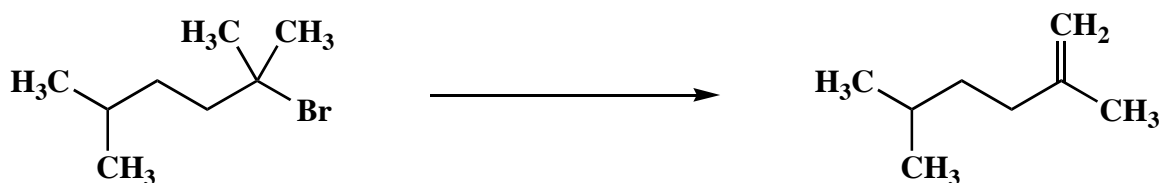
A.



B.



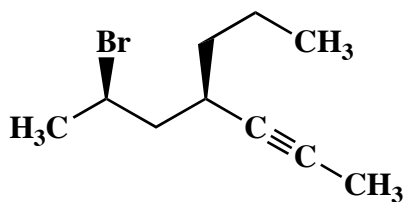
C.



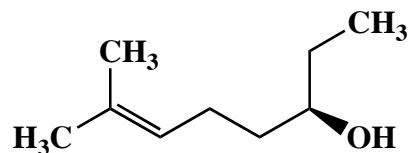
2. (20 points)

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

A.



B.



Name: _____

3. (30 points)

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

A. The reaction of *cis*-hex-3-ene with osmium tetroxide/aqueous *N*-methylmorpholine-*N*-oxide affords

1. an optically active product
2. a racemic mixture
3. an achiral product

B. The alkenes, *trans*-hex-3-ene and *cis*-hex-2-ene are

1. regioisomers
2. diastereomers
3. enantiomers

C. A late transition state structurally resembles the

1. starting material
2. reagent
3. product

D. The most stable chair conformation of *cis*-1-methyl-4-propylcyclohexane has

1. both the methyl and propyl groups equatorial
2. the methyl group axial and the propyl group equatorial
3. the methyl group equatorial and the propyl group axial

E. Which alcohol can be oxidized by pyridinium chlorochromate (PCC) to an aldehyde?

1. pentan-2-ol
2. 2-methylpentan-2-ol
3. pentan-1-ol

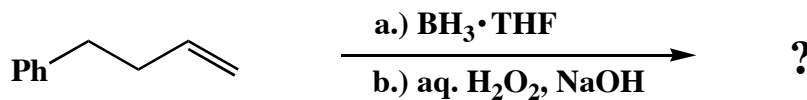
F. Which of the following is a Lewis acid?

1. BBr_3
2. HCBBr_3
3. Br_2

Name: _____

4. (25 points)

When the following reaction was run, a product was isolated that showed infrared absorptions at 3500, 3025, 2975, 1600, 1575, 1495, 1445, 1305 and 1130 cm^{-1} . Draw the structure of the product. Use the infrared spectroscopic evidence to support your answer. Make clear assignments of all absorptions to explain your reasoning. (An IR correlation table is included separately.)



infrared assignments:

absorption (cm^{-1})

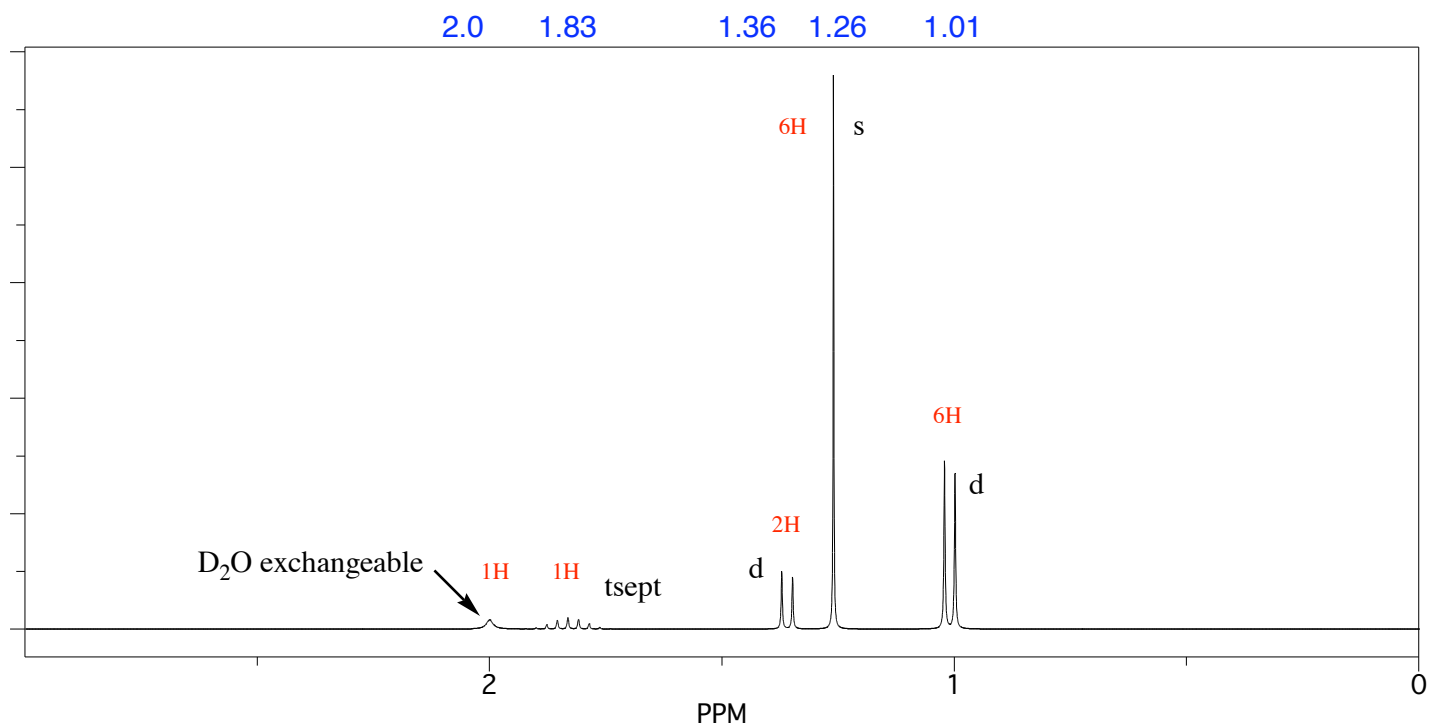
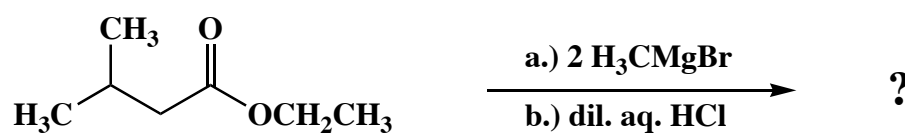
assignment



Name: _____

5. (25 points)

Draw the major organic product that is formed from the following reaction. The ^1H NMR spectrum of the product is shown below. The labels next to each of the resonances signify the integrals and multiplicities observed in the spectrum (s = singlet, d = doublet, tsept = triplet of septets). Use this spectroscopic evidence to determine the identity of the compound. Make clear assignments of all resonances to explain your reasoning. (A ^1H NMR correlation table is included separately.)



Name: _____

5. (continued)

^1H NMR assignments:

chemical shift (ppm)

assignment

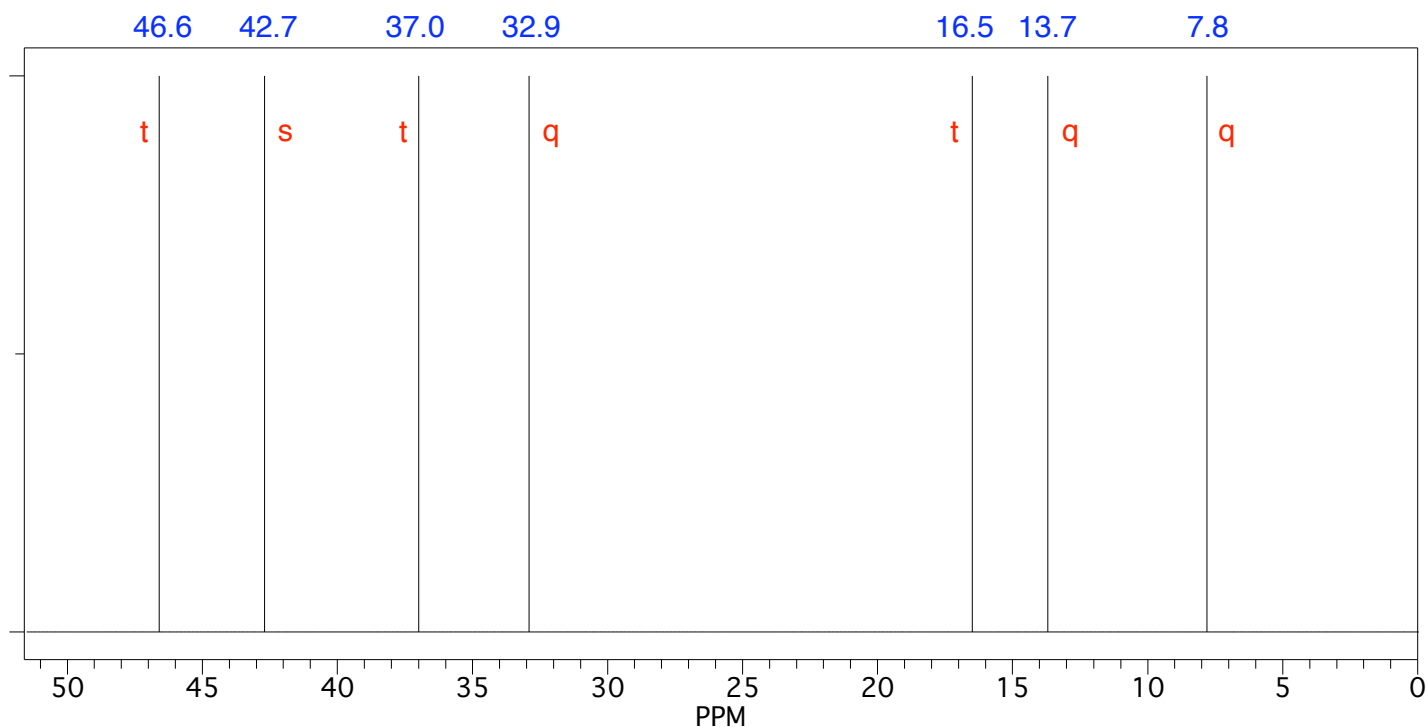
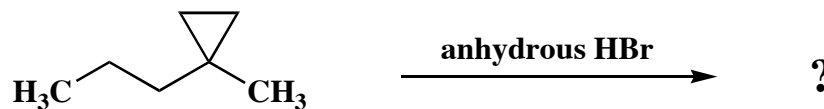
explanation of multiplicity



Name: _____

6. (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 (s = singlet, t = triplet, q = quartet). Use this spectroscopic evidence to determine the identity of the compound. Make clear assignments of all resonances to explain your reasoning. (A ^{13}C NMR correlation table is included separately.)



Name: _____

6. (continued)

^{13}C NMR assignments:

chemical shift (ppm)

assignment

explanation of multiplicity



Congratulations!

1	/25
2	/20
3	/30
4	/25
5	/25
6	/25
total:	/150