

Chemistry 333

Examination #3

July 15, 2005

Professor Charonnat

Name: _____

Be certain that your examination has nine (9) 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)

Circle the number that corresponds to the correct answer for each of the following five (5) questions.

A. Which alkene reacts least rapidly with anhydrous HBr?

1. 2-methylhex-1-ene
2. 2-methylhex-2-ene
3. *trans*-2-methylhex-3-ene

B. Electron-impact mass spectra of tertiary alcohols typically

1. show an intense molecular ion
2. show a medium-intensity molecular ion
3. do not show a molecular ion

C. Which carbenes react with 1,2-disubstituted alkenes to afford stereochemically pure cyclopropanes?

1. singlet carbenes
2. triplet carbenes
3. both singlet and triplet carbenes

D. The addition of molecular bromine to *trans*-hex-3-ene gives

1. an optically-active product
2. a racemic product
3. a meso product

E. The reaction of the acetylide anion of pent-1-yne with *tert*-butyl bromide proceeds via an

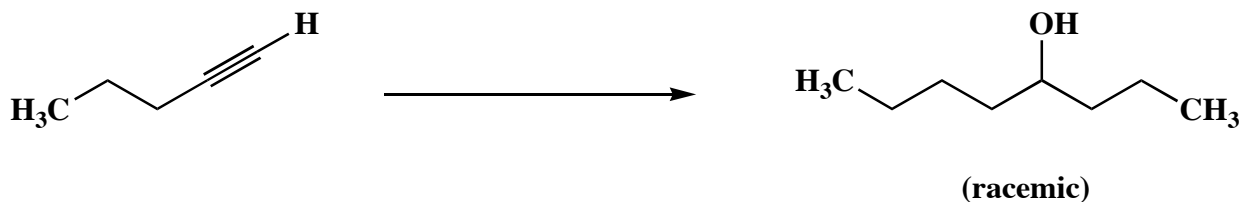
1. S_N2 mechanism
2. S_N1 mechanism
3. E2 mechanism

Name: _____

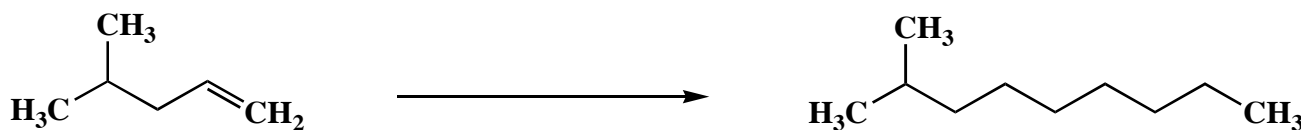
2. (20 points)

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.

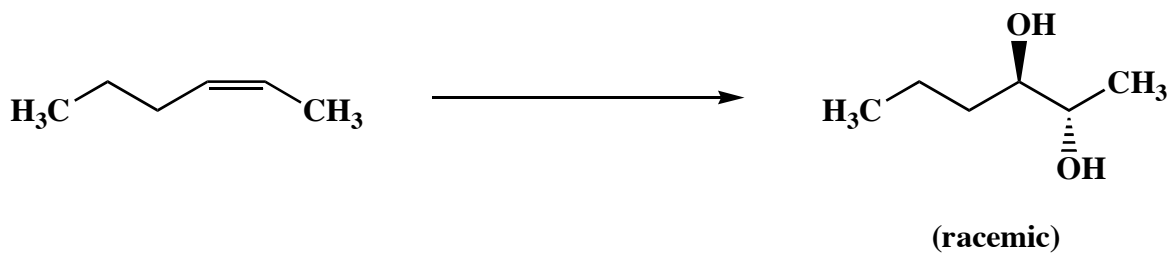
A.



B.

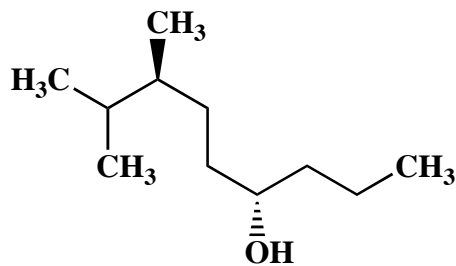


C.



3. (10 points)

Use IUPAC nomenclature to write the systematic name of the following alcohol.

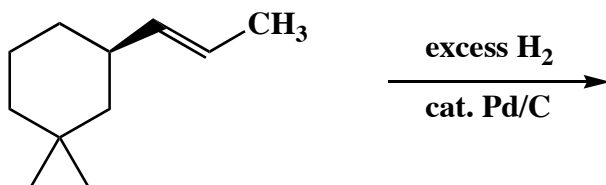


Name: _____

4. (25 points)

Draw the structure of the expected major organic product for each of the following five (5) questions. Clearly specify stereochemistry, if relevant.

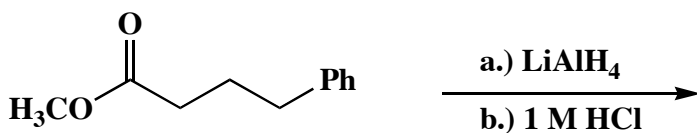
A.



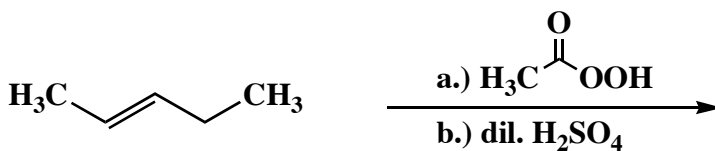
B.



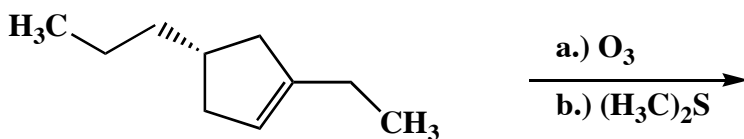
C.



D.



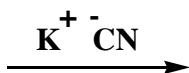
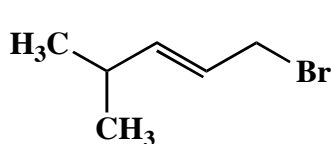
E.



Name: _____

5. (20 points)

When the following reaction was run, a product was isolated that showed infrared absorptions at 3050, 2950, 2250 and 1645 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:

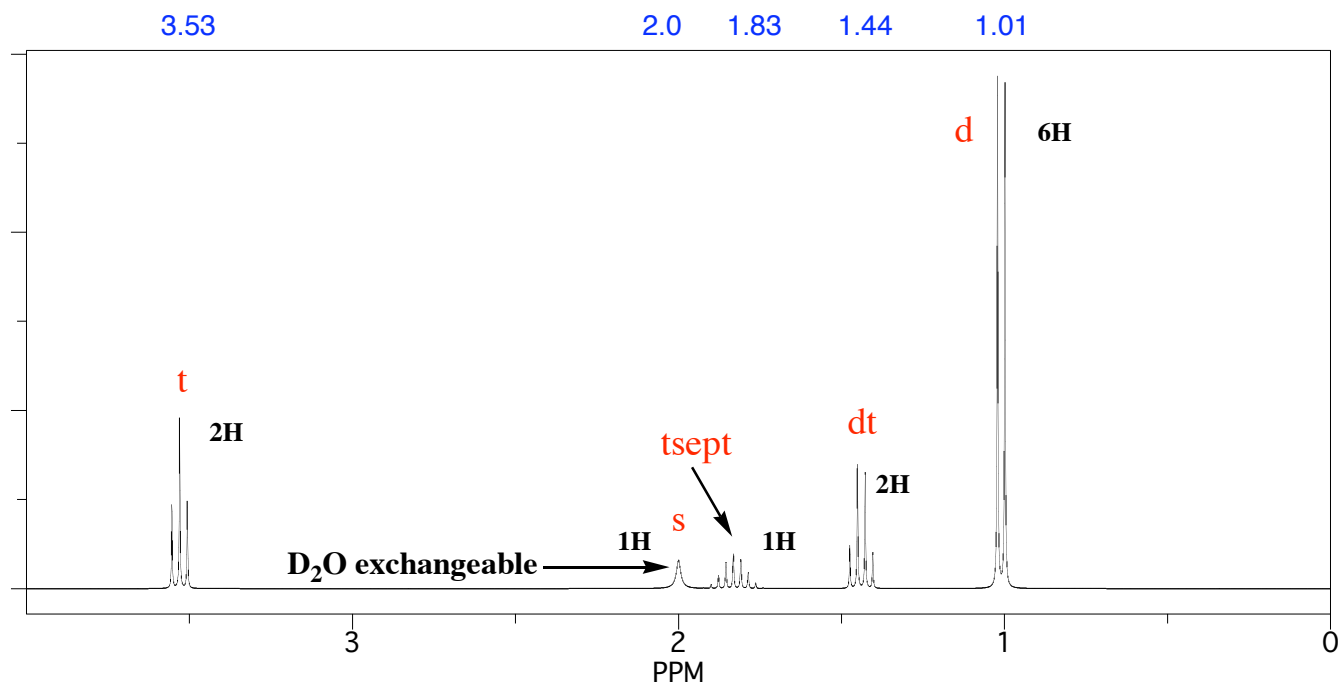
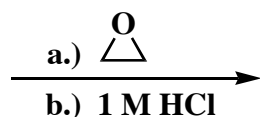
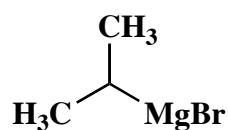
absorption

assignment

Name: _____

6. (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, t = triplet, dt = doublet of triplets, 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: _____

6. (continued)

^1H NMR assignments:

chemical shift (ppm)

assignment

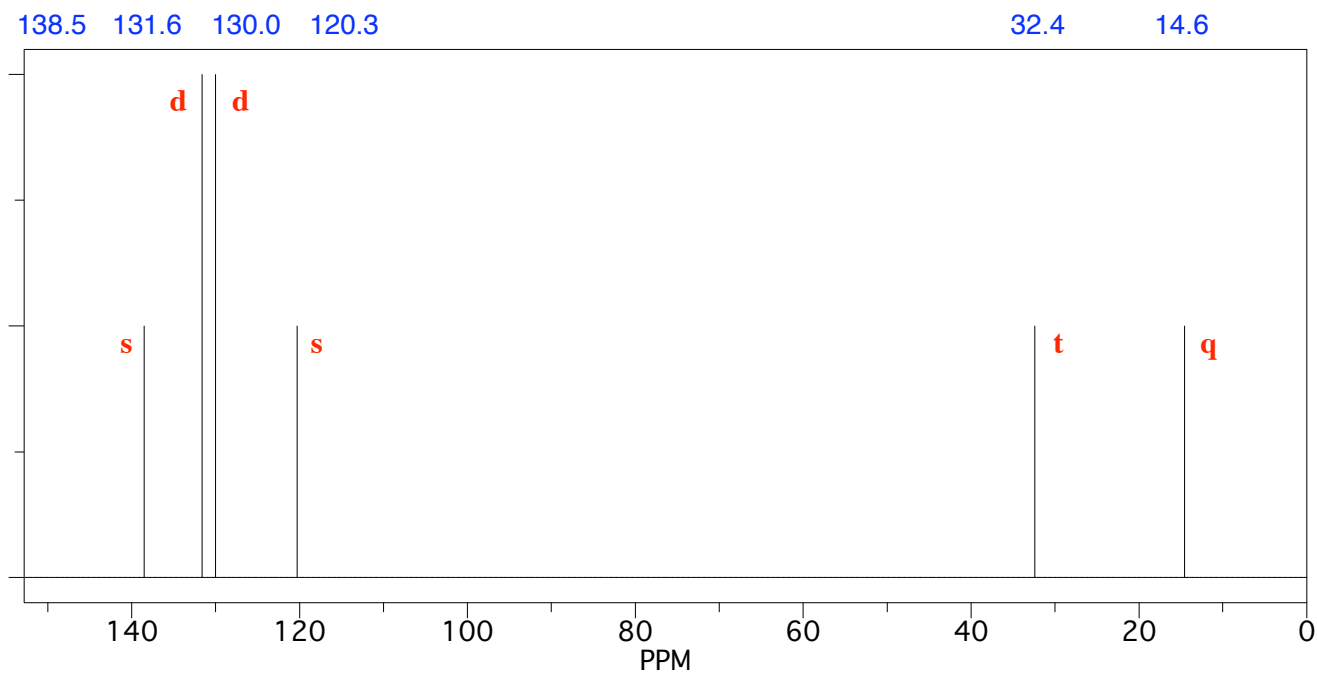
explanation of multiplicity



Name: _____

7. (25 points)

The broadband proton-decoupled ^{13}C NMR spectrum of compound A ($\text{C}_8\text{H}_9\text{Br}$) 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, d = doublet, 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: _____

7. (continued)

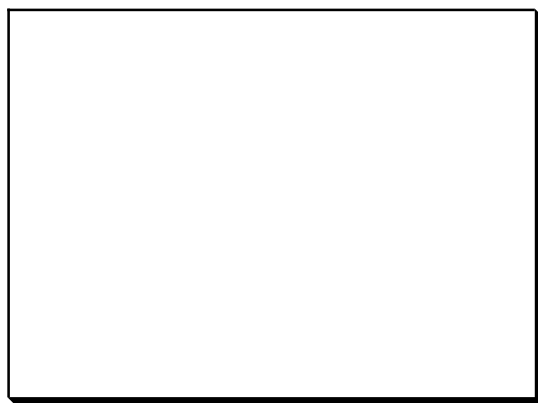
^{13}C NMR assignments:

chemical shift (ppm)

assignment

explanation of multiplicity

Structure of compound A:



Congratulations!

1	/25
2	/20
3	/10
4	/25
5	/20
6	/25
7	/25
Total:	/150

Course grade: _____