

Chemistry 333

Examination #3

July 12, 2002

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.

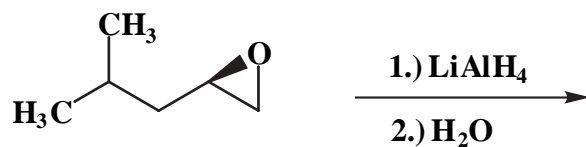
Molecular models are allowed for this examination. Calculators are unnecessary and are not allowed.

Name: _____

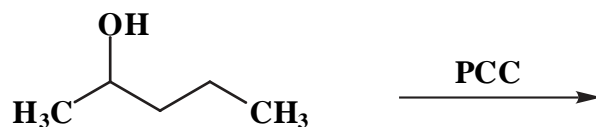
1. (25 points)

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

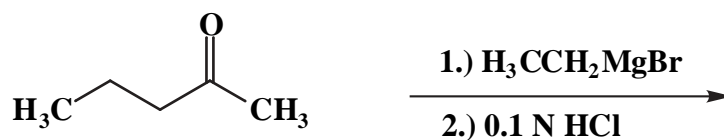
A.



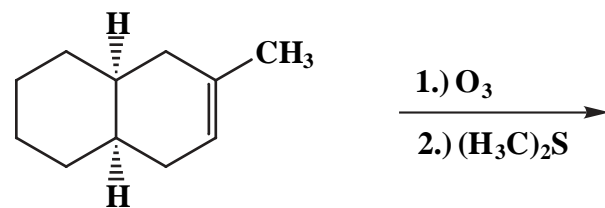
B.



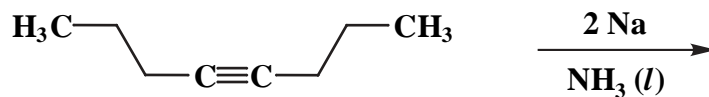
C.



D.



E.



Name: _____

2. (25 points)

For each of the following five (5) questions, circle the number that corresponds to the correct answer.

A. Hydroboration/oxidation of 1,1-disubstituted alkenes affords:

1. Markovnikov hydration
2. anti-Markovnikov hydration
3. a 1:1 mixture of Markovnikov and anti-Markovnikov hydration

B. Acetylene is:

1. more acidic than ethylene
2. less acidic than ethylene
3. equally acidic as ethylene

C. The base peak in a gas chromatography-mass spectrum has the:

1. largest mass
2. largest intensity
3. largest retention time

D. Mercuric acetate catalyzed hydration of alkenes:

1. always proceeds with rearrangements
2. sometimes proceeds with rearrangements
3. never proceeds with rearrangements

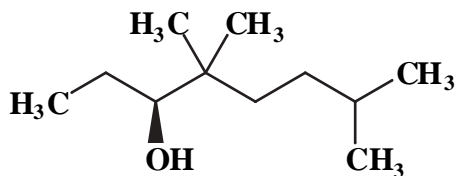
E. Diisobutylaluminum hydride (DIBAL-H) reduction of methyl propionate ($\text{H}_3\text{CCH}_2\text{CO}_2\text{CH}_3$) at 0°C affords a product whose infrared spectrum contains a broad absorption at 3480 cm^{-1} . The product is:

1. $\text{H}_3\text{CCH}_2\text{CO}_2\text{H}$
2. $\text{H}_3\text{CCH}_2\text{CHO}$
3. $\text{H}_3\text{CCH}_2\text{CH}_2\text{OH}$

Name: _____

3. (10 points)

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



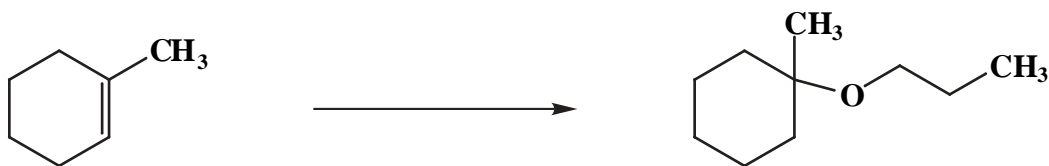
4. (20 points)

For both of the following two (2) questions draw the specific reagent(s) necessary to effect the transformation shown. If more than one step is required, be certain to specify each step separately.

A.



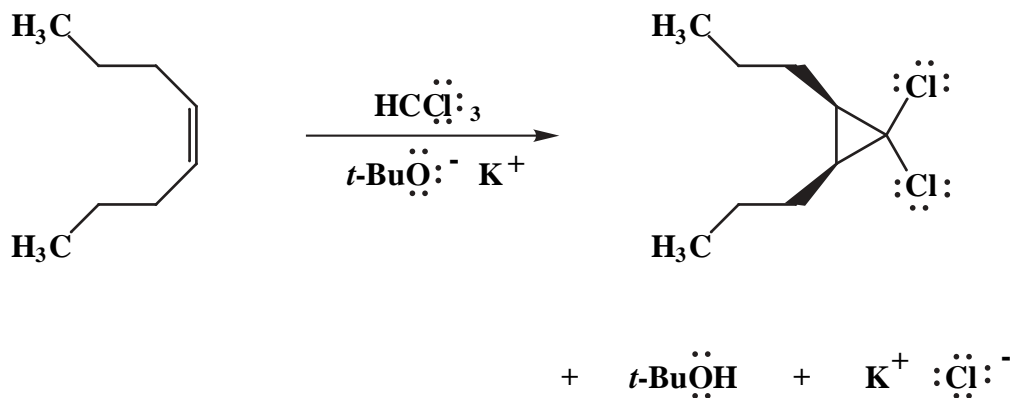
B.



Name: _____

5. (20 points)

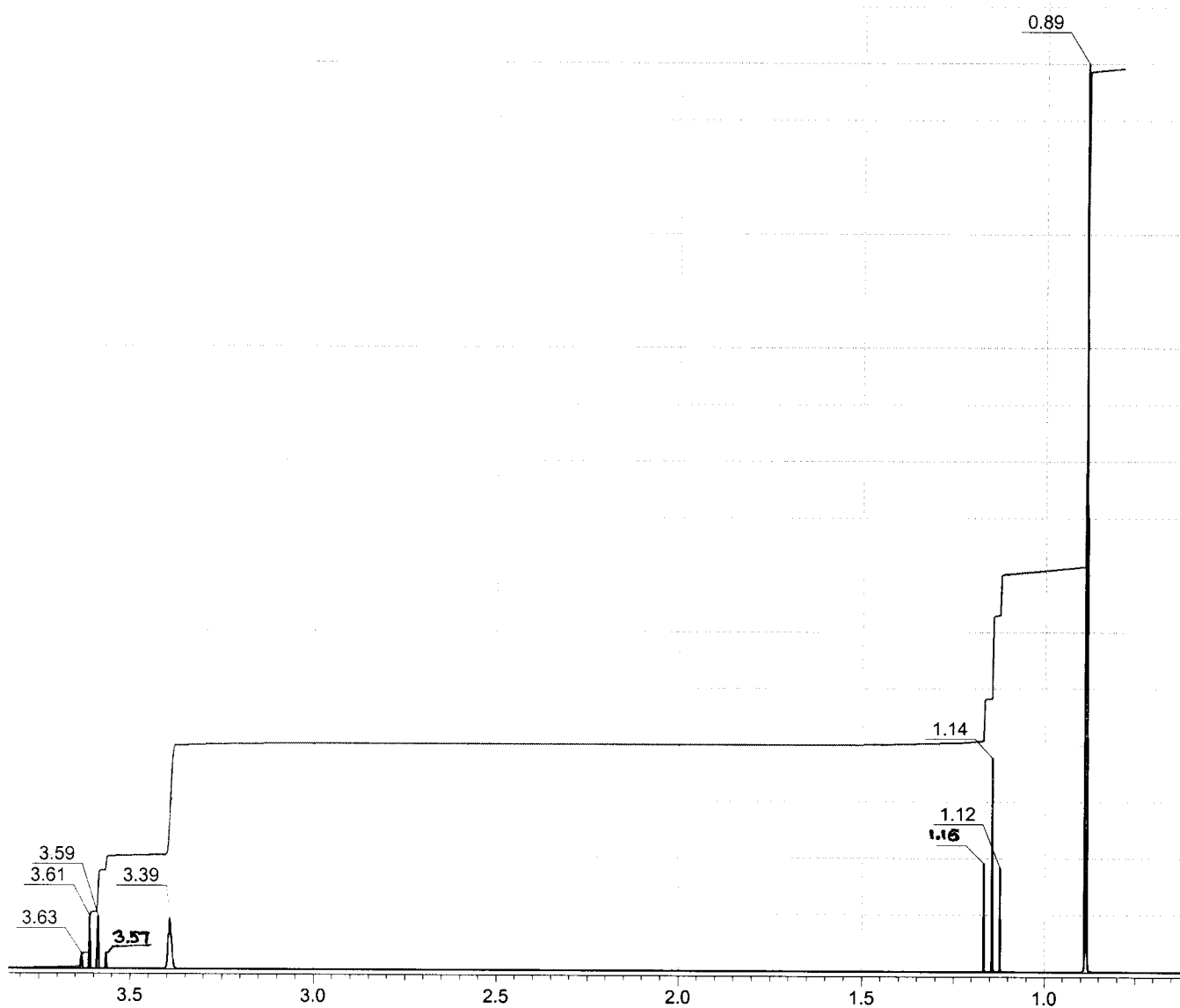
Draw the mechanism of the following reaction, using the curved-arrow notation to indicate the reorganization of electron density. Show all intermediates and denote all unshared electrons, formal charges and countercharges where appropriate. State why the product has two propyl groups *cis*-, not *trans*- to each other.



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6. (25 points)

The ^1H NMR spectrum of compound A ($\text{C}_7\text{H}_{16}\text{O}$) is shown below. Clearly assign all the resonances that you can identify with certainty and draw the structure of compound A. (A ^1H NMR correlation table is included separately.)



Name: _____

6. (cont.)

^1H NMR assignments:

chemical shift (ppm)

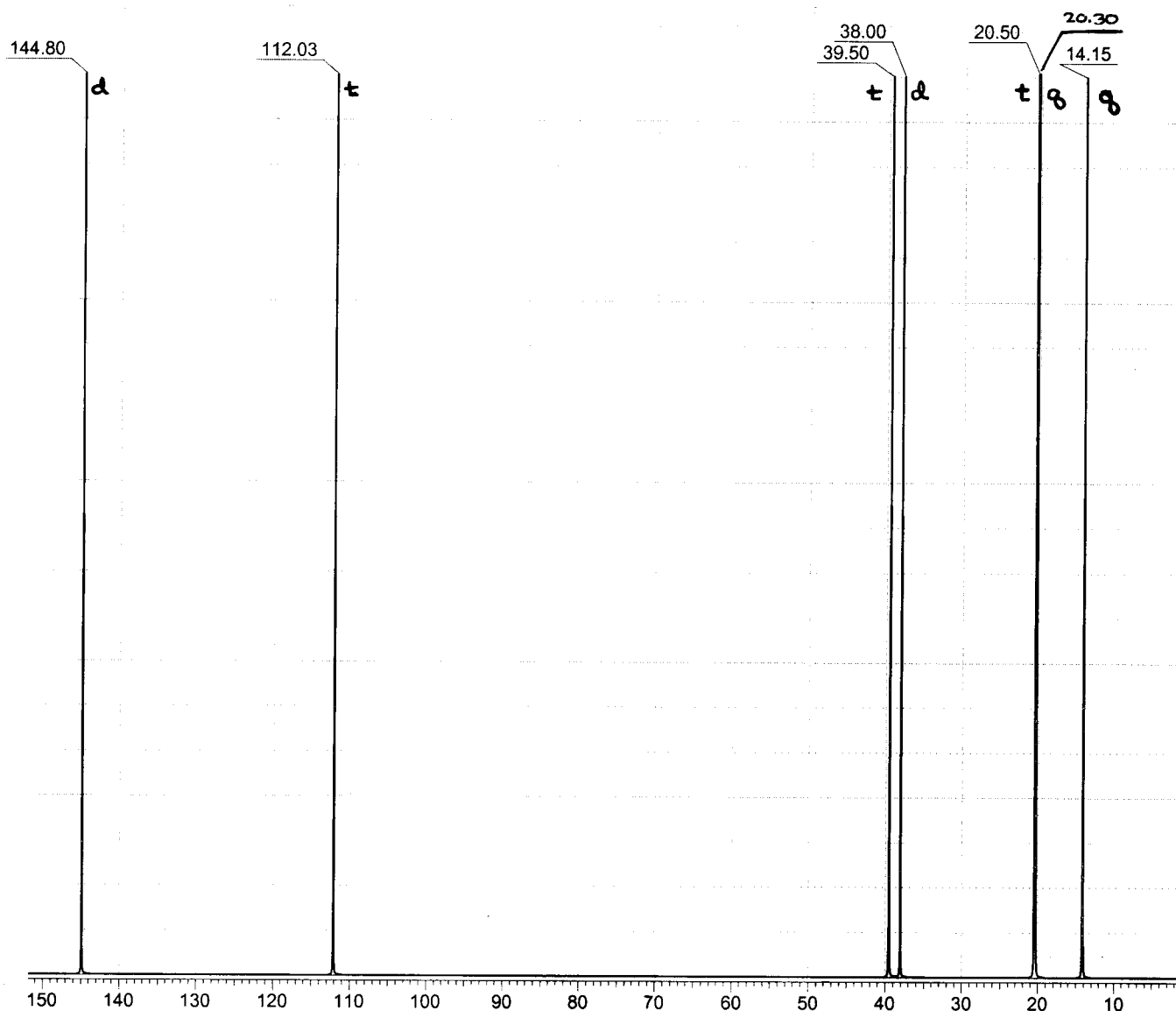
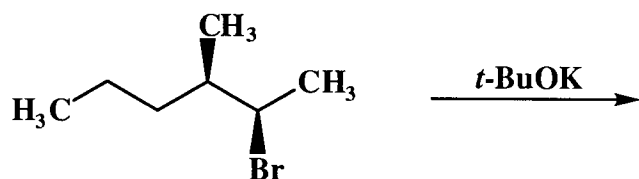
assignment

explanation of multiplicity

structure of compound A:

7. (25 points)

The following reaction yields only one of two possible, isomeric, elimination products. Draw the possible products. The broadband proton-decoupled ^{13}C NMR spectrum of the actual product is shown below. The multiplicities stated are those of the corresponding off-resonance proton-decoupled ^{13}C spectrum. Clearly assign all the resonances in this spectrum to decide the identity of the observed product. Put a star next to the product. Finally, state what would have been observed spectroscopically if the isomer was formed, instead. (A ^{13}C NMR correlation table is included separately.)



Name: _____

7. (cont.)

^{13}C NMR assignments:

chemical shift (ppm)

assignment

explanation of multiplicity

Expected spectroscopic data for the isomer:

Congratulations!

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

Overall Course Grade: _____