

Chemistry 334

Final Examination

May 17, 2016

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.

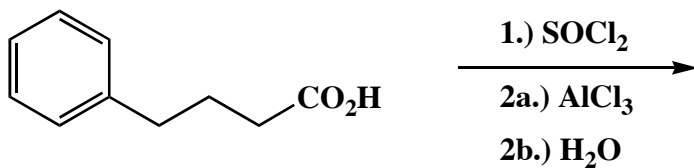
Molecular models are allowed for this examination. All electronic devices, including calculators and cell phones, are unnecessary and are not allowed.

Name: \_\_\_\_\_

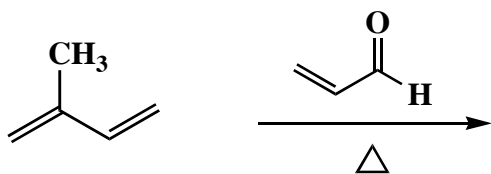
1. (25 points)

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

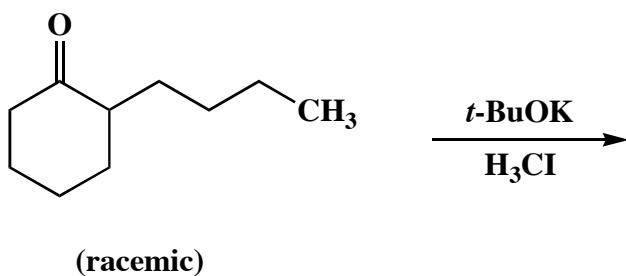
A.



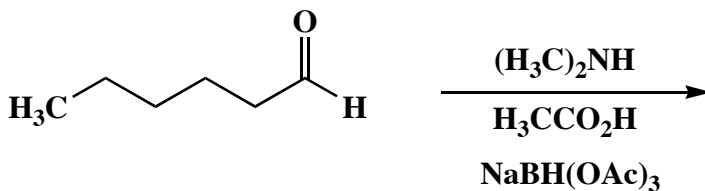
B.



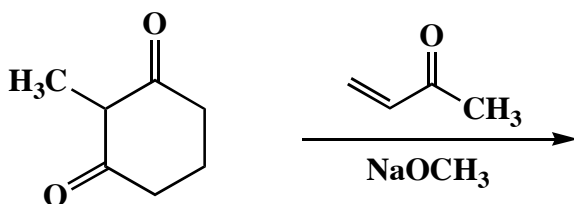
C.



D.



E.



Name: \_\_\_\_\_

2. (25 points)

Draw specific structures for each of the following twelve (12) categories.

A. a syndiotactic polymer:

B. a naturally-occurring saturated fatty acid:

C. a naturally-occurring condensation homopolymer:

D. a naturally-occurring phospholipid:

E. a prostaglandin:

F. an  $\alpha$ -D-pyranoside:

G. a steroid:

H. a naturally-occurring wax:

I. a neutral  $\alpha$ -amino acid:

J. a sulfonium salt:

K. an aldol product:

L. an antiaromatic compound:

Name: \_\_\_\_\_

3. (50 points)

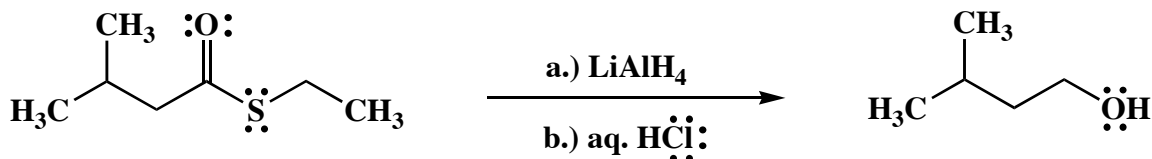
Circle the letter that corresponds to the correct answer for each of the following ten (10) questions.

These questions are unavailable due to copyright considerations.

Name: \_\_\_\_\_

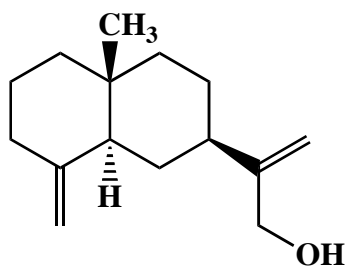
4. (20 points)

An early step in the biosynthesis of terpenes and steroids is the NADPH reduction of a thioester to the corresponding primary alcohol. Although the starting material and reagent are different, the following reaction is analogous in that it accomplishes the same general transformation. Draw the mechanism of this reaction, using the curved-arrow notation to indicate the reorganization of electron density. Show all intermediates, lone pairs, nonzero formal charges, countercharges, and reversibility or irreversibility.



5. (15 points)

The terpene, (+)- $\beta$ -costol, is a component of the essential oil from the roots of *Saussurea lappa*. This natural product is used to treat stomach ailments in Chinese and Japanese popular medicine. Circle the "isoprene" units in this terpene. Label the head (h) and tail (t) of each "isoprene" unit. Finally, state (+)- $\beta$ -costol's terpene classification.



(+)- $\beta$ -costol

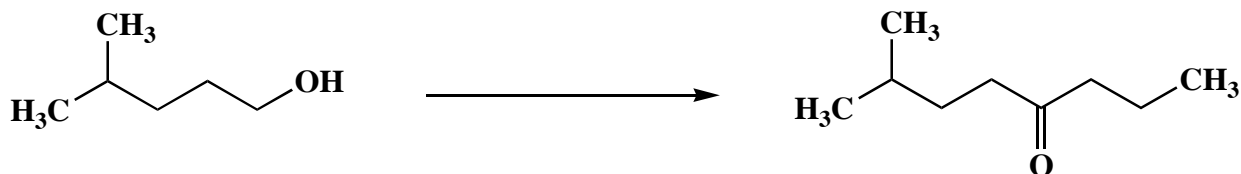
classification: \_\_\_\_\_

Name: \_\_\_\_\_

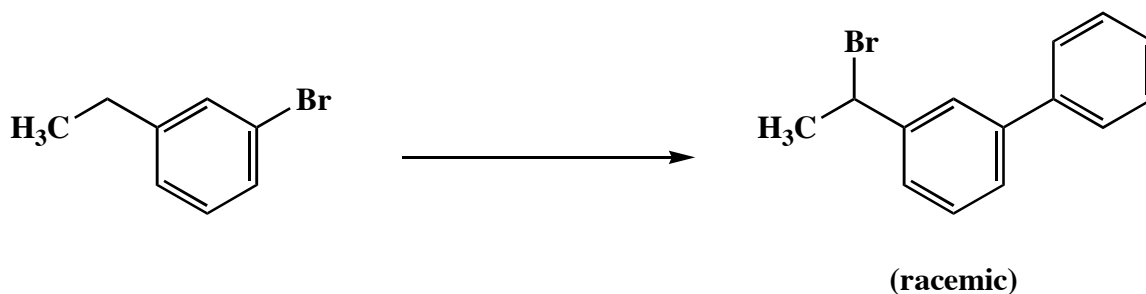
6. (30 points)

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.

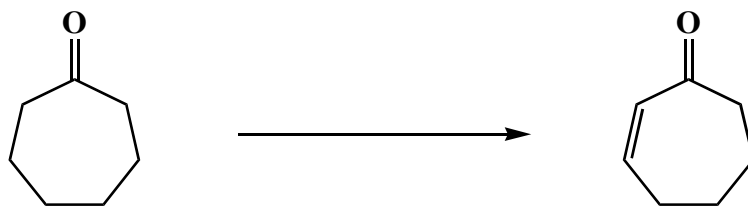
A.



B.



C.



7. (15 points)

Focusing only on resonances with a chemical shift above 100 ppm, use broadband proton-decoupled  $^{13}\text{C}$  NMR and DEPT to show how one would distinguish between heptanal, heptan-3-one, and methyl hexanoate. A  $^{13}\text{C}$  correlation table is included separately.

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8. (20 points)

Answer the following two (2) questions precisely, succinctly, and with correct grammar.

A. Why are aldehydes more reactive than ketones toward nucleophilic addition?

B. Why is a full mole, not a catalytic amount of base required in Claisen condensations?  
Draw a mechanism to support your answer.

**Congratulations!**

1	/25
2	/25
3	/50
4	/20
5	/15
6	/30
7	/15
8	/20
<hr/> Total:	<hr/> /200