Chemistry 334

Examination #3

August 18, 2009 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.

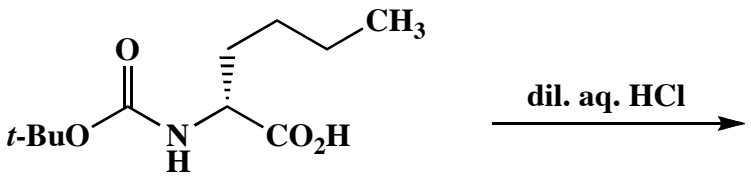
Molecular models are allowed for this examination. All electronic devices, including calculators, are unnecessary and are not allowed.

Name: _____

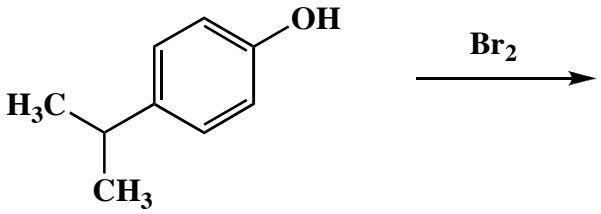
1. (25 points)

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

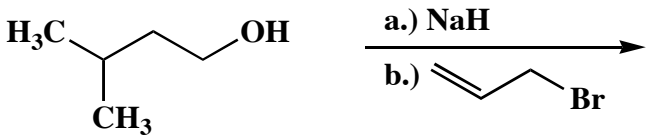
A.



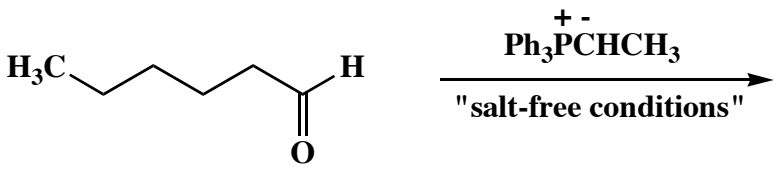
B.



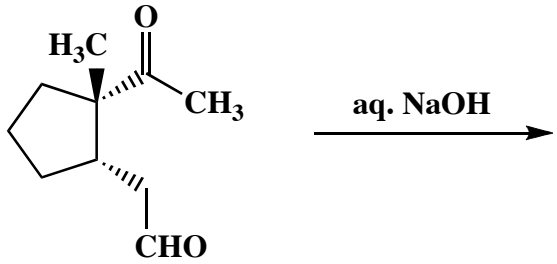
C.



D.



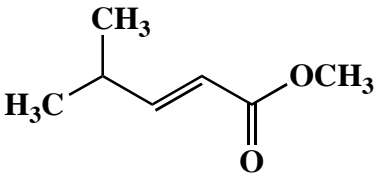
E.



Name: _____

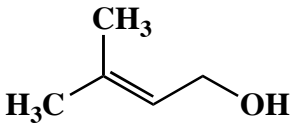
2. (20 points)

Design a synthesis of the α,β-unsaturated ester **1** from the allylic alcohol **2**. Use any inorganic and organic reagents that are necessary. Show all reagents and stable synthetic intermediate compounds. (**N.B.** Do not draw mechanisms for each synthetic transformation!)



1

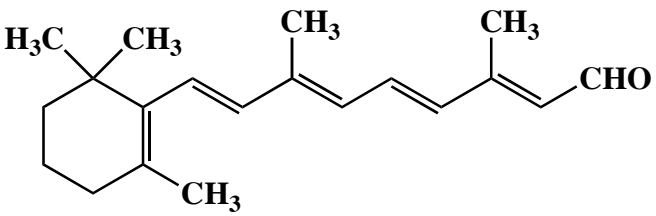
from



2

3. (15 points)

Circle the "isoprene" units in the following terpene. Label the head (h) and tail (t) of each "isoprene" unit clearly. Finally, state retinal's terpene classification.



retinal

Name: _____

4. (30 points)

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

A. Typical dienophiles also can undergo

1. cationic polymerization
2. anionic polymerization
3. both anionic and cationic polymerization

B. The absolute stereochemistry of D-(–)-serine [$H_3N^+CH(CH_2OH)CO_2^-$] is

1. R
2. S
3. neither, because the molecule is achiral

C. Fatty acid biosynthesis involves

1. oxidation of an aldol product
2. reduction of a Claisen product
3. oxidation of an α,β-unsaturated carbonyl compound

D. α-Glycosides

1. always are more stable than the corresponding β-stereoisomer
2. sometimes are more stable than the corresponding β-stereoisomer
3. never are more stable than the corresponding β-stereoisomer

E. D-(–)-Ribose and L-(+)-erythrose are

1. diastereomers
2. regioisomers
3. not isomeric

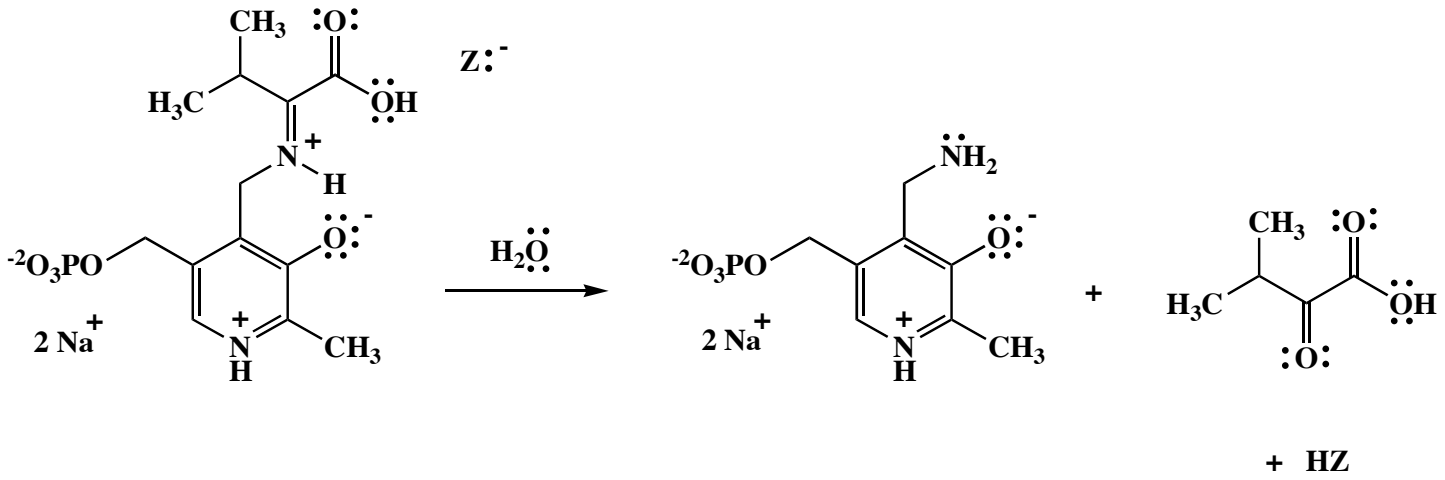
F. Free-radical polymerization of styrene is

1. an exothermic process
2. an endothermic process
3. a thermoneutral process

Name: _____

5. (25 points)

Draw the mechanism of the following pyridoxal-5´-phosphate 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. (Note: HZ is a weak acid.)

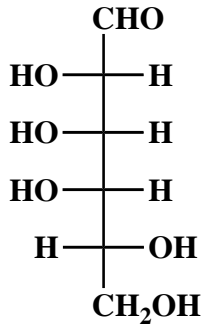


Name: _____

5. (continued)

6. (15 points)

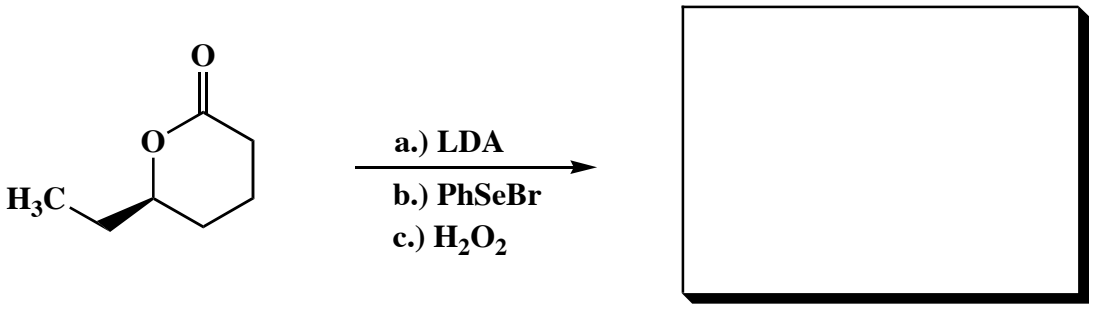
Draw the most stable conformation of the α-anomer of the pyranose hemiacetal of the monosaccharide, D-(+)-talose. Denote all 1,3-diaxial interactions clearly.

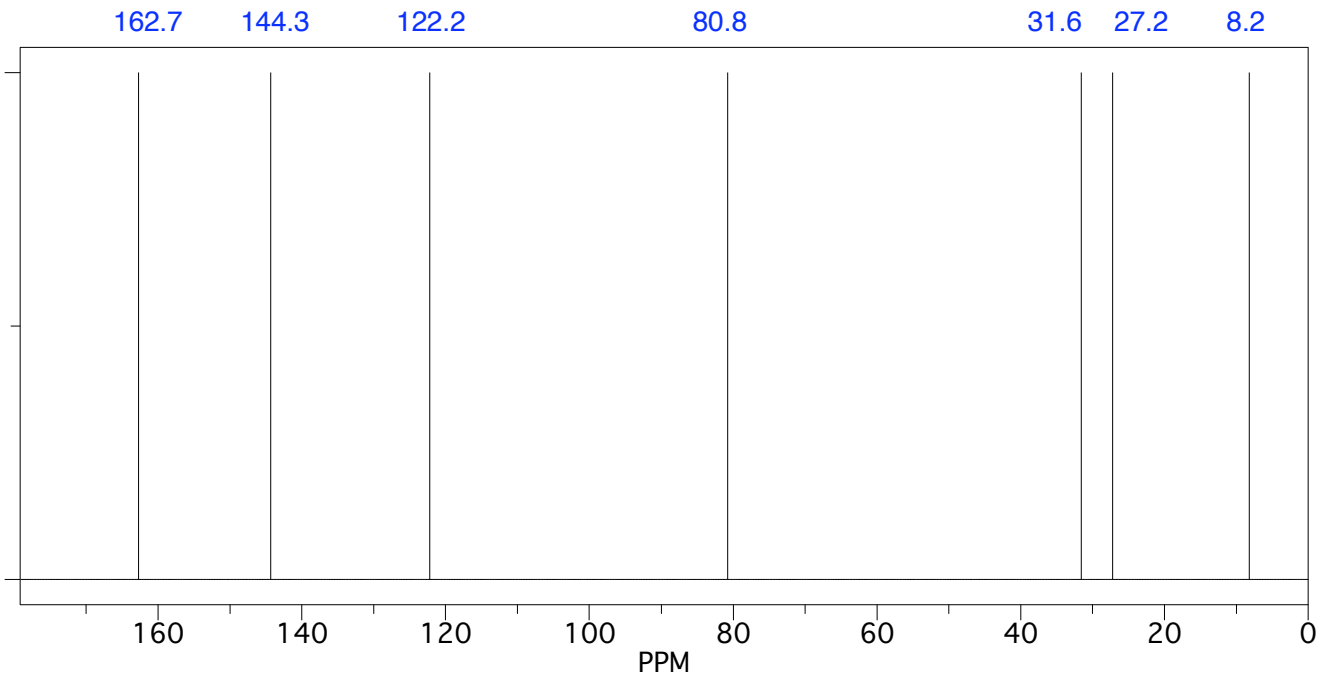


Name: _____

7. (20 points)

Draw the structure of the expected major organic product of the following reaction sequence. The broadband proton-decoupled ^{13}C NMR spectrum of this product is shown below. Use the spectroscopic data to identify the product. Make clear assignments of all resonances to explain your reasoning. (A ^{13}C NMR correlation table is included on page 9.)





Name: _____

7. (continued)

^{13}C NMR assignments:

chemical shift (ppm)	assignment
162.7	
144.3	
122.2	
80.8	
31.6	
27.2	
8.2	

Congratulations!

1	/25
2	/20
3	/15
4	/30
5	/25
6	/15
7	/20
Total:	/150