

Chemistry 334

Examination #2

October 31, 2005

Professor Charonnat

Name: _____

Be certain that your examination has five (5) 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.

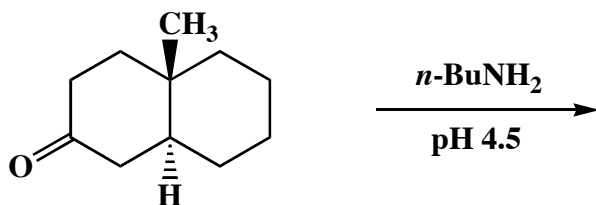
Molecular models are allowed for this examination. All electronic devices, including calculators, are unnecessary and are not allowed.

Name: _____

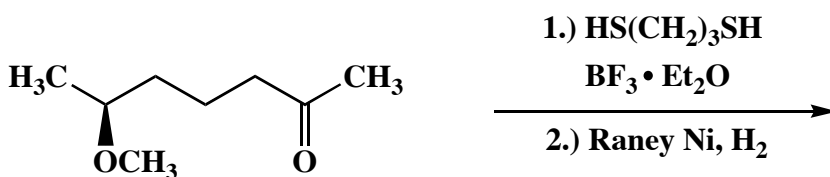
1. (25 points)

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

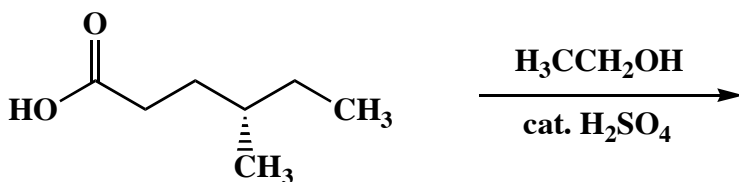
A.



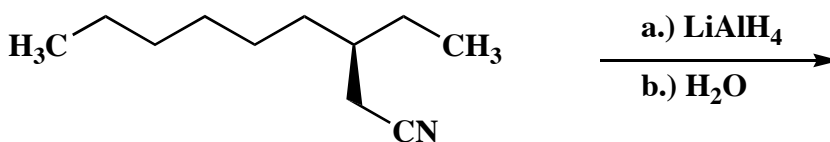
B.



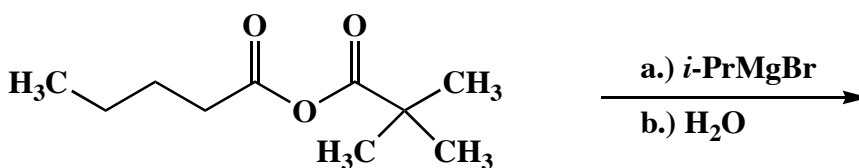
C.



D.



E.



Name: _____

2. (25 points)

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

A. The ^1H NMR resonance of the alpha protons of 3-methylbutanal is a

1. singlet
2. doublet
3. doublet of doublets

B. The "salt-free" Wittig reaction of *n*-butanal with $\text{Ph}_3\text{PCHCH}_2\text{CH}_2\text{CH}_3$ affords a product whose broadband proton-decoupled ^{13}C NMR spectrum shows how many peaks?

1. 4
2. 6
3. 8

C. Which of the following compounds has the lowest pK_a ?

1. 8,8,8-trichlorooctanoic acid
2. 5,5-dichlorooctanoic acid
3. 2-chlorooctanoic acid

D. Bender's work shows that nucleophilic substitutions of carboxylic acid derivatives usually occur via

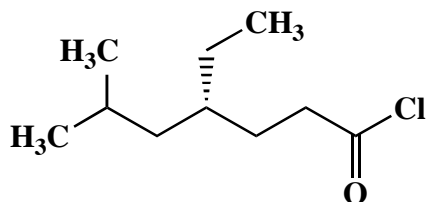
1. an $\text{S}_{\text{N}}2$ mechanism
2. a nucleophilic addition/elimination mechanism
3. a condensation mechanism

E. DCC coupling of pentanoic acid with *n*-butylamine (*n*- BuNH_2) affords a product whose infrared spectrum shows how many NH stretching absorptions?

1. 0
2. 1
3. 2

3. (10 points)

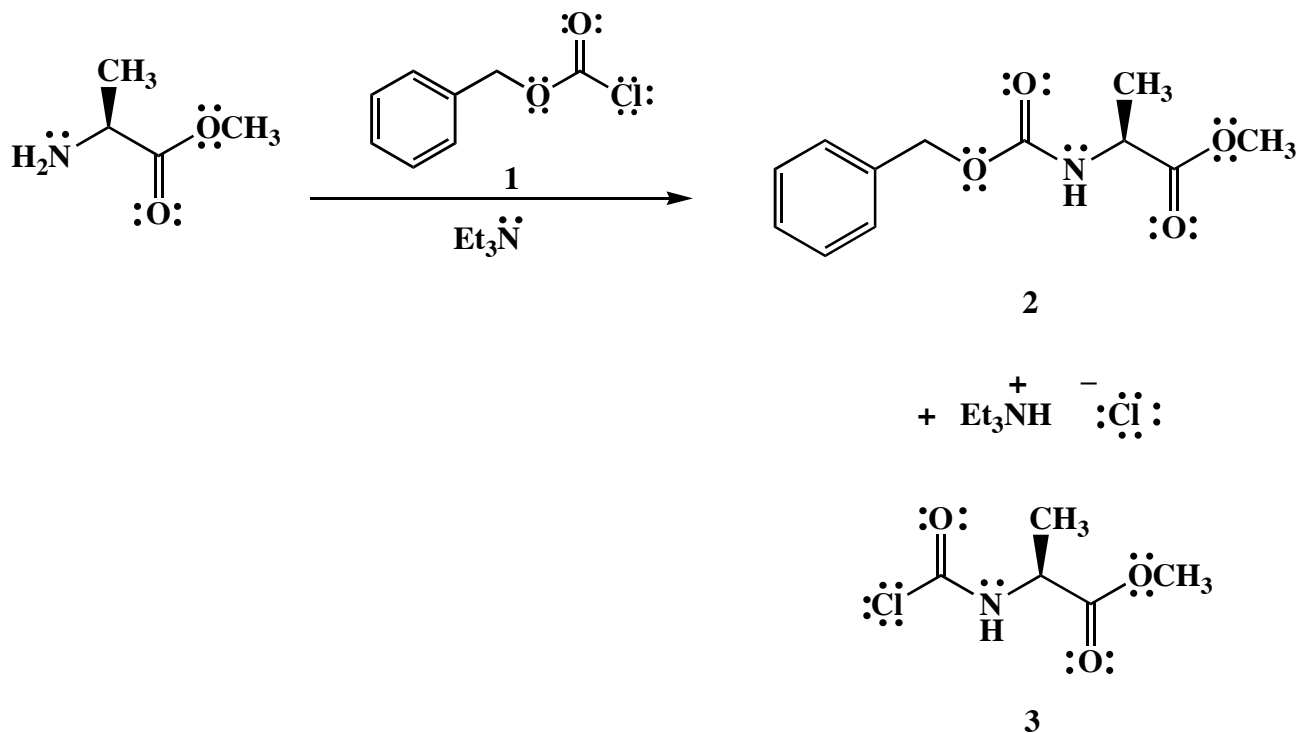
Use IUPAC nomenclature to write the systematic name of the following carboxylic acid derivative.



Name: _____

4. (20 points)

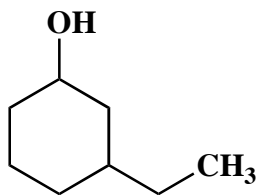
The carbobenzyloxy (Cbz) group has been used extensively in peptide synthesis as an amine protecting group. Cbz-protected amines are formed by the reaction of an amine with benzyl chloroformate **1** and triethylamine. A specific example of its use is shown below. Draw the mechanism of this reaction, using the curved-arrow notation to indicate the reorganization of electron density. Show all intermediates, unshared electrons, formal charges and countercharges. Explain concisely why the carbamate **2** is formed instead of the alternative carboxylic acid derivative **3**.



Name: _____

5. (20 points)

Devise a synthesis of the alcohol **4** (as a racemic mixture of diastereomers) from anisole (PhOCH_3). 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!)



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Congratulations!

1	/25
2	/25
3	/10
4	/20
5	/20
Total:	<hr style="width: 100%; border: 0.5px solid black;"/> /100