

Chemistry 333

Examination #2

July 2, 2004

Professor Charonnat

Name: _____

Be certain that your examination has six (6) 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.

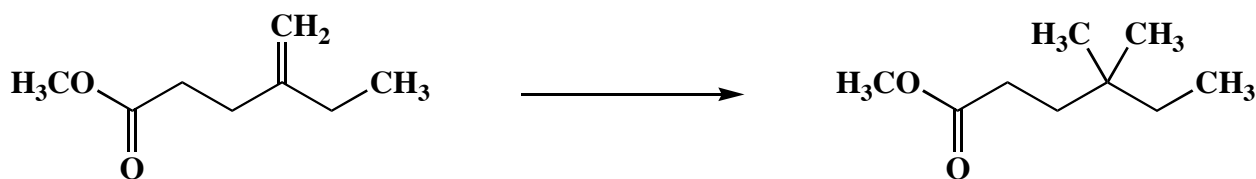
Molecular models are allowed for this examination. All electronic devices, including calculators, are unnecessary and are not allowed.

Name: _____

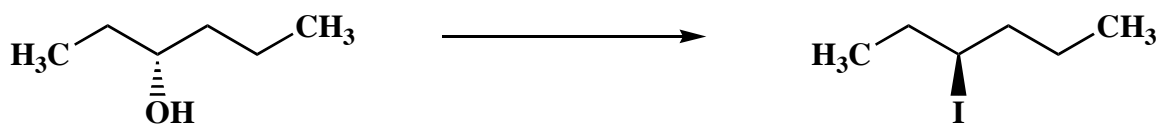
1. (25 points)

Draw the specific reagent(s) necessary to effect the transformation shown for each of the following three (3) questions. If more than one step is required, be certain to specify each step separately.

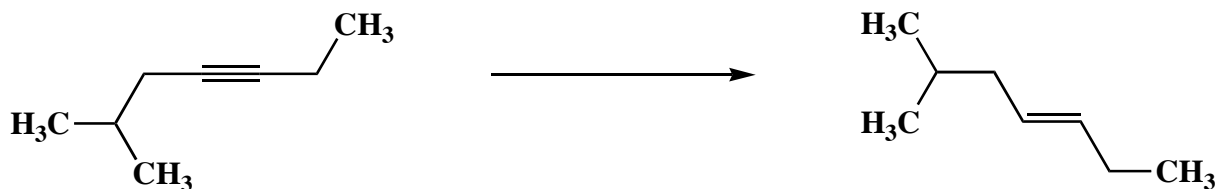
A.



B.



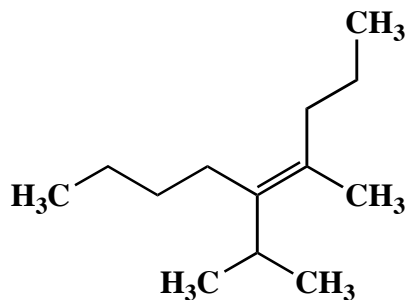
C.



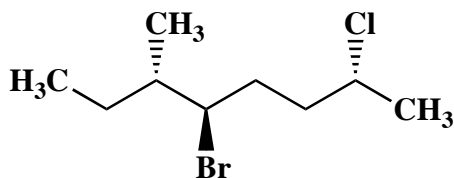
2. (20 points)

Use IUPAC nomenclature to write the systematic names of the following two (2) compounds.

A.



B.



Name: _____

3. (30 points)

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

A. In an E1cB reaction:

1. deprotonation occurs first, followed by departure of the leaving group
2. departure of the leaving group occurs first, followed by a deprotonation
3. deprotonation and departure of the leaving group occur simultaneously

B. Oxymercuration of an alkene proceeds via a:

1. radical intermediate
2. mercurinium ion intermediate
3. carbocation intermediate

C. E2 reactions:

1. favor *syn*-elimination
2. favor *anti*-elimination
3. afford equal amounts of *syn*- and *anti*-elimination

D. S_N1 reactions involving relatively stable carbocations typically afford:

1. complete inversion of configuration
2. a mixture of inversion and retention of configuration, favoring inversion of configuration
3. a 1:1 mixture of inversion and retention of configuration

E. Rank the following compounds from least to most reactive as S_N2 substrates:

1. *n*-PrCl, *n*-PrBr, *n*-PrI
2. *n*-PrCl, *n*-PrI, *n*-PrBr
3. *n*-PrI, *n*-PrBr, *n*-PrCl

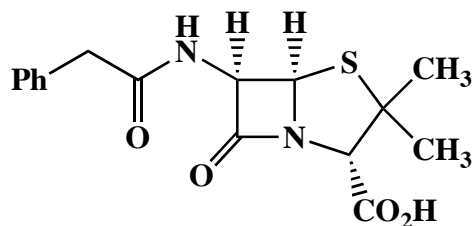
F. (2*R*, 3*S*)-2,3-dibromobutane:

1. has a positive specific rotation at 25 °C
2. has a positive specific rotation at 0 °C
3. is optically inactive at 25 °C

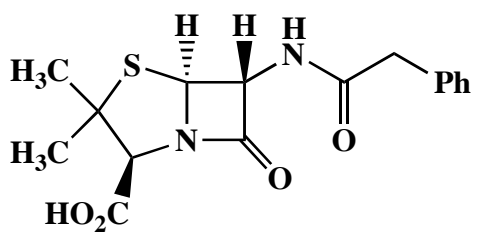
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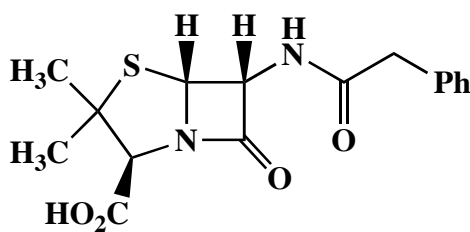
4. (30 points)

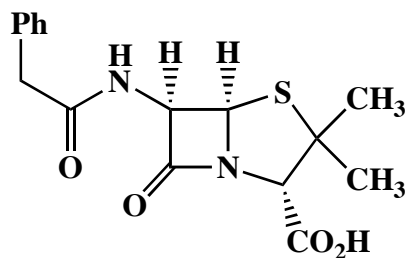
Penicillin G is an important β -lactam antibiotic. State the relationship between each of the following six (6) structures and penicillin G (identical, enantiomer, diastereomer, structural isomer, conformational isomer, different compound that is not isomeric).

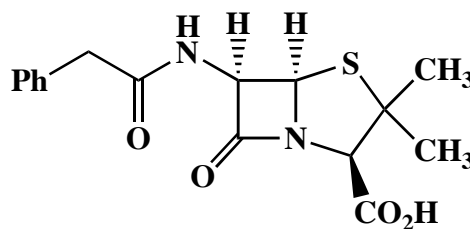


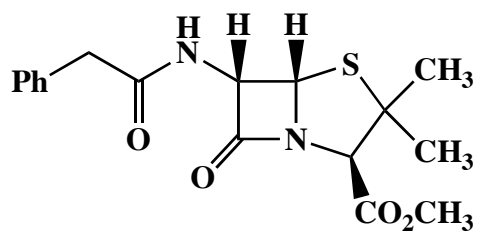
penicillin G

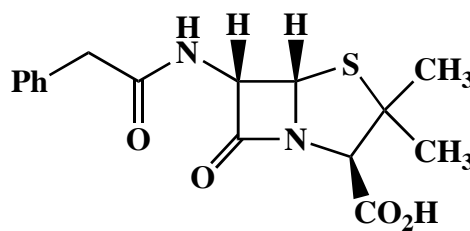








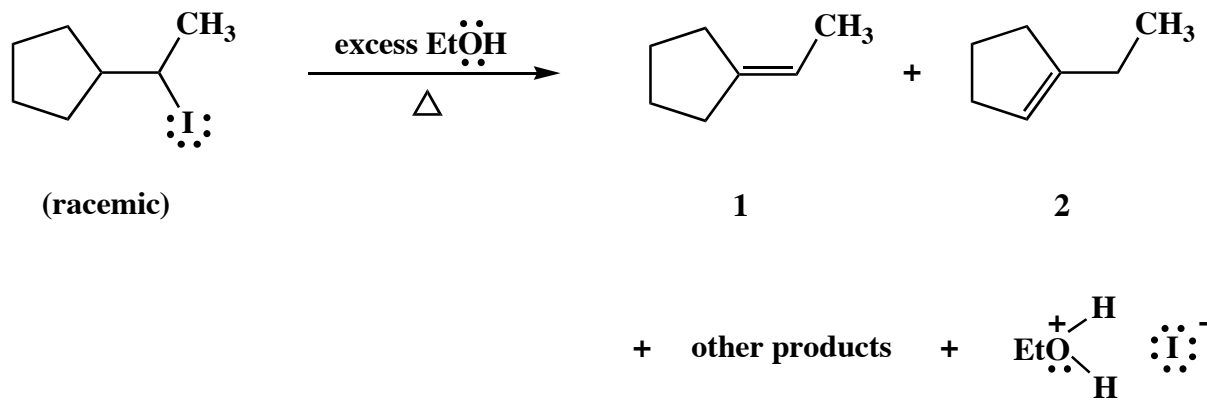




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5. (25 points)

Draw the mechanism of the following reaction, using the curved-arrow notation to indicate the reorganization of electron density. Show all pathways that form alkenes **1** and **2**. Show **all** intermediates and denote **all** lone pairs, nonzero formal charges and countercharges.



Name: _____

6. (20 points)

Answer the following two (2) questions precisely, succinctly and with correct grammar. Draw reaction-energy diagrams (graphs of potential energy versus reaction progress) to illustrate both answers.

A. Why are primary kinetic isotope effects observed in E2 reactions, but not in E1 reactions?

B. Use the Hammond postulate to explain why an S_N2 reaction that creates a stronger nucleophile-carbon bond proceeds more rapidly than a similar S_N2 reaction that creates a weaker nucleophile-carbon bond.

Congratulations! Happy Fourth of July!

1	/25
2	/20
3	/30
4	/30
5	/25
6	/20
Total:	<hr/> /150