

CHEM 3311-100 Spring 2007

Exam 3

Professor R. Hoenigman

High = 92

Low = 15

Average = 54

I pledge to uphold the CU Honor Code:

Signature _____

Name (printed) _____

Last four digits of your student ID number _____

Recitation TA _____

Recitation number, day, and time _____

You have 1 hour and 30 minutes to complete this exam.

No model kits or calculators allowed.

Periodic table and scratch paper are attached.

DO NOT TURN THIS PAGE UNTIL INSTRUCTED TO DO SO.

Recitation Sections:

| # | Day | Time | TA |
|-----|-----------|-------|-------|
| 121 | Tuesday | 8 am | Kelly |
| 131 | Tuesday | 1 pm | Kelly |
| 141 | Wednesday | 8 am | Greg |
| 151 | Wednesday | 12 pm | Greg |
| 153 | Wednesday | 12 pm | Kelly |
| 152 | Wednesday | 5 pm | Kelly |
| 171 | Thursday | 12 pm | Greg |

SCORE:

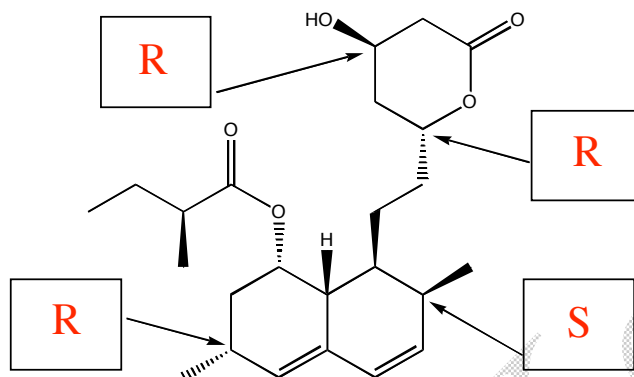
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Page 2 _____/10 Page 5 _____/26

Page 3 _____/24

TOTAL _____/100

1. (8 pts) Lovastatin, shown below, is a cholesterol-lowering drug produced by Merck. In the boxes below give the stereochemical designator for each indicated chirality center.



2. (5 pts) The following questions pertain to neopentyl bromide.

A. Draw neopentyl bromide.



B. Does neopentyl bromide undergo an S_N2 reaction? Why or why not?

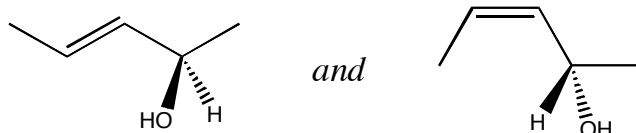
No, even though neopentyl bromide is a primary bromide it cannot undergo an S_N2 reaction because it is too hindered for backside attack from the nucleophile.

3. (5 pts) Why is it necessary to allow a geminal dihalide to react with three equivalents of sodium amide in liquid ammonia, followed by an aqueous workup, in order to obtain a terminal alkyne?

Since NH_2^- is a strong base it can react with the starting material, the alkene intermediate, and the terminal alkyne product. In order to ensure the reaction goes to completion, we use three equivalents of $NaNH_2$ to convert all of the starting material to the deprotonated alkyne. The aqueous workup converts the alkyne anion to the neutral alkyne.

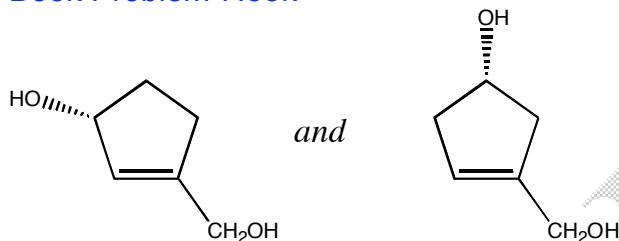
4. (10 pts) In the boxes below, indicate whether each pair of compounds are constitutional isomers, diastereomers, enantiomers, the same compound, or have no relation.

A. [Book Problem 7.33i](#)



Diastereomers

B. [Book Problem 7.33k](#)



Constitutional Isomers

C.

cis-3-methylcyclopentanol

and

(1*R*,3*R*)-3-methylcyclopentanol

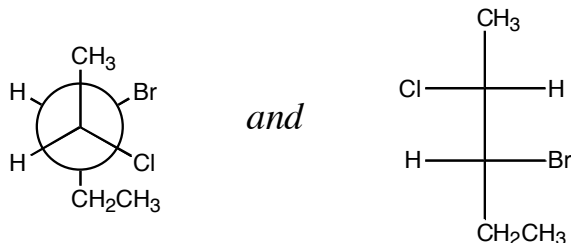
Diastereomers

D. [Book Problem 7.33d](#)



Enantiomers

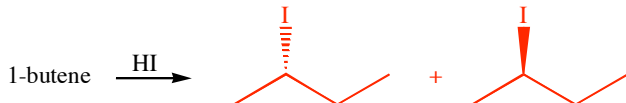
E.



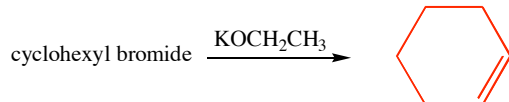
Enantiomers

5. (24 pts) Give the major organic product(s) of each of the following reactions. If necessary, clearly show the stereochemistry of the products. If no reaction occurs, write NR.

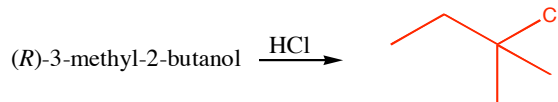
A. Book Problem 7.44a



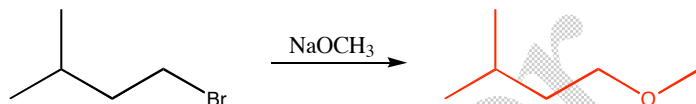
B. Book Problem 8.13a



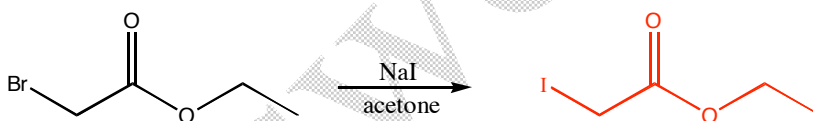
C. Book Problem 8.17



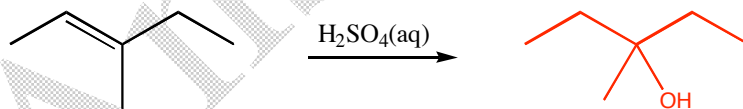
D.



E. Book Problem 8.20a



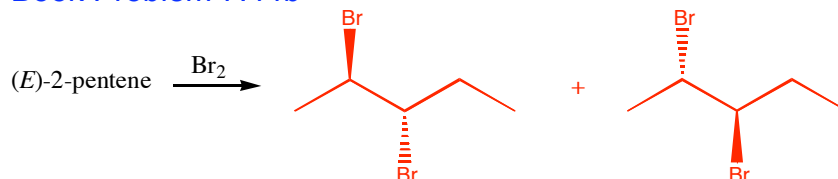
F.



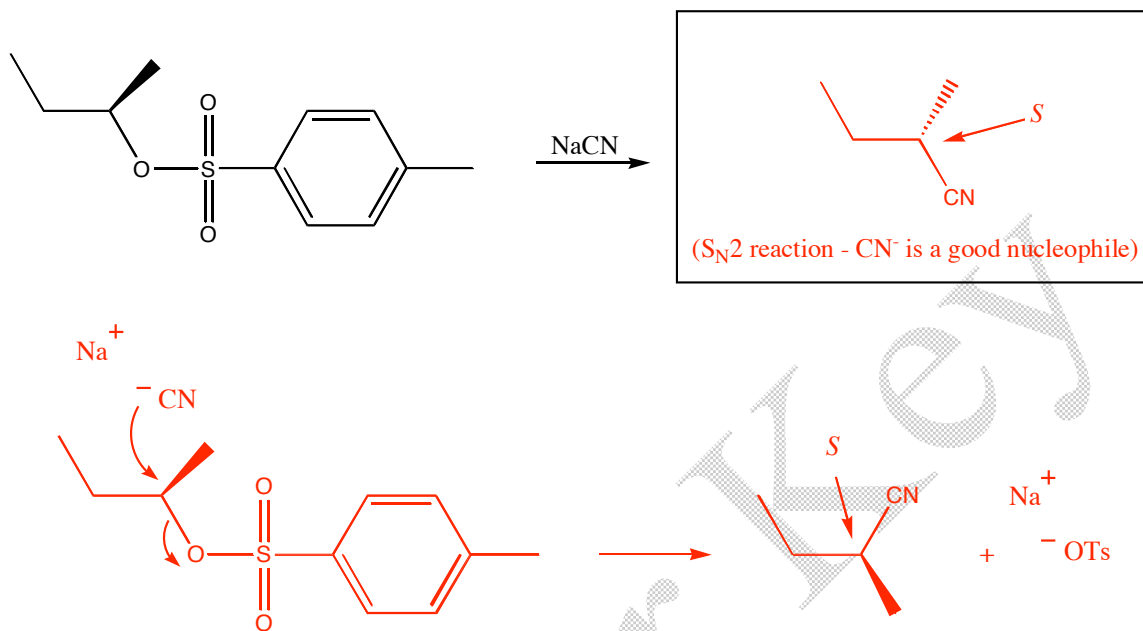
G.



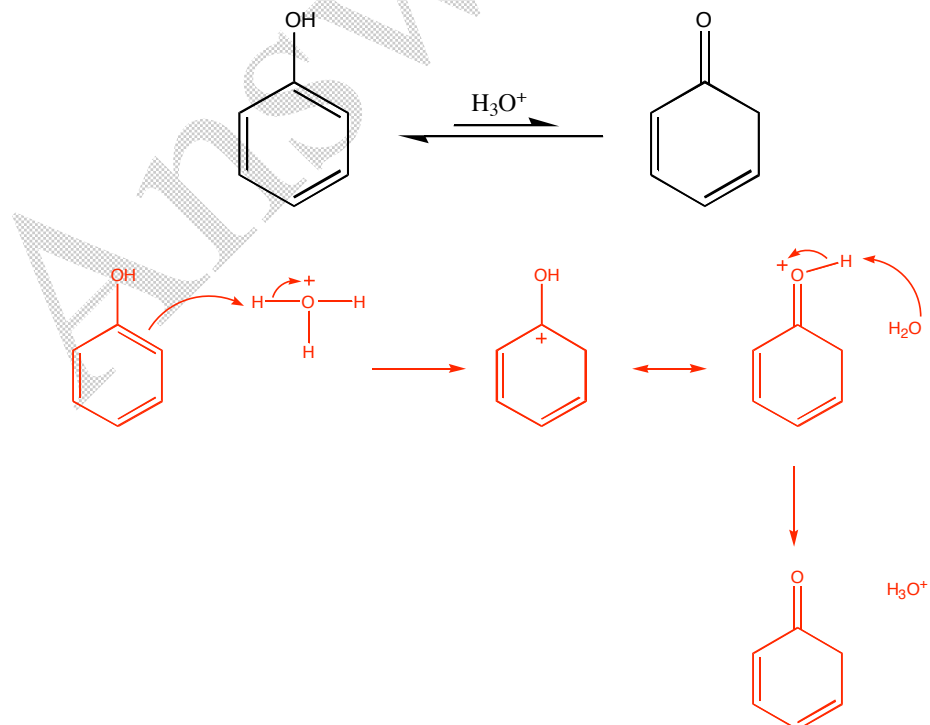
H. Book Problem 7.44b



6. (12 pts) Fill in the organic product(s) of the following reaction and, using arrows to show the flow of electrons, draw a mechanism to account for its formation.

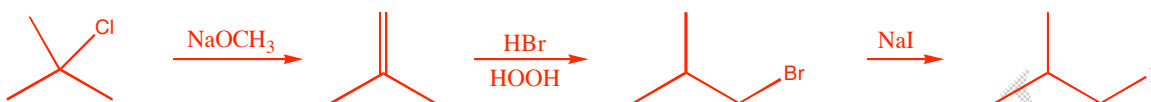


7. (10 pts) Using curved arrows to show the flow of electrons, propose a mechanism for the acid catalyzed enol-keto tautomerization shown below.



8. (26 pts) Propose an efficient synthesis for each of the following transformations. You may use any reagents you like. Be sure to show any intermediates. (Do not draw a mechanism.)

A. isobutyl iodide *starting from* *tert*-butyl chloride (10 pts)
 Book Problem 8.32f



B. *trans*-2-hexene *starting from* *cis*-2-butene (16 pts)

