EXAM 3

Comprehensive Organic Chemistry

CHEMISTRY 225b

Friday, March 31, 2006

NAME (print): _____

TA:_____ Section Day:_____ Section Time:_____

No Calculators! Take a few moments to look over the exam. Answer each question on the exam paper.

Important clues and structures are in **bold**.

Do all **preliminary** drawing or computations on the work sheets at the end of the exam. The work sheets will not be graded.

The exam is 55 minutes.

STOP writing and hand in your exam when you are asked to do so.

REMEMBER: Neatness is to your advantage.

1. (25 pts) Structure _____

2. (25 pts) Potpourri _____

3. (25 pts) Reactions _____

4. (25 pts) Synthesis _____

_____

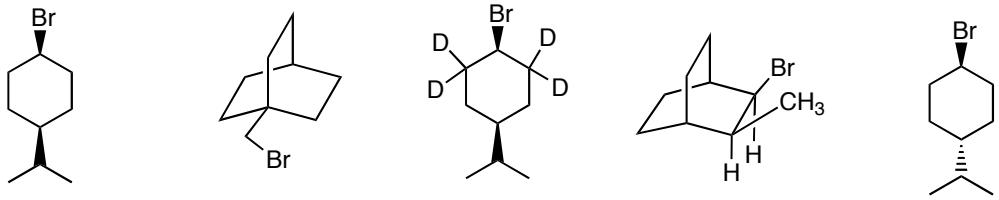
Total (100 pts)

1. (25 pts.) **Structure:** Compound (*S*)-**A** ($C_7H_{15}Br$) reacts **readily** with water to give optically active **B**, $C_7H_{16}O$. Compound **A** reacts with aq. NaOH to give achiral **C** (major) and optically active **D** (minor). When compound **A** is exposed to *tert*-C_4H_9OK/*tert*-C_4H_9OH, the ratio **C/D** decreases relative to the same ratio in the reaction with NaOH. What are the structures **A**-**D**? Explain and illustrate.

2. (5 x 5 pts. = 25 pts.) **Potpourri:** Complete each of the following questions.

a) The compound $C_{14}H_{25}BrClN_3O$ has how many degrees of unsaturation? Show work.

b) **Circle** the compound expected to have the greatest rate of E_2 elimination.



c) **Circle** the greatest number of compounds at the same oxidation level.

CH_3CH_2OH $HOCH_2CH_2OH$ CH_3CHO CH_3CHCl_2 $ClCH_2CH_3$

d) **Circle** the terms that may apply to E_2 reactions.

0^o dihedral angle concerted bond cleavage isotope effect

bimolecular kinetically controlled

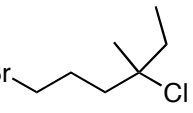
e) As a rule, a convergent synthesis is preferred over a linear synthesis. Explain briefly.

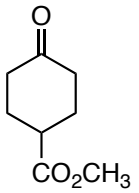
3. (25 pts.) **Reactions:** Complete each of the following questions. **Pay attention** to stereochemistry, etc.

a) (3*S*, 4*R*)-3-chloro-4-methyloctane $\xrightarrow[C_2H_5OH]{C_2H_5ONa}$ **A** (major) **B** (minor) **C** (minor)

all are isomers; **B** and **C** are geometrical isomers;%**B**>%**C**.

b) *cis*-1-bromo-4-methylcyclohexane $\xrightarrow[\text{ethanol}]{\text{NaSCN}}$ **A** ($C_8H_{13}NS$)

c) (R)-  $\xrightarrow[\text{room temperature}]{\text{excess methanol}}$ **A**

d)  $\xrightarrow[C_2H_5OH]{NaBH_4}$ **A** (more stable) + **B** (less stable)

A and **B** are diastereomers

4. **Synthesis:** Design a synthesis of 3-ethyl-3-hexanol using only C_1 and C_2 compounds as the source of carbon atoms. All other reagents are available to you.

Work Sheets

Name: _____

Work Sheets

Name: _____

Work Sheets