**First Examination** **Chemistry 118B(A)** **February 3, 2006**
**(Closed book, no models)**

Name _____**Key**_____
(Please print) Last First Middle initial
Last 4 digits of Students ID Number:_____

**Circle the name of the TA whose section you attend.**

| Section | TA | Sect. | TA | Sect. | TA |
|---|---|---|---|---|---|
| 1 | Aurea Chu | 7 | Thelma Garcia | 13 | Nannan Tao |
| 2 | Aurea Chu | 8 | Thelma Garcia | 14 | Grace Chavis |
| 3 | Marci Amii | 9 | Shengshu Huang | 15 | Marci Amii |
| 4 | Vahid Eskandari | 10 | Mike Varela | 16 | Mike Lodewyk |
| 5 | Radhika Bachu | 11 | Vahid Eskandari | 17 | Grace Chavis |
| 6 | Nannan Tao | 12 | Mike Varela | 18 | Mike Lodewyk |

**Repeaters** : Please write the name of your designated TA here _____.

1) This exam consists of 5 pages (including this page) and 6 questions.

2) Do not turn the pages until 11:00 am.

3) Turn in your paper to one of the teaching staff by 11:50 am.

4) Put your initials in the upper right corner of the next 4 pages. Be sure you have pages 2-5.

5) Please answer clearly in the spaces provided. Back of the pages are only for scratch work.

6) Any request for regrading should be done according to the TA's instruction.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1<br>H | | | | | | | | 2<br>He |
| 2 | 3<br>Li | 4<br>Be | | 5<br>B | 6<br>C | 7<br>N | 8<br>O | 9<br>F | 10<br>Ne |
| 3 | 11<br>Na | 12<br>Mg | | 13<br>Al | 14<br>Si | 15<br>P | 16<br>S | 17<br>Cl | 18<br>Ar |
| 4 | 19<br>K | 20<br>Ca | | 31<br>Ga | 32<br>Ge | 33<br>As | 34<br>Se | 35<br>Br | 35<br>Kr |
| 5 | 37<br>Cs | 38<br>Sr | | 49<br>In | 50<br>Sn | 51<br>Sb | 52<br>Te | 53<br>I | 53<br>Xe |

| Page | Score |
|---|---|
| 2 | /25 |
| 3 | /44 |
| 4 | /21 |
| 5 | /10 |
| Total | /100 |

1. (15 Pts). Multiple choice. Circle one.

a. In the reduction of alkynes using sodium in liquid ammonia, which of the species below is not believed to be an intermediate in the commonly accepted mechanism?

A) vinyl cation B) vinyl radical C) vinyl anion D) radical anion

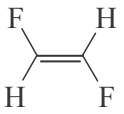
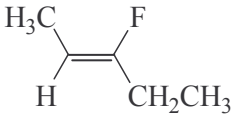
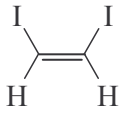
b. In the addition of hydrogen bromide to alkynes in the absence of peroxides, which of the following species is believed to be an intermediate?

A) carbene B) vinyl radical C) vinyl cation D) vinyl anion

c. Which of the species below is the weakest base?

A) $CH_3ONa$ B) $CH_3MgBr$ C) $CH_3Li$ D) $NaNH_2$

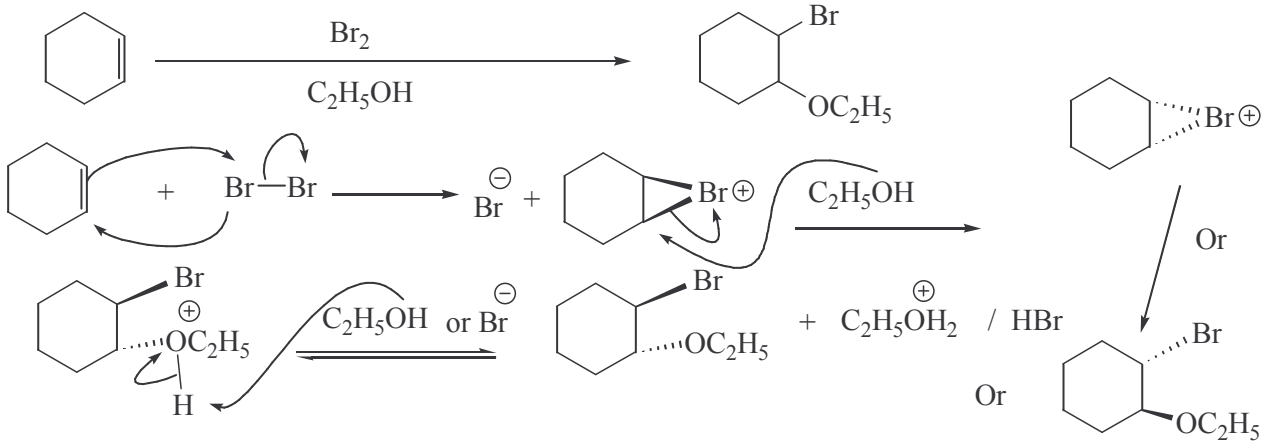
d. The most polar compound:

A)  B) $CH_3(CH_2)_2CH_2OH$ C)  D) 

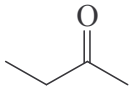
e. How many degree of unsaturation are implied by the molecular formula $C_7H_8ClNO_2$?

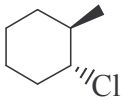
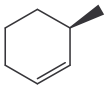
A) 1 B) 2 C) 3 D) 4 E) 5

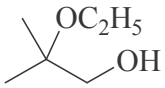
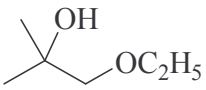
**2.** (10 Pts) Write a complete, stepwise, detailed mechanis for the following reaction. Show the stereochemistry clearly.

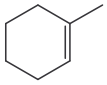
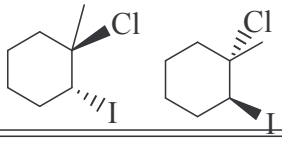


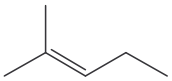
**3.** (36 Pts) Provide the structure(s) of the expected **major** organic product(s). Unless mentioned otherwise, you can assume that all reagents are present in one mole. **Show stereochemistry where needed and write NR if there is no reaction.**

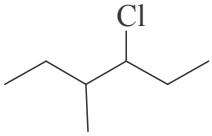
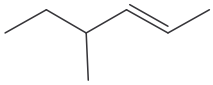
a. $CH_3CH_2C{\equiv}CH$ $\xrightarrow[H_2O_2,\ NaOH,\ H_2O]{1)\ R_2BH}$ $CH_3CH_2CH_2CHO$ 

b.  $\xrightarrow[C_2H_5OH]{NaOC_2H_5}$ 

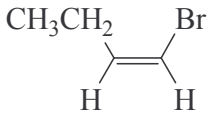
c.  $\xrightarrow[H^+]{C_2H_5OH}$  

d.  $\xrightarrow{ICl}$ Anti-addition 

e.  $\xrightarrow[C_2H_5OH]{NaOC_2H_5}$ NR

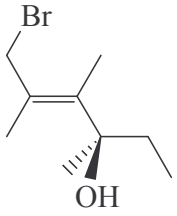
f.  $\xrightarrow[C_2H_5OH]{KOC(C_2H_5)_3}$ 

g. $C_2H_5CH{=}CH_2$ $\xrightarrow[H_2O_2,\ h\upsilon]{HCl\ (1\ Equivalent)}$ $C_2H_5\underset{Cl}{C}H{-}CH_3$ Racemate

h. $CH_3CH_2C{\equiv}CH$ $\xrightarrow[R_2O_2,\ h\upsilon]{HBr}$  $CH_3CH_2CH{=}CHBr$

i. $C_2H_5{-}C{\equiv}C{-}H$ $\xrightarrow[H_2O]{Br_2}$ $CH_3CH_2\overset{O}{\overset{\|}{C}}CH_2Br$

**4.** (8 Pts) Name the following compound.



2 Pts 2 Pts

**(3R)-(4E)-6-Bromo-3,4,5-trimethylhex-4-en-3-ol**

**(3R)-(4E)-6-Bromo-3,4,5-trimethyl-4-hexen-3-ol**

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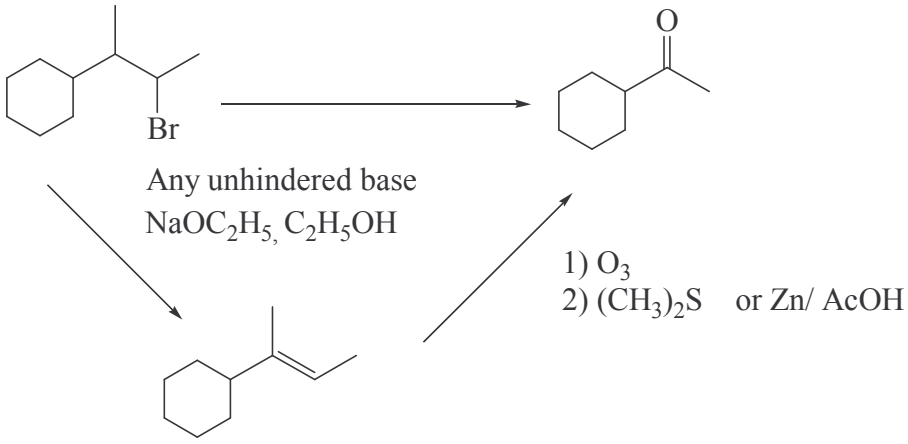
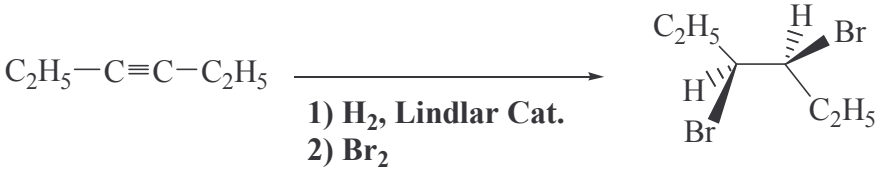
**(R)-(E)-6-Bromo-3,4,5-trimethyl-4-hexen-3-ol**

**5.** (21 Pts) Show how you would carry out the following transformations in high yield. In addition to the reactants, you may use any organic, and inorganic reagents. You don't need to show the mechanism, just write the steps in order you do the reactions.

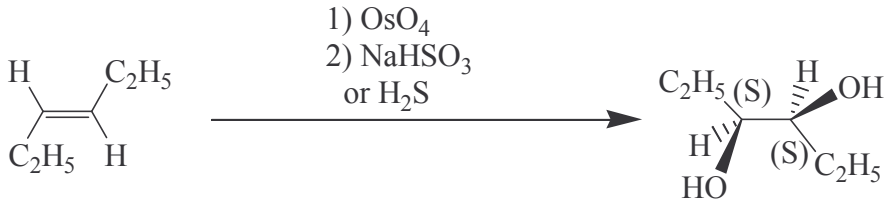
a. (8 Pts)




b. (8 Pts)




c. (5 Pts)



**6.** (10 Pts) Using the following spectra, draw a possible structure for $C_6H_{10}O$.

Answer

**$CH_3CH_2CH_2C{\equiv}CCH_2OH$**