

CHEM 3311-200  
Exam 3  
November 20, Fall 2008

By printing my name below, I pledge that  
"On my honor, as a University of Colorado at Boulder student, I have neither given nor  
received unauthorized assistance on this work."

Name ANSWER KEY  
Student CU ID # \_\_\_\_\_

Recitation TA's Name \_\_\_\_\_ (Bailey, Meylemans)  
Recitation Day & Time \_\_\_\_\_

Grading Information

Page #	Points Possible	Your Score
2 (Questions 1 & 2)	25	—
3 (Question 3)	20	—
4 (Question 4)	27	—
5 (Questions 5 & 6)	28	—

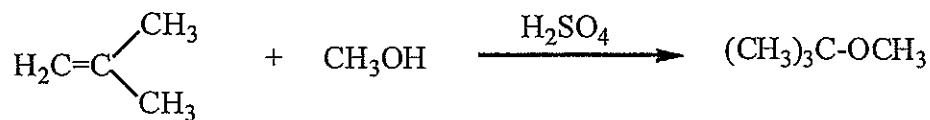
\_\_\_\_\_ TOTAL (out of 100)

General Instructions

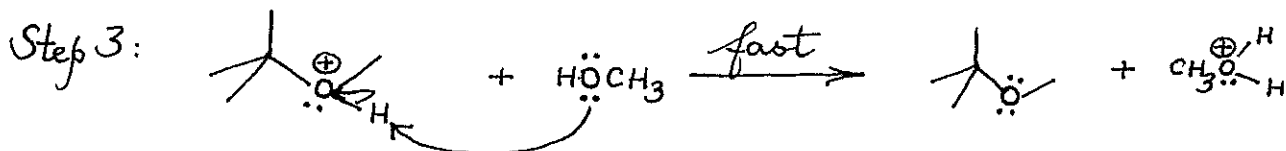
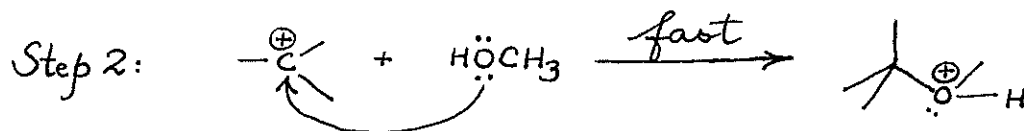
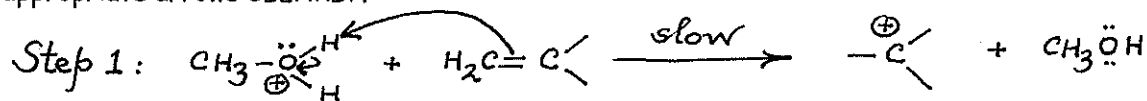
- (1) This is a CLOSED BOOK exam! No notes and molecular models are allowed.
- (2) You have 2 hours to complete the exam.
- (3) Write your name at the top of each page, starting with page 2.
- (4) Use the back of exam pages for scratch paper.
- (5) Cell phones must be turned off; cell phones, headsets, and Bluetooth devices must be placed in a backpack or on the floor, and may not be accessed during the exam. Students violating this policy will be asked to leave and will receive a zero for the exam.
- (6) If caught cheating, you will receive at best an F for this exam. The instructor reserves the right to proceed further, in compliance with university policies.

Name: Answer Key

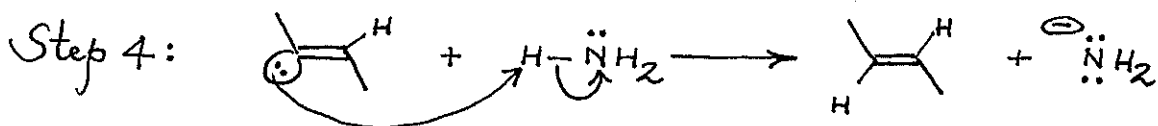
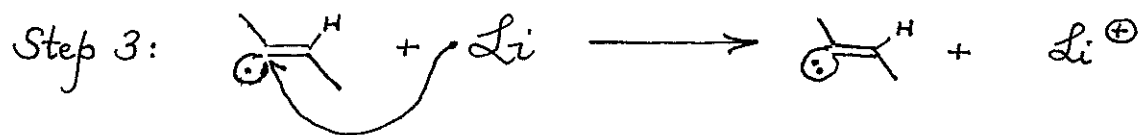
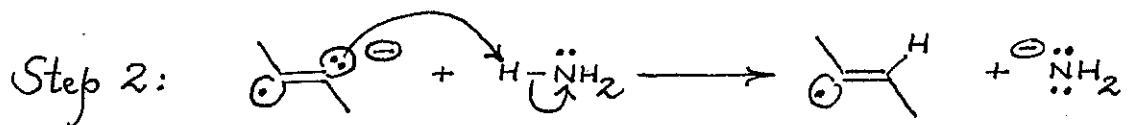
1. (10 points) Write a reasonable mechanism for the reaction shown:



Please label each step as Step 1, Step 2, etc. and show all lone pairs or unpaired electrons and the appropriate arrows CLEARLY.

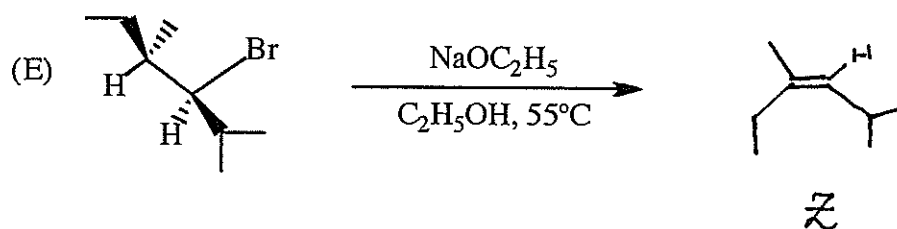
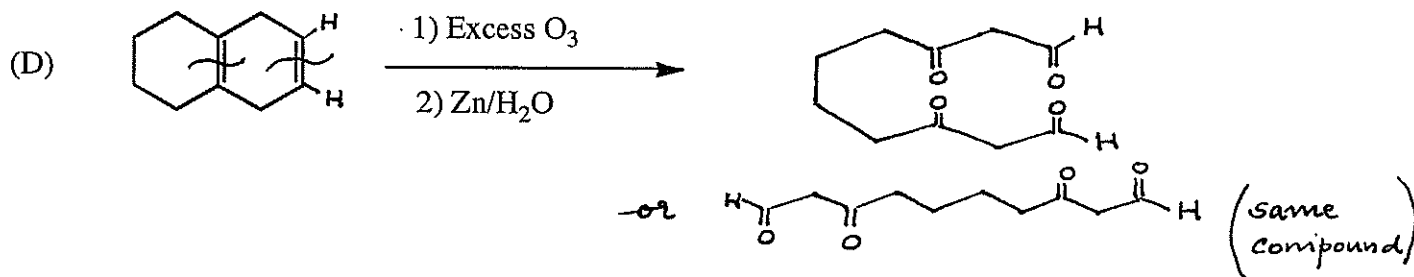
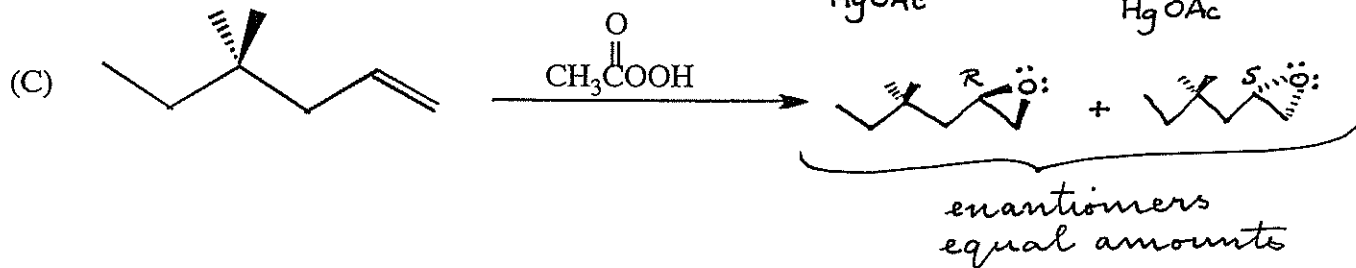
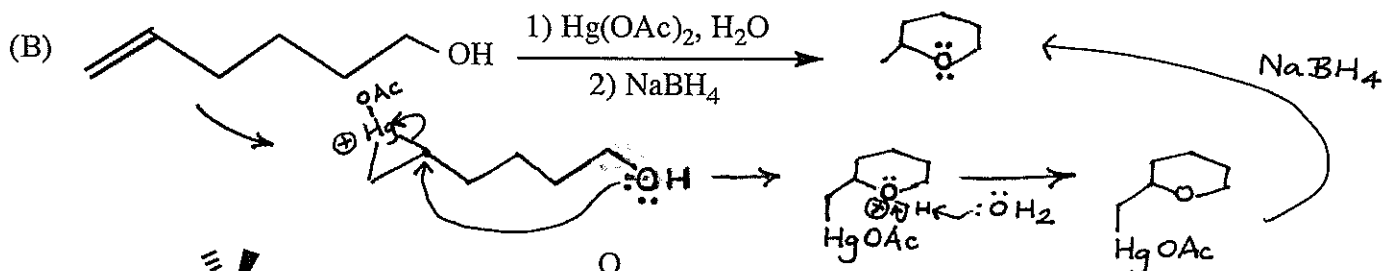
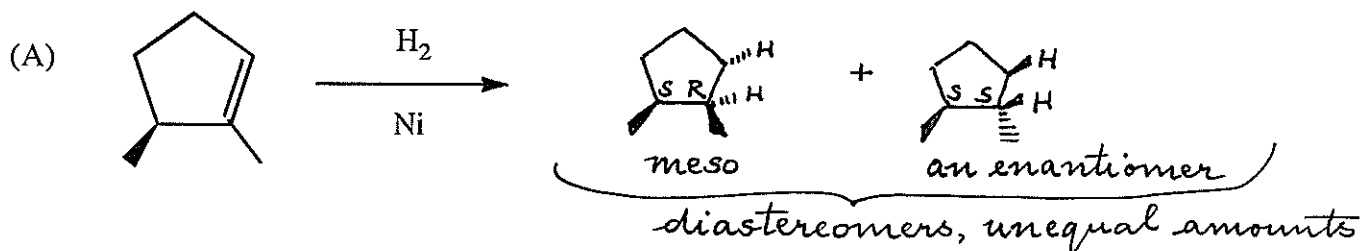


2. (15 points) Write a clear, legible, stepwise mechanism for the reaction of 2-butyne with lithium in liquid ammonia. Please label each step as Step 1, Step 2, etc. and show all lone pairs or unpaired electrons and the appropriate arrows CLEARLY.



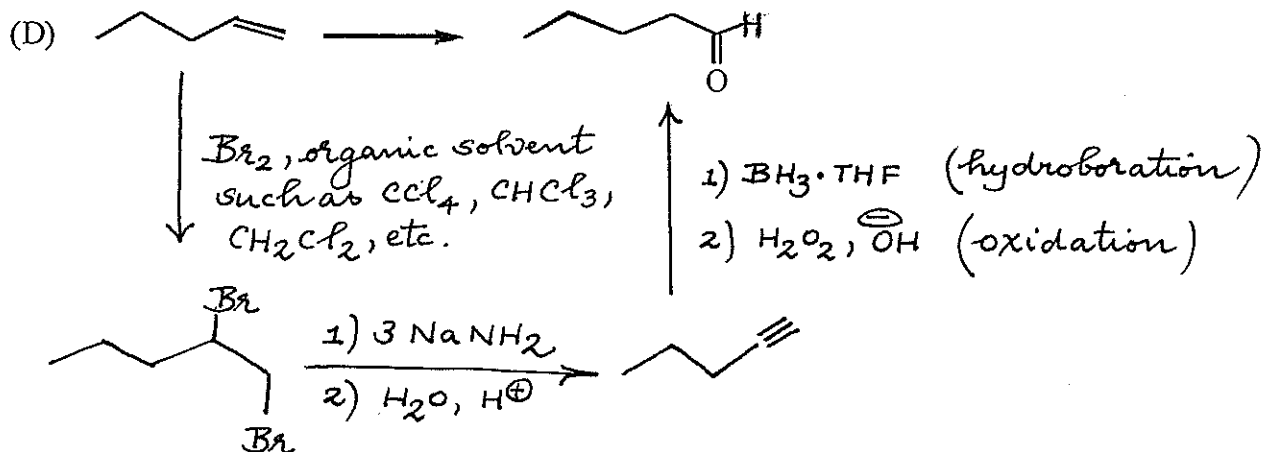
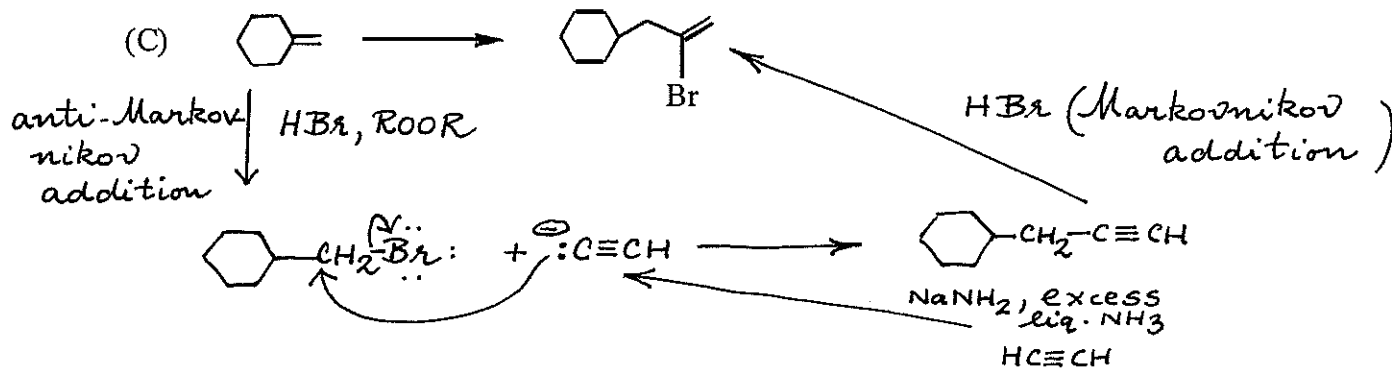
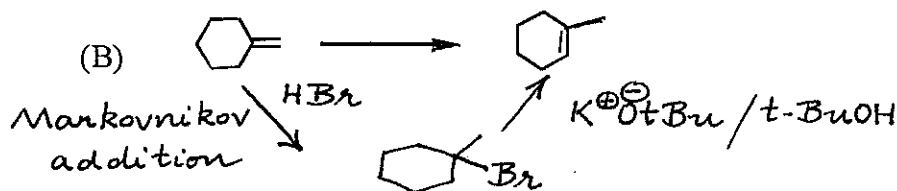
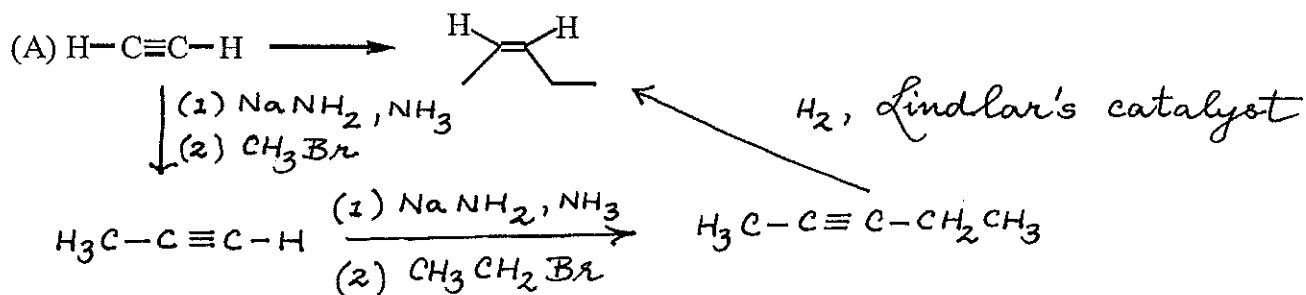
Name: Answer Key

3. (20 points) Provide the missing products for the following reactions (each reaction has an appropriate work-up). For reactions that produce stereoisomers, draw the structures with correct stereochemistry and label the products as "enantiomers" or "diastereomers". CLEARLY indicate if they would be produced in equal or unequal amounts. Please label "meso" or E or Z where relevant.



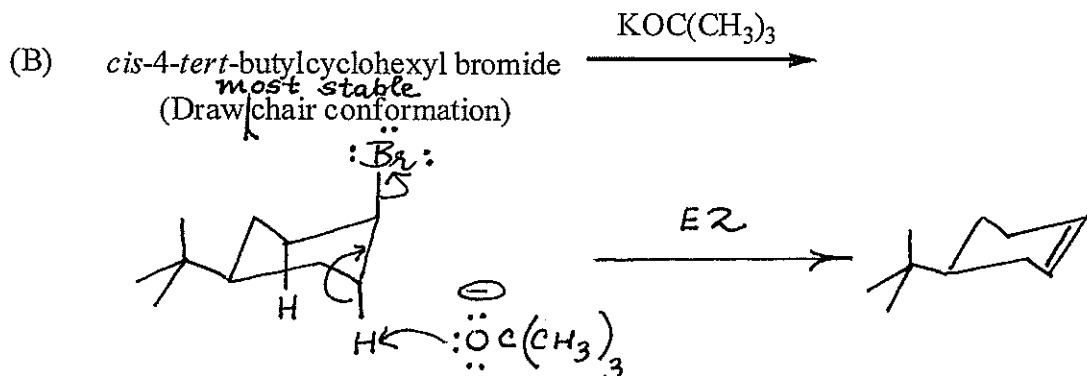
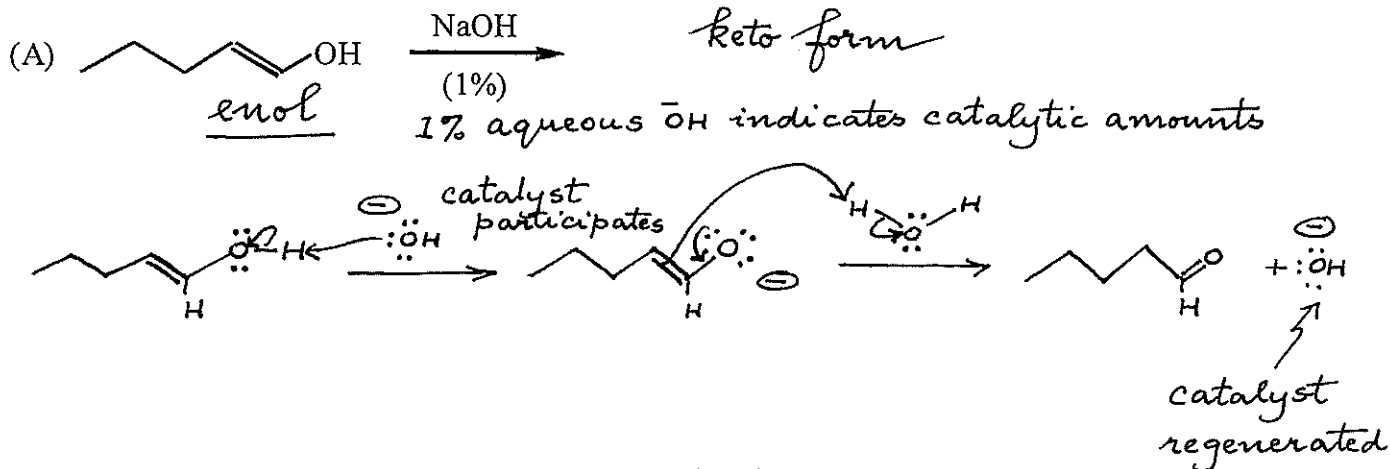
Name: Answer Key

4. (27 points) Complete the syntheses shown below using organic reagents of 5 carbons or less and any inorganic reagents you wish. If your synthesis requires more than one step, you MUST write the structure of the product formed in each step.



Name: Answer Key

5. (18 points) Provide the products and mechanisms for these reactions. Please show every intermediate clearly as well as all arrows, lone pairs, and formal charges.



6. (10 points)

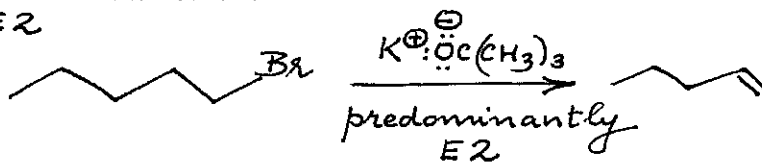
(A) Consider the reaction of 1-bromopentane with each of the reagents listed in the choices. Which conditions would yield the highest elimination/substitution ratio?

(A)  $\text{NaOCH}_2\text{CH}_3$ , ethanol,  $55^\circ\text{C}$   $\text{S}_{\text{N}}2$  &  $\text{E}2$

(B)  $\text{NaSH}$ , ethanol-water,  $25^\circ\text{C}$   $\text{S}_{\text{N}}2$  only

(C)  $\text{KOC(CH}_3)_3$ ,  $(\text{CH}_3)_3\text{COH}$ ,  $55^\circ\text{C}$

(D)  $\text{KCN}$ ,  $\text{DMSO}$ ,  $40^\circ\text{C}$   $\text{S}_{\text{N}}2$  only



(B) When compound X was reacted with  $\text{HBr}$  and then with  $\text{NaN}_3$  in acetone, the major product was 2-azidohexane. What is the identity of X?

(A) 1-Bromohexane

(B) 2-Bromohexane

(C) 1-Hexene

(D) 2-Hexene

