Chemistry 334

Examination #1

October 4, 1999 Professor Charonnat

Name: _____

Be certain that your examination has seven (7) pages including this one.

Put your name on **each** page of this examination booklet.

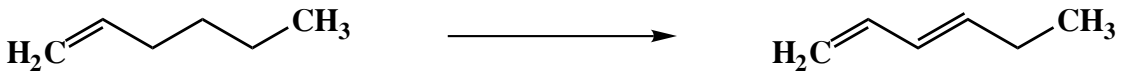
By putting your name on this examination booklet you agree to abide by
California State University, Northridge policies of academic honesty and integrity.

Name:_____

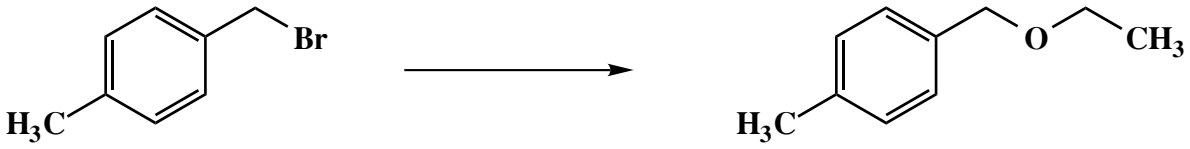
1. (25 points)

For each of the following five (5) questions, draw the specific reagent(s) necessary to effect the transformation shown. If more than one reaction is involved in an answer, be certain to distinguish the individual steps clearly.

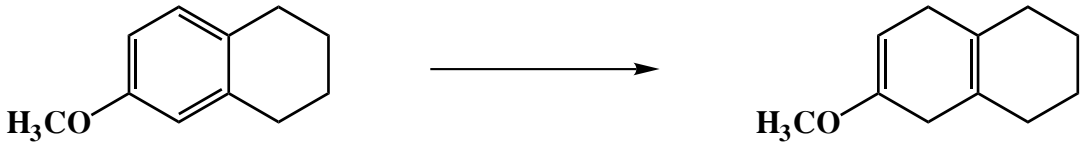
A.



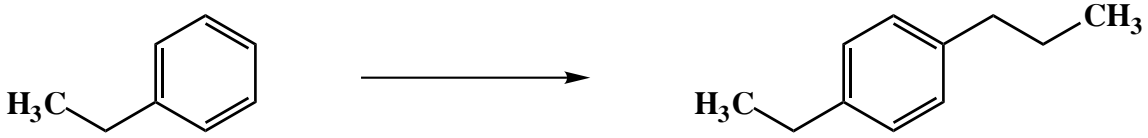
B.



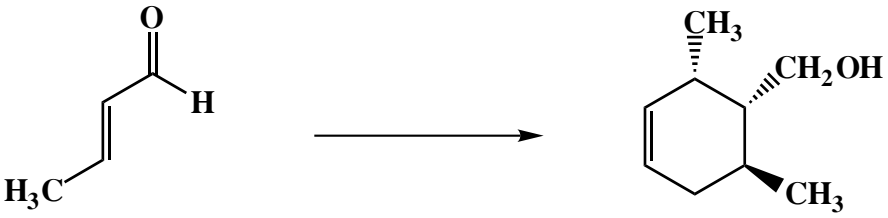
C.



D.



E.

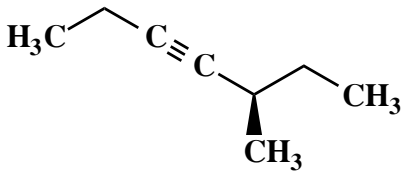


(racemic)

Name:_____

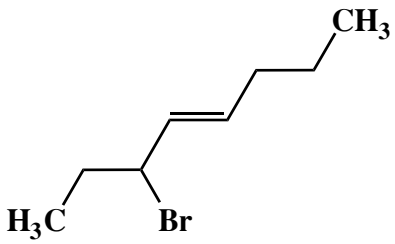
2. (10 points)

Use IUPAC nomenclature to write the systematic name of the following unsaturated hydrocarbon.



3. (25 points)

Design a synthesis of the racemic allylic bromide **1** from acetylene, organic compounds that contain four or fewer carbons, and any additional inorganic reagents that are necessary. Show all reagents and stable synthetic intermediate compounds. Use a star to mark each step that creates a chiral product. Explain clearly why any of these steps affords a racemic mixture of the allylic bromide **1**.

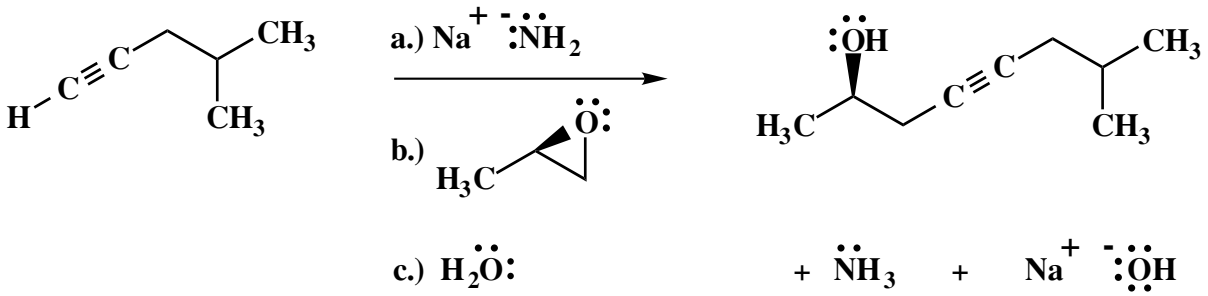


1

Name:_____

4. (20 points)

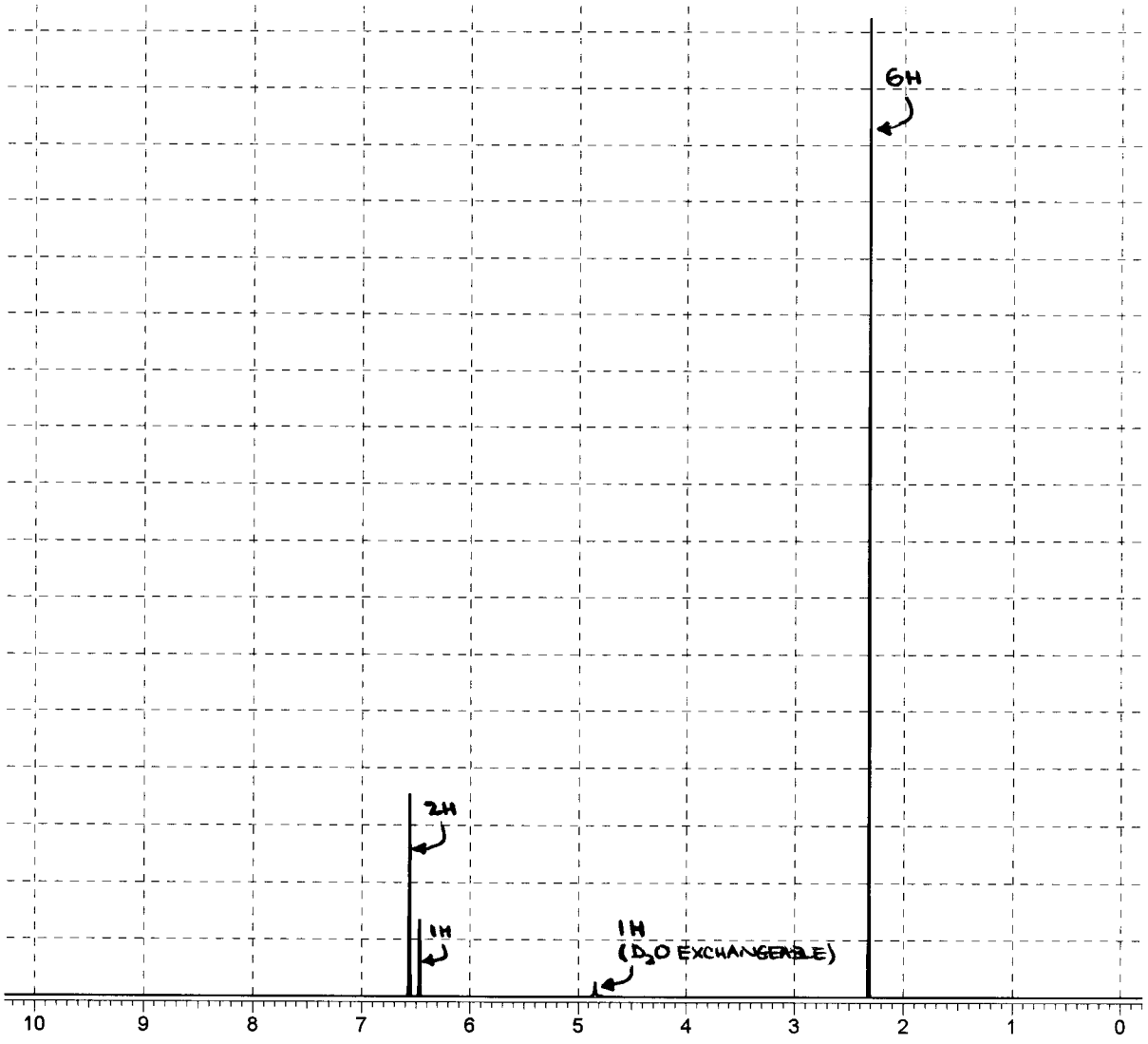
Draw the mechanism of the following reaction, using the curved-arrow notation to indicate the reorganization of electron density. Show all intermediates and denote all lone pair electrons, formal charges and countercharges where appropriate. Draw all important resonance contributors for intermediates. Explain the mechanistic basis for the observed regiochemistry of the epoxide opening.



Name:_____

5. (20 points)

The ^1H NMR spectrum of compound A ($C_8H_{10}O$) is shown below. Clearly assign all the resonances and draw the structure of compound A.



Name:_____

5. (cont.)

^{1}H NMR assignments:

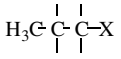
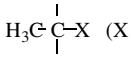
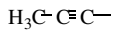
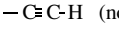
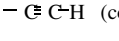
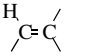
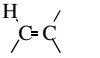
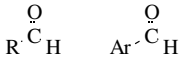
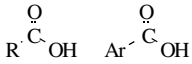
chemical shift (ppm)	**assignment**	**explanation of multiplicity**

structure of compound A:

Congratulations!

1	/25
2	/10
3	/25
4	/20
5	/20
Total:	/100

SELECTED ^{1}H NMR CORRELATIONS

structural type	chemical shift range (ppm)
cyclopropyl	0.0 - 0.9
RNH_2 R_2NH	0.5 - 5.0 [a]
$-CH_3$ (saturated)	0.7 - 1.3
 (X = halogen, O, N, carbonyl)	0.9 - 1.2
 (saturated)	1.2 - 1.3
 (saturated)	1.4 - 1.6
 (X = halogen, O, N, carbonyl)	1.0 - 2.0
ROH	1.0 - 5.0 [a]
	1.6 - 1.9
	1.8 - 2.2
	1.9 - 2.6
H_3C-Ar	2.1 - 2.6
	2.1 - 3.0
 (nonconjugated)	2.0 - 2.6
 (conjugated)	2.8 - 3.1
H_3C-X (X = halogen, O)	2.6 - 4.4
$Ar\text{-}NH_2$ Ar_2NH	3.0 - 5.0 [a]
	3.3 - 4.2
ArOH	4.0 - 10.0 [a]
 (nonconjugated)	4.6 - 5.0
 (nonconjugated)	5.1 - 5.9
 (conjugated)	5.3 - 6.3
 (conjugated)	5.3 - 7.7
ArH	6.0 - 9.5
	9.5 - 10.5
	9.7 - 13.2