Chemistry 118 B
Spring 2010
Final
Thurs. June 10, 2010
Instructor: Lievens

This exam contains ten (10) pages and eleven (11) problems. Please make sure that your copy contains all ten (10) pages. If there is a problem, please tell the exam administrator prior to beginning. Please answer all questions. Remember that UCDavis Code of Academic Conduct applies to this exam and all other graded work in this class.

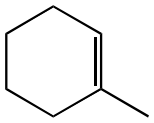
Name: _____
Last First MI

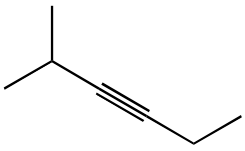
Student ID. # _____

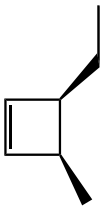
T.A./ Lab Section: _____

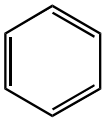
Page #	Points	Page #	Points
2		7	
3		8	
4		9	
5		10	
6		Total (213)	

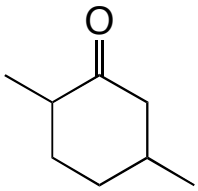
1. **Reactions:** (24 pts). Draw the structure of the expected organic product(s) formed in the following reactions including correct stereochemistry. If the product is racemic write both isomers or write racemic. Assume all reagents listed are present in excess unless otherwise noted. If no reaction occurs, state 'No Reaction'.

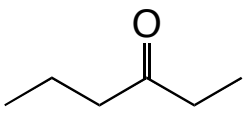
A)  CH_2N_2, hv →

B)  Lindlar's Cat. / H_2 →

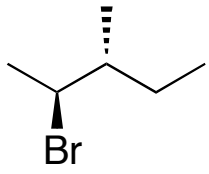
C)  heat →

D)  1) HNO_3, H_2SO_4 → 2) Zn(Hg), HCl, heat 3) CH_3CH_2COCl

E)  NH_2NH_2, NaOH, heat →

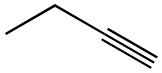
F)  I_2 (xs), NaOH (xs) →

2. **Reactions:** (24 pts). Draw the structure of the expected organic product(s) formed in the following reactions including correct stereochemistry. If the product is racemic write both isomers or write racemic. Assume all reagents listed are present in excess unless otherwise noted. If no reaction occurs, state 'No Reaction'.

G) 

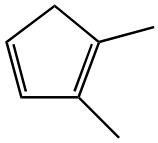
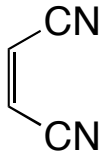
$CH_3)_3COK$

$(CH_3)_3COH$

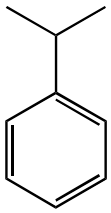
H) 
1) LDA

2) CH_3CH_2Cl

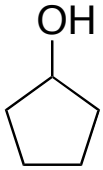
3) Br_2 (xs), CCl_4

I) 


heat

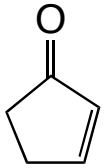
J) 
1) SO_3, H_2SO_4

2) Br_2 (1eq), $FeBr_3$

K) 

1) PCC

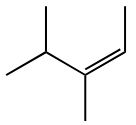
2) NH_2OH

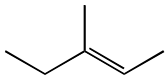
L) 

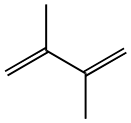
1) $((CH_3CH_2CH_2)_2CuLi$

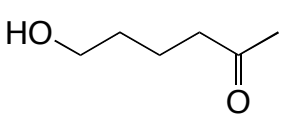
2) CH_3CH_2I

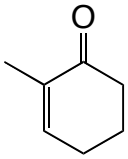
3. **Reactions:** (24 pts). Draw the structure of the expected organic product(s) formed in the following reactions including correct stereochemistry. If the product is racemic write both isomers or write racemic. Assume all reagents listed are present in excess unless otherwise noted. If no reaction occurs, state 'No Reaction'.

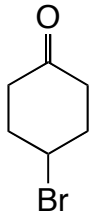
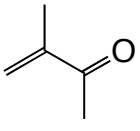
M)  1) $HgSO_4$, H_2O, NaOH
2) $NaBH_4$, CH_3CH_2OH

N)  1) mCPBA
2) H_3O^+

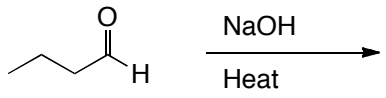
O)  HCl (1 eq)
40° C

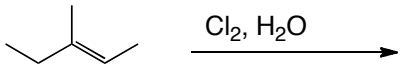
P)  H_2SO_4 (cat.)

Q)  1) $LiAlH_4$
2) H_3O^+

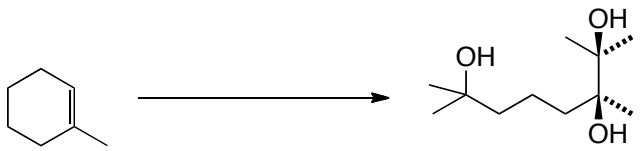
R)   H_2O, NaOH, heat

4. **Mechanisms:** (30 pts). Show the detailed reaction mechanism for each of the following reactions. Include the structure of the expected products and all relevant resonance structures.

A) 

B) 

5. **Synthesis:** (21 pts). Show how you would carry out the following synthesis. Include the reagents you would need for each step and the intermediate products formed in each step.



6. **Vocabulary:** (23 pts.) Fill in the blanks with the appropriate vocabulary word. If two words are given circle the correct one.

A) At high temperatures we usually get the most stable _____ formed this is called _____ control

B) Conjugated alkenes are **more / less** reactive and **more / less** stable than non-conjugated alkenes.

C) The Saytzev elimination uses an _____ base to give the **most / least** substituted alkene.

D) Generally the α-carbon of a carbonyl acts as a good **nucleophile / electrophile** while the carbon in the carbonyl itself acts as a good **nucleophile / electrophile.**

E) Acetals can be formed from carbonyls using **base / acid / both / neither** as a catalyst, they are **always / sometimes / never** difficult to isolate as pure compounds.

F) Formation of a diol with OsO_4 and alkene will give a **syn / anti** addition of the new atoms,

G) Which of the following is a meta director. Circle all that apply.

a. –CN -Br -COR -OH $-CH_3$ $-CF_3$ $-NH_2$

H) In the electrocyclic opening of 5,6-dimethyl-1,3-cyclohexadiene with heat, the reaction proceeds in a _____ direction.

I) Which of the following is an activator. Circle all that apply.

a. –CN -Br -COR -OH $-CH_3$ $-CF_3$ $-NH_2$

J) **True / False.** Intramolecular aldol reactions prefer to make 5 and 6 carbon rings.

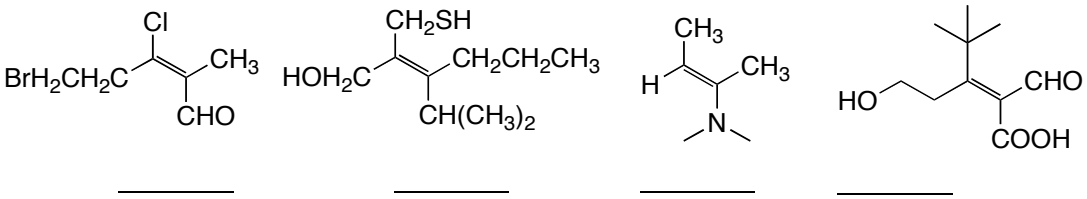
K) **True / False** In α,β-unsaturated ketones the alkene generally reacts like an alkene and the carbonyl reacts like a carbonyl.

L) True / False. Ketones make good nucleophiles, but poor electrophiles in aldol reactions.

M) **Alcohols / aldehydes / ketones / alkenes** have priority in nomenclature under the IUPAC system.

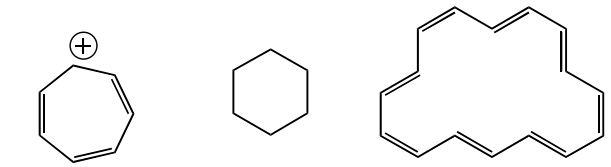
N) In ^1H NMR of alkenes _____ couplings occur between H on the same carbon and generally are **0-3 / 4-10 / 6-14 / 10-18** Hz.

7. **Identification:** (4 pts) Label each of the given molecules as E or Z.

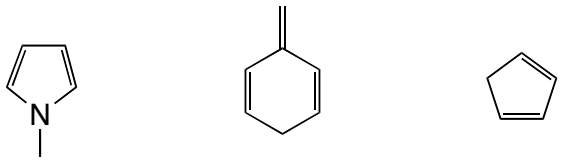


_____ _____ _____ _____

8. **Identification:** (6 pts). Label each of the given molecules as aromatic, nonaromatic, or antiaromatic.

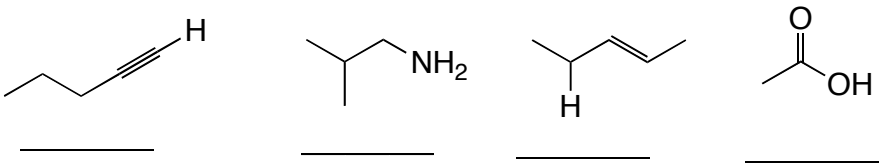


_____ _____ _____

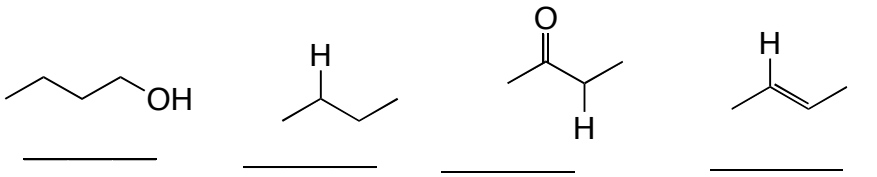


_____ _____ _____

9. **Identification:** (8 pts). Match each of these with their pKa given below.
pKa's = 4.75, 15.7, 20, 25, 35, 40, 44, and 50

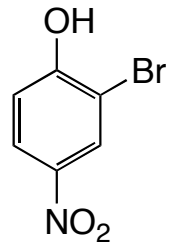


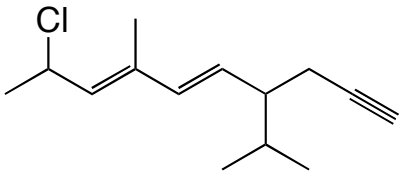
_____ _____ _____ _____

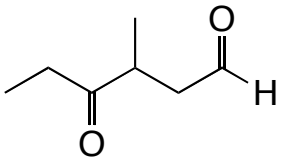


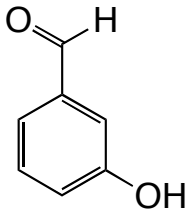
_____ _____ _____ _____

10. **Nomenclature:** (15 pts.). Give the proper (IUPAC) chemical name or draw the structure of each of the following compounds.

A) 

B) 

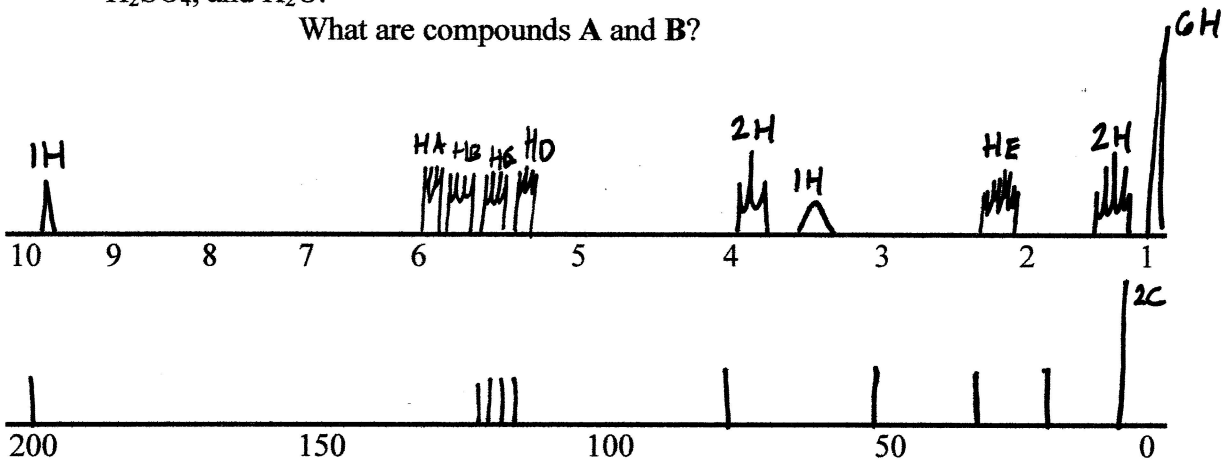
C) 

D) 

E) Z-2-methyl-3-bromodec-3-en-6-yn-2-ol

11. **Spectroscopy:** (34 pts.) The unknown compound **A** ($C_{11}H_{18}O_2$) gives the following proton and carbon NMR spectra. Significant IR peaks were also observed. Compound **B** forms after reacting compound **A** with an excess of CrO_3, H_2SO_4, and H_2O.

What are compounds **A** and **B**?



IR: ν 3327 (broad), 3105 2950, 2750 1715, 1620, 1209, cm^{-1}.

H_A = 1H J = 18 Hz (d), 3 Hz (d)
H_B = 1H J = 16 Hz (d), 15 Hz (d), 3 Hz (d), 2 Hz (t)
H_C = 1H J = 16 Hz (d), 6 Hz (t), 1 Hz (d)
H_D = 1H J = 18 Hz (d), 15 Hz (d), 1 Hz (d)
H_E = 2H J = 7 Hz (t), 6 Hz (d), 2 Hz (d),