Chemistry 118 B
Spring 2011
Second Midterm
Fri. May 20th, 2011
Instructor: Lievens

This exam contains seven (7) pages and nine (9) problems. Please make sure that your copy contains all seven 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.
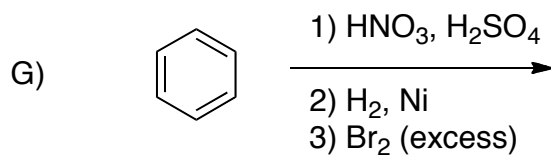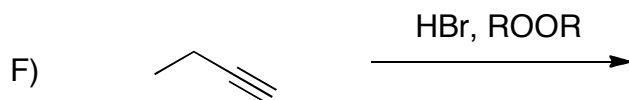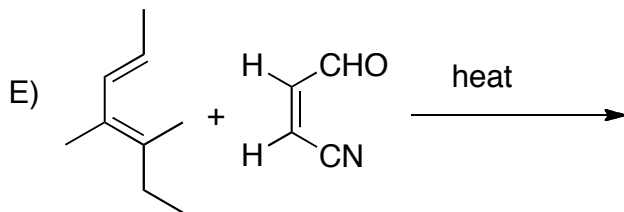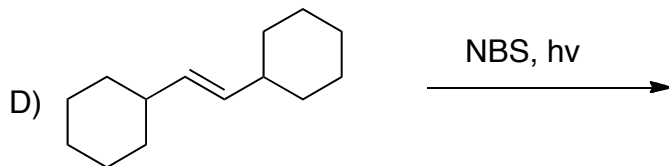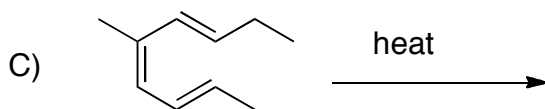
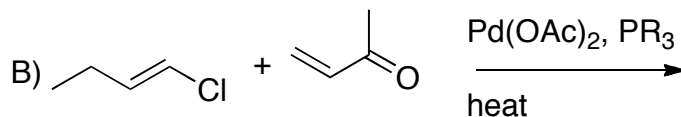**Name:** _____
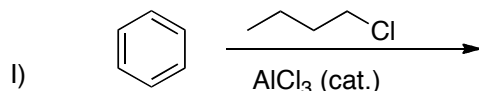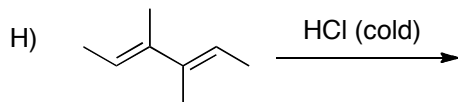   Last   First   MI

Student ID. # _____

T.A./ Lab Section: _____

Page #	Points
2	
3	
4	
5	
6	
7	
Total (123)	

1. **Reactions:** (28 pts). Draw the structure of the expected organic product(s) formed in the following reactions *including correct stereochemistry.* Assume all reagents listed are present in *excess* unless otherwise noted. If no reaction occurs, state 'No Reaction'.

A)

H_2O, H_2SO_4

heat

B)

+

$Pd(OAc)_2$, PR_3

heat

C)

heat

D)

NBS, hv

E)

H   CHO

+

H   CN

heat

F)

HBr, ROOR

G)

1) HNO_3, H_2SO_4

2) H_2, Ni

3) Br_2 (excess)
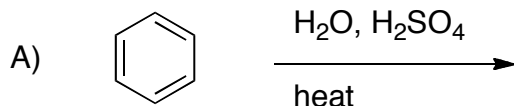
2. **Reactions:** (8 pts). Draw the structure of the expected organic product(s) formed in the following reactions *including correct stereochemistry.* Assume all reagents listed are present in *excess* unless otherwise noted. If no reaction occurs, state 'No Reaction'.

H)   [structure of a diene] $\xrightarrow{\text{HCl (cold)}}$

I)   [benzene] $\xrightarrow[\text{AlCl}_3 \text{ (cat.)}]{\text{[4-carbon chain with Cl]}}$

3. **Vocabulary:** (18 pts) Fill in the blanks with the appropriate vocabulary word. If two bold words are given circle the correct one.

    A) _____ are resonance donators, but are generally deactivating towards electrophilic aromatic substitution. They are also _____ directors.

    B) A meta director is **always / sometimes / never** an activating group.

    C) **True / False** A Diels-Alder works best with an electron-rich diene and an electron-poor dieneophile

    D) **True / False** Heat can close a conjugated diene to a cyclobutene and does so in a conrotory manner.

    E) A $-NH_2$ / **-OH** / **-CH$_3$** / **-NHCOCH$_3$** group on a benzene is the most activating towards electrophilic aromatic substitution. All these functional groups are _____ directors

    F) We generally get UV absorption by an organic molecule when we have at least **1 / 2 / 5 / 7 / 11** conjugated alkenes. We generally get visible color in an organic molecule when we have at least **1 / 2 / 5 / 7 / 11** conjugated alkenes

    G) Aromatic systems must be _____, _____, _____ and have _____ pi electrons.

    H) A reaction under _____ control gives the most stable product and generally occurs when the reaction is **hot / cold**.

    I) **True / False** Conjugated alkenes are more stable than non-conjugated alkenes.

    J) A conjugated system must have at least **2 / 4 / 6 / 10** parallel p-orbitals. These orbitals are **always / sometimes / never** alkenes

4. **Mechanism:** (13 pts.). Show detailed reaction mechanisms for the following reaction. Include all relevant resonance structures and the structure of the expected products.
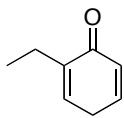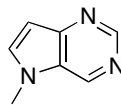
Br_2, $FeBr_3$

???
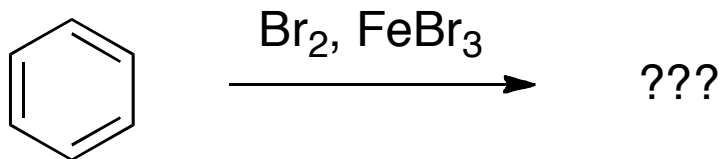
5. **Synthesis:** (14 pts) Show how you would carry out the following synthesis. Include the reagents you would need for each step and the structure of the intermediate products formed in each step.
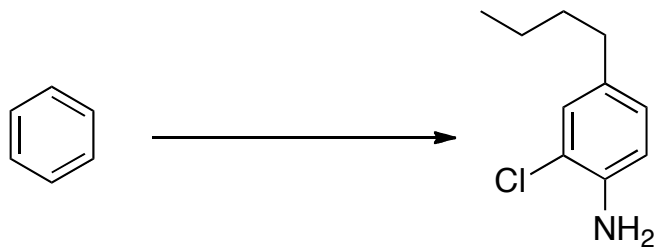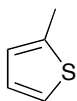
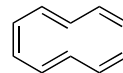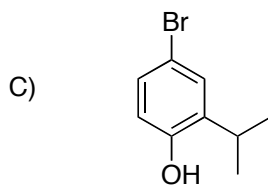6. **Identification:** (6 pts) Label each compound as aromatic, non-aromatic, or anti aromatic.

_____   _____   _____

_____   _____   _____
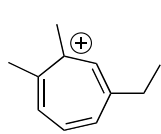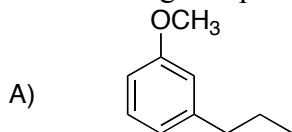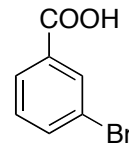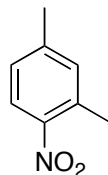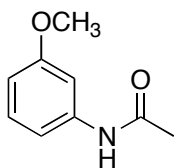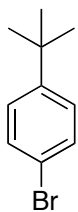
7. **Nomenclature:** (8pts.) Provide the systematic names or structure of each of the following compounds include E/Z where relevant.

A)

B)

C)
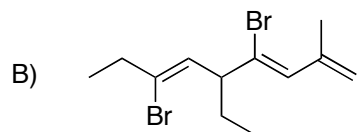
D)   p-propoxychlorobenzene

8. **Reactivity:** (8 pts) Circle the carbon(s) on each molecule that is/are most likely to undergo reaction in an electrophilic aromatic substitution reaction.

6

9. **Spectroscopy:** (20 pts.) The unknown compound **A** ($C_{16}H_{22}O$) gives the following proton and carbon NMR spectra. Significant IR peaks were also observed.

6H

1H

1H 1H 1H

2H

2H 1H

2H 2H 2H

8   7   6   5   4   3   2   1

200   150   100   50   0
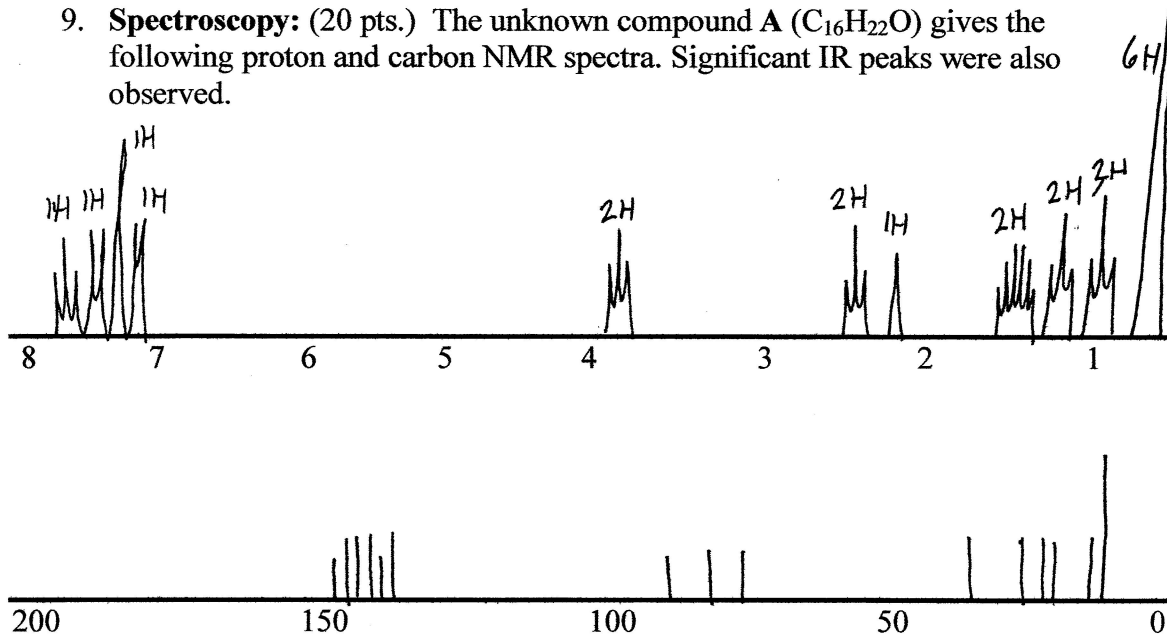
IR: 3324 (sharp), 3034, 2957, 2253, 1592, 1210, 792, 702, and fingerprint cm^{-1}.