

Second Exam

Name (PRINT) \_\_\_\_\_

Last, First

Chemistry 3332

Signature \_\_\_\_\_

March 16, 2007

ID# \_\_\_\_\_

**Please circle class time.**

**Dr. Bean's 10:00 AM**

**Dr. Bean's 1:00 PM**

Page #	Score	
1. 12 pts.		
2. 14 pts.		
3. 18 pts.		
4. 18 pts.		
5. 13 pts.		
6. 13 pts.		
7. 12 pts.		

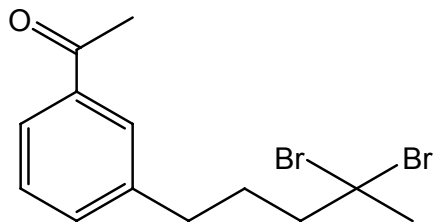
TOTAL \_\_\_\_\_

**Note: Present your student ID when you return the exam booklet**

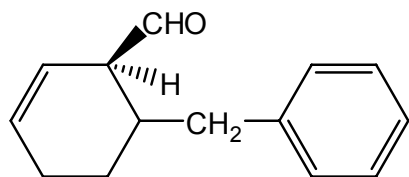
**A. Nomenclature:** (12 points)

Give an acceptable IUPAC name for each of the following compounds. Be sure to indicate the **stereochemistry** where appropriate.

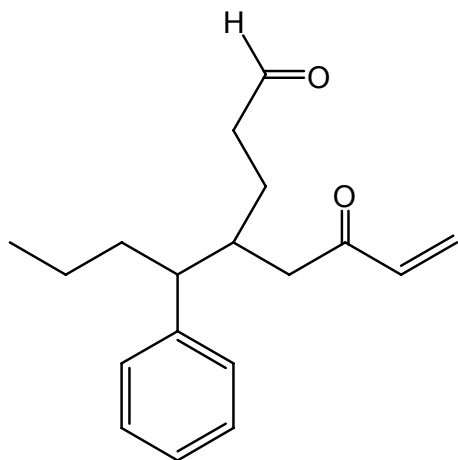
1.



2.

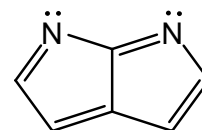
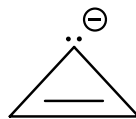
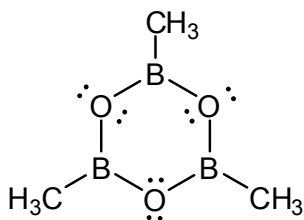
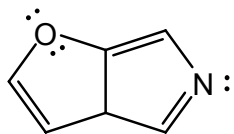


3.

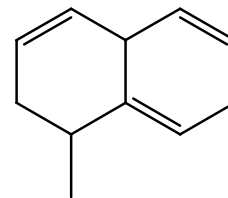
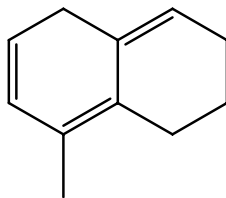
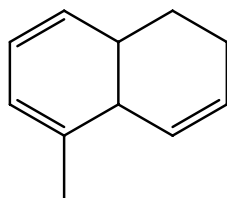


**B. Facts:** (14 points total)

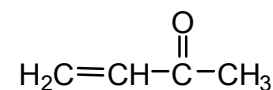
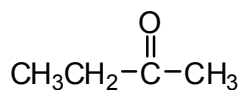
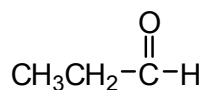
1. Label the molecules below as aromatic (**AR**), antiaromatic (**AA**), or nonaromatic (**NA**). You may assume all are planar. (8 pts.)



2. Place the compounds in increasing order of  $\lambda_{\max}$  (wavelength) for the  $\pi$  to  $\pi^*$  transition in the UV spectrum. (1=shortest wavelength, 3=longest wavelength) (3 pts.)



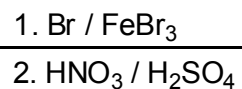
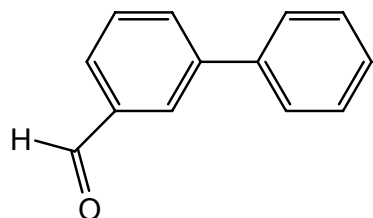
3. Consider the reaction of the compounds below with water. Place them in order of increasing amount of hydrate present at equilibrium. (1=least hydrate at EQ, 3=most hydrate at EQ) (3 pts.)



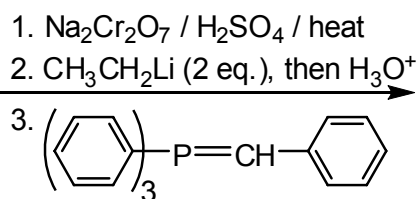
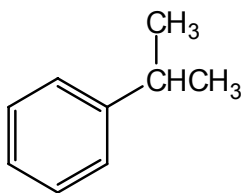
**C. Reactions:** Total = 36 points, 6 points each

Please provide the reagents or the major product in the answer box. Indicate **stereochemistry** if applicable. Partial credit is awarded only when intermediate products in a multi-step reaction are shown below the reaction.

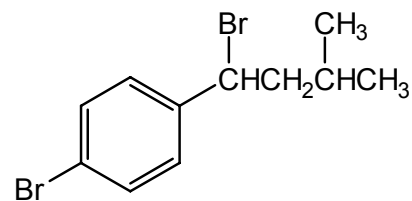
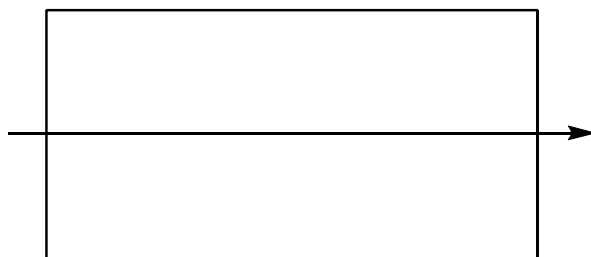
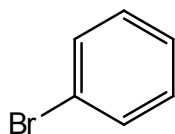
1.



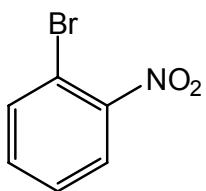
2.



3.



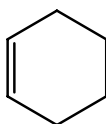
4.



1. NaOH (2 eq.) / heat  
 2. CH<sub>3</sub>Br  
 3. Na / NH<sub>3</sub> / EtOH



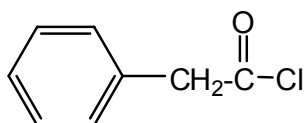
5.



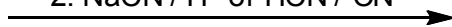
1. NBS / light  
 2. Mg / ether  
 3. CH<sub>3</sub>CH<sub>2</sub>CN, then H<sub>3</sub>O<sup>+</sup>



6.

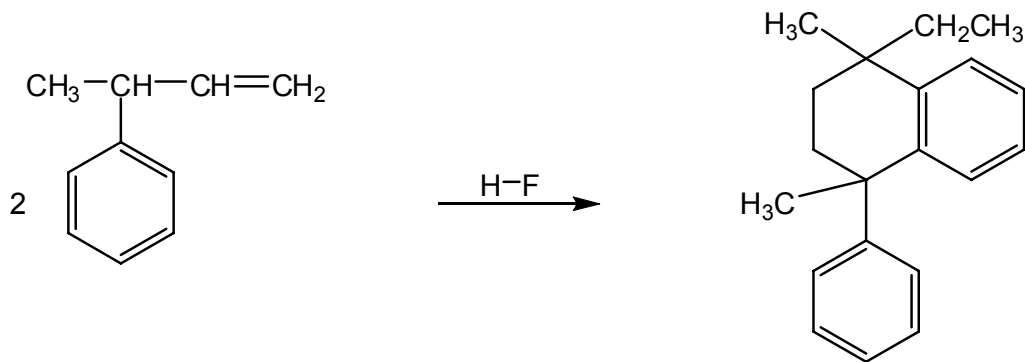


1. (CH<sub>3</sub>CH<sub>2</sub>)<sub>2</sub>CuLi  
 2. NaCN / H<sup>+</sup> or HCN / CN<sup>-</sup>  
 3. PCC / CH<sub>2</sub>Cl<sub>2</sub>



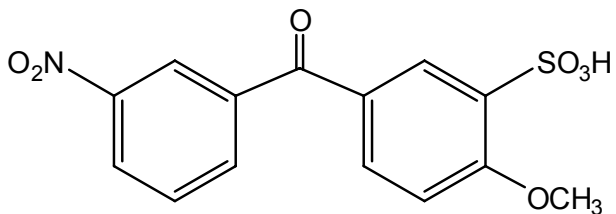
**D. Mechanisms:** (13 points)

Provide a clear mechanism to explain the formation of the product. Use curved arrows to indicate "electron flow". Remember to show only one step at a time. **Show all intermediates and all formal charges.** **When more than one resonance contributor may be drawn, be sure to draw the most stable contributor.**



**E. Synthesis:** 13 Points

Synthesize the molecule below using any of the following reagents: benzene, any **stable, one carbon** molecule, any inorganic reagents, any oxidizing or reducing agents, and any peroxyacids.



## F. Spectroscopy: 12 Points

A compound with the formula  $C_6H_{12}O$  exhibits the IR,  $^1H$  NMR and proton decoupled  $^{13}C$  NMR spectra shown below. Please identify this compound and draw the structure in the box provided below. (Note: The peak at 2.02 – 2.24 ppm represents two overlapped signals.)

