

Last Name WST

Seat No. _____

First Name _____

Lecture Section. A

(Please print your name)

**PLEASE REMOVE LAST PAGE OF EXAM BEFORE PRINTING YOUR NAME
ON THE BACK OF PAGE 6.
THERE ARE 7 PAGES TO THIS EXAM. CHECK TO MAKE SURE
YOU HAVE A COMPLETE EXAM.**

CHEMISTRY 331

EXAM V

Tuesday, December 4, 2007

I. (27 points) _____

II. (16 points) _____

III. (15 points) _____

IV. (24 points) _____

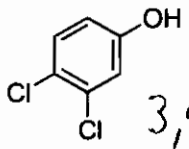
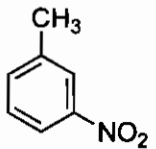
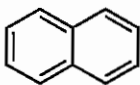
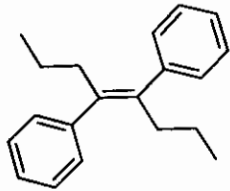
V. (12 points) _____

VI. (6 points) _____

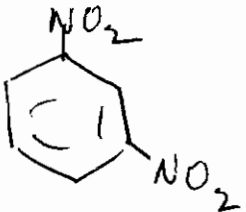

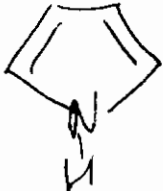
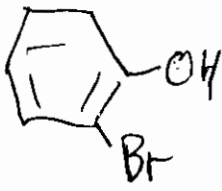
TOTAL (100 points) _____

The Final Exam is scheduled for Tuesday, December 11, from 7:00-9:00 P.M.

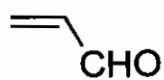
Ia. Give the proper name for each including stereochemical designation when required. (12pts)

 <p>3,4-dichlorophenol</p>	 <p>meta-nitrotoluene or 3 1-methyl-3-nitrobenzene (or meta)</p>
 <p>naphthalene</p>	 <p>E-4,5-diphenyl-4-octene 1pt (or trans)</p>

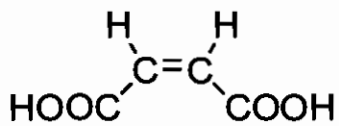
Ib. Write the structure for each of the following. (12pts)

<p>m-dinitrobenzene</p> 	<p>p-chloroaniline</p> 
<p>pyrrole</p> 	<p>2-bromophenol</p> 

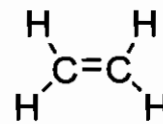
Ic. Rank the following dienophiles (1, 2, 3 where 1 is the fastest), in order of increased reactivity in the Diels-Alder reaction. (3 pts)



2



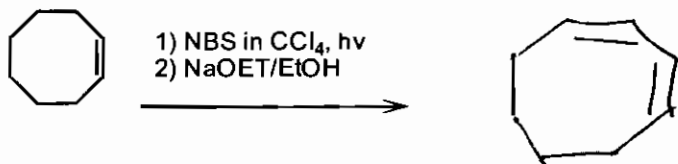
1



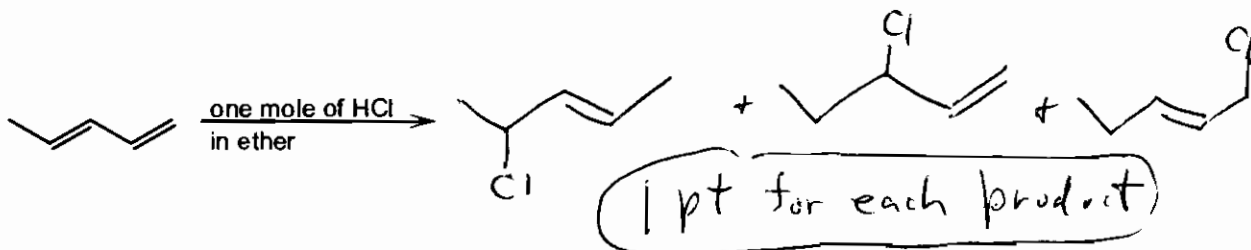
3

IIa. Draw the product(s) of the following reactions. No stereochemistry required. (12 pts)

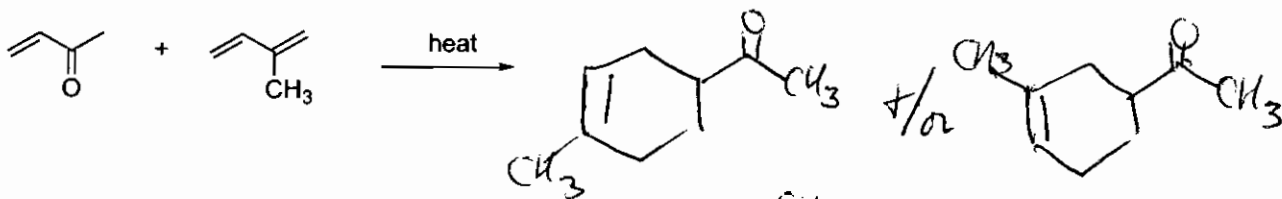
1)



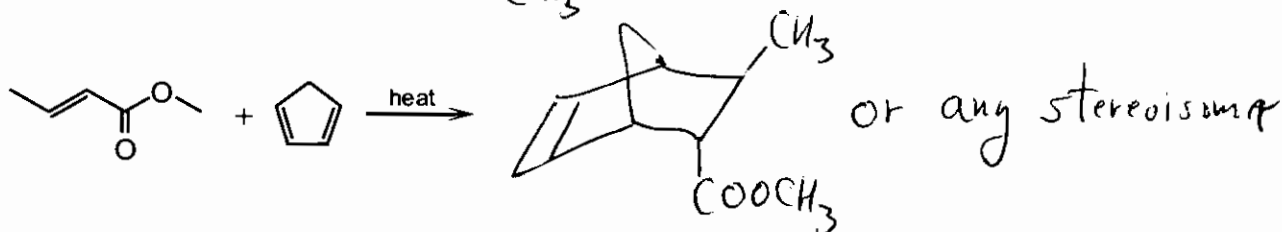
2)



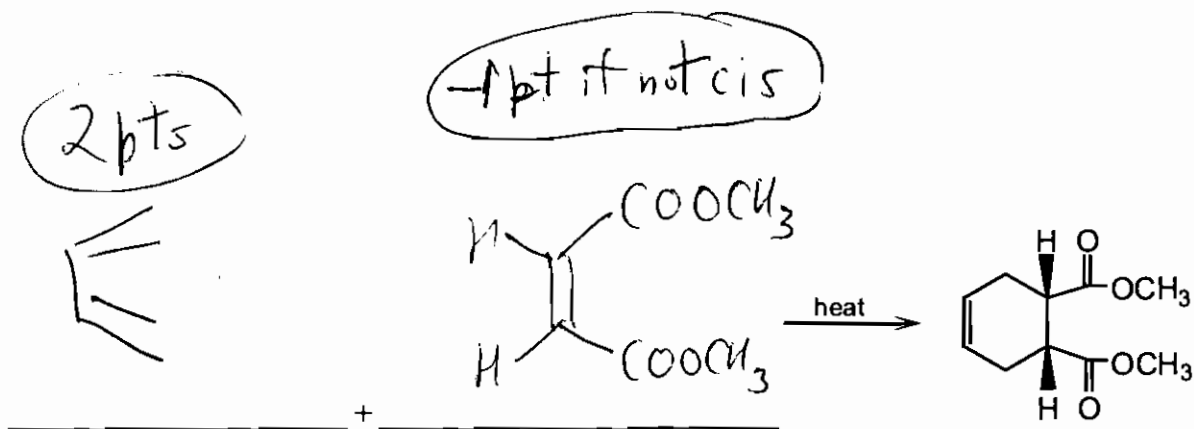
3)



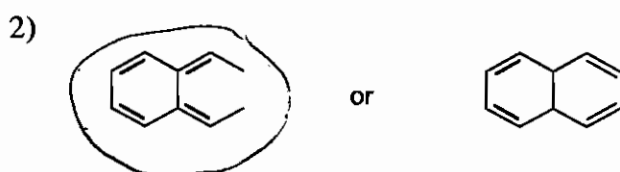
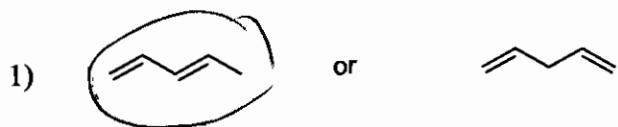
4)



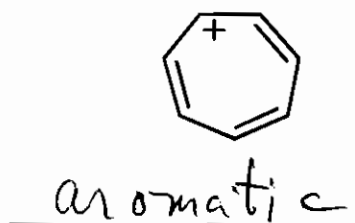
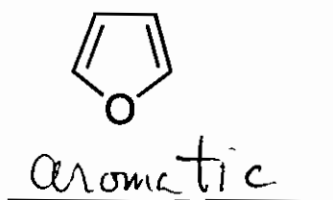
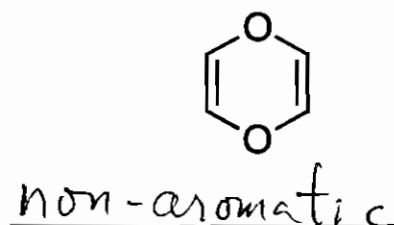
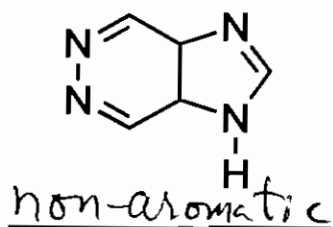
IIb. What dienophile and diene were used to prepare the following molecule? (4pts)



IIIa. Circle the compound in each pair, which absorbs UV light at a longer wavelength. (4pts)



IIIb. Identify each molecule as aromatic or non-aromatic. (8pts)

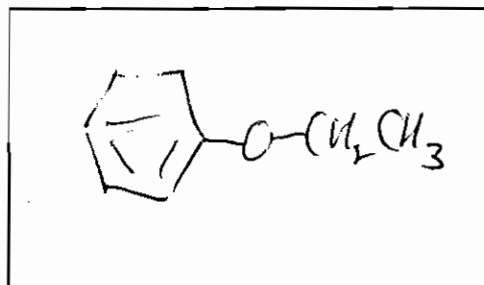
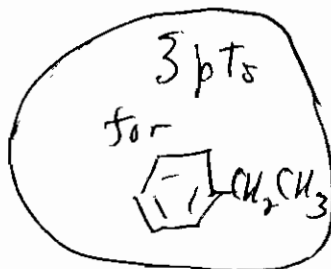


IIIc. The fundamental reaction of vision involves: (3pts)

1. a Diels-Alder reaction.
2. The oxidation of vitamin A.
3. The reduction of β -carotene.
4. A cis-trans isomerization.

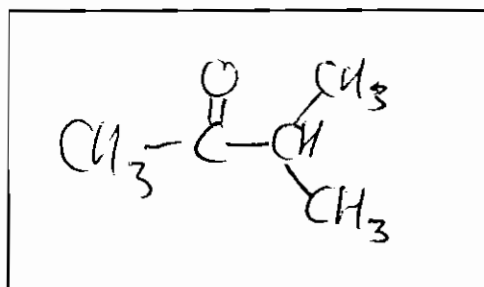
IV. In the box provided propose a structure consistent with each data set. (24pts)

- a) Molecular formula $C_8H_{10}O$.
 IR absorption at $3150-2850\text{ cm}^{-1}$.
 $^1\text{H NMR}$ data: 7.3-6.8 (multiplet, 5H), 3.95 (quartet, 2H) ppm and 1.4 (triplet, 3H) ppm.



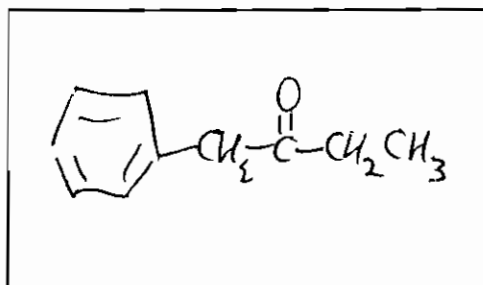
- b) Molecular formula $C_5H_{10}O$
 IR absorption at $1710-1740\text{ cm}^{-1}$.
 $^1\text{H NMR}$ 2.55 (1H, septet), 2.10 (3H singlet), 1.05 (6H, doublet) ppm.
 $^{13}\text{C NMR}$ 212.6, 41.5, 27.2, 17.8 ppm.

1 pt
ketone
or
aldehyde



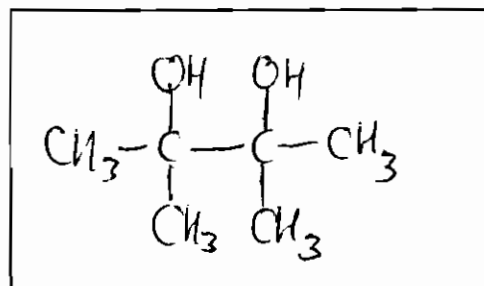
- c) Molecular formula $C_{10}H_{12}O$
 IR absorption at 1710 cm^{-1} .
 $^1\text{H NMR}$ 7.2 ppm (5H, singlet), 3.6 (2H, singlet), 2.4 (2H, quartet), 1.0 (3H, triplet) ppm.

1 pt
ketone
or
aldehyde



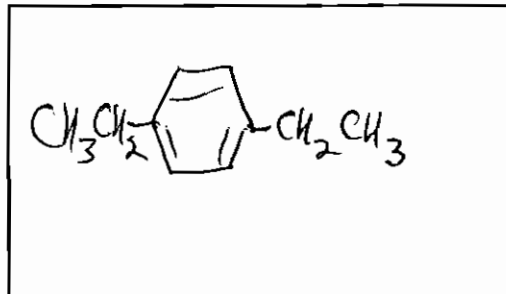
- d) Molecular formula $C_6H_{14}O_2$
 IR absorption at 3400 cm^{-1} .
 $^1\text{H NMR}$ 2.0 (2H, singlet), 1.2 (12H, singlet) ppm.

1 pt
alcohol



Va. In the box provided propose a structure consistent with each data set. (12pts)

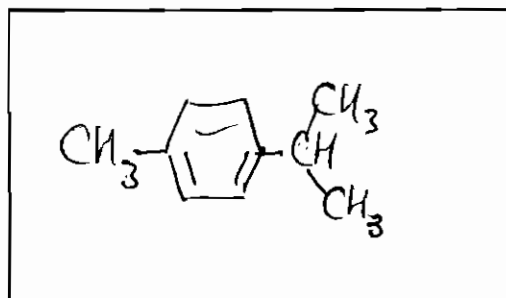
- a) Molecular formula $C_{10}H_{14}$
 1H NMR 7.0 (4H, singlet), 2.70 (4H, quartet), 1.20 (6H triplet) ppm.
 ^{13}C NMR 141.4, 127.8, 28.5, 15.7 ppm.



3 pt for meta

4 pts for ortho

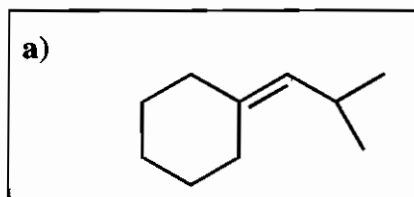
- b) Molecular formula $C_{10}H_{14}$
 1H NMR 7.18 (4H, broad singlet), 2.85 (1H, septet), 2.28 (3H, singlet), 1.20 (6H doublet) ppm.
 ^{13}C NMR 145.8, 135.1, 128.9, 126.2, 33.7, 24.1, 20.9 ppm.



3 pts for meta.

4 pts for ortho

VIb. How many signals are present in the broadband-decoupled ^{13}C NMR spectrum of: (6pts)

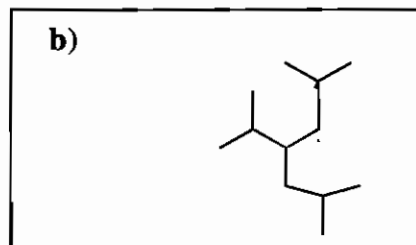


1) 7

2) 8

3) 9

4) 10



1) 2

2) 3

3) 4

4) 6