

Name _____

PID _____

CHEMISTRY 252
Exam 1 – 100 pts.
Section 703 – Grand Rapids
27 July 2006

- Make sure you have all 12 exam pages
- You will have 90 minutes to complete the 5 questions
- Please sign your name at the bottom of this page.
- Try to make your answers as **clear** as possible. You don't need to be an artist, but if an answer is ambiguous it may be marked incorrect.
- Keep all answers inside the designated boxes.
- Read the directions, and don't be distracted by the large molecules.
- **Good luck!**

By signing this test, I certify that this is my own work and that my work is in accordance with MSU's policy on academic honesty, as stated in the Academic Freedom Report.

I		24
II		22
III		20
IV		10
V		24
Total		100

X _____



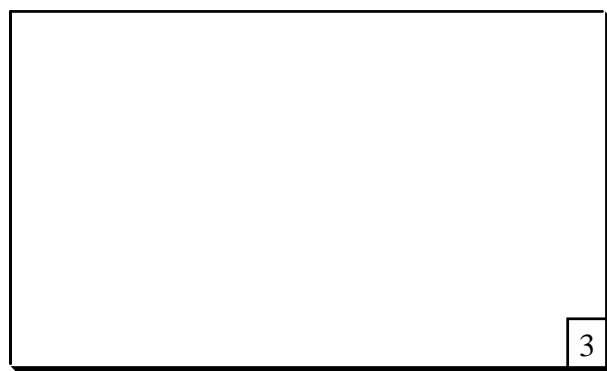
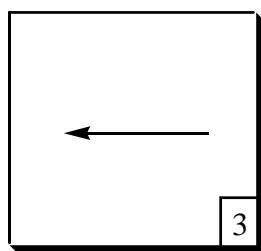
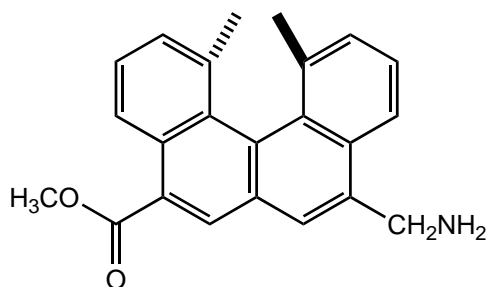
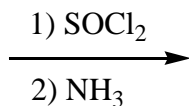
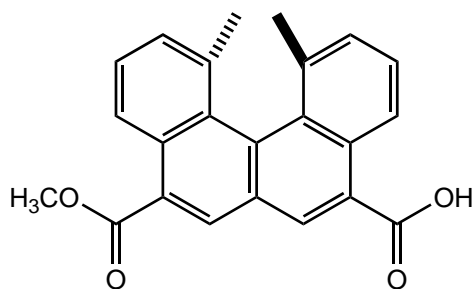
then, when you graduate high school, you go to college, where you pick what you want to study you can study anything from business to science to art to booze and pot

most people call that last one "english major"

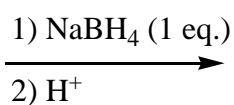
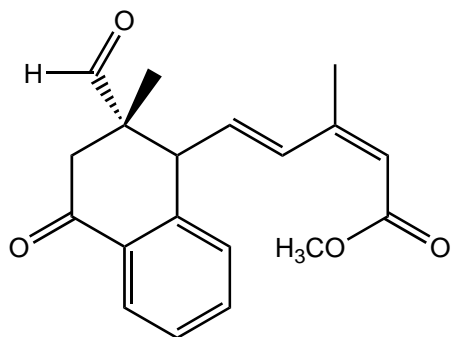
I. (24 pts.)

Complete the following reactions.

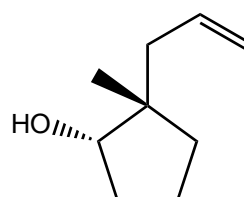
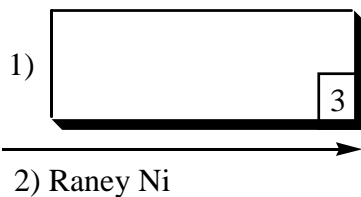
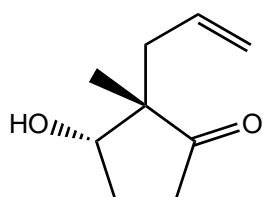
a) Synthesis of DNA-like folding molecules (*Bull. Chem. Soc. Jpn.* **2006**, 79(2), 317-332).



b) Synthesis of abscisic acid analogues to regulate aspects of plant growth and development (*Org. Biomol. Chem.* **2006**, 4, 1400-1412).

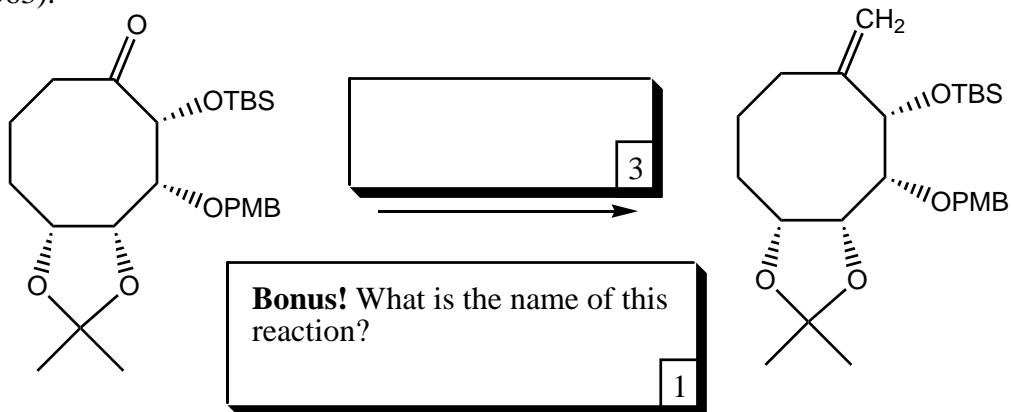


c) New techniques for synthesis of clavirolides, possible anti-cancer pharmaceuticals (*Tetrahedron Lett.* **2005**, 46, 8431-8434).

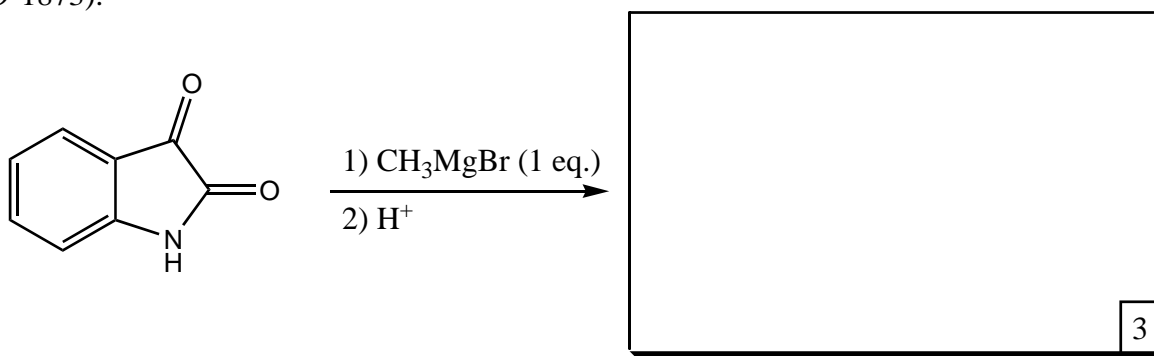


I. continued

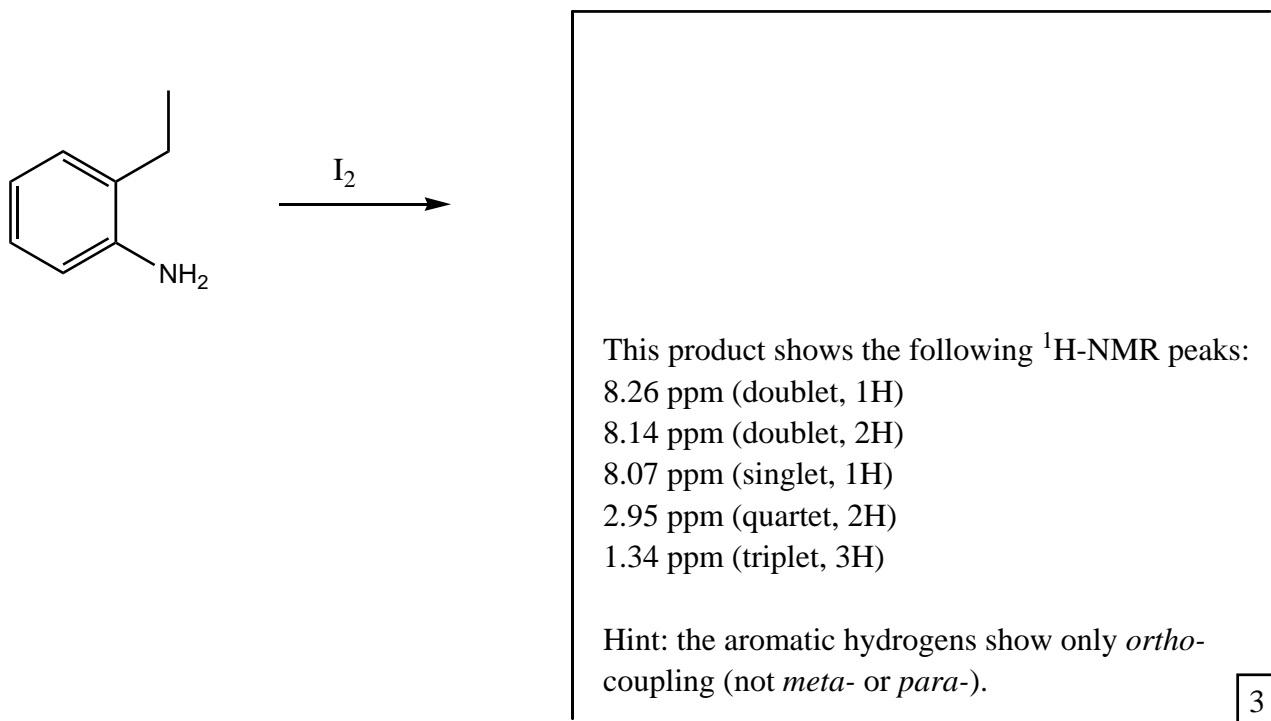
d) Synthetic route to new glycosidase inhibitors (anti-viral and anti-cancer) (*J. Org. Chem.* **2006**, 71(12), 4353-4363).



e) Synthesis of HIV-1 protease inhibitors for antiretroviral AIDS therapy (*Bioorg. Med. Chem. Lett.* **2006**, 16, 1869-1873).



f) Synthesis of some potential organic semiconductors (*J. Org. Chem.* **2005**, 70, 3396-3424).



II. (22 pts.)

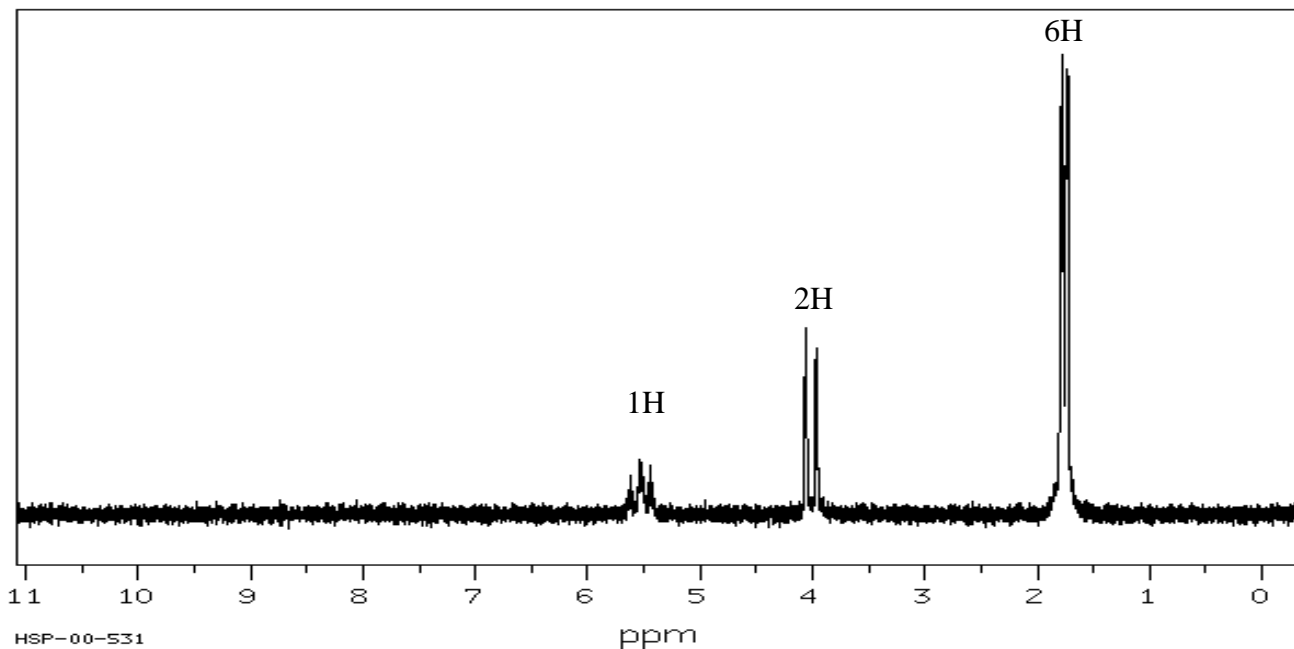
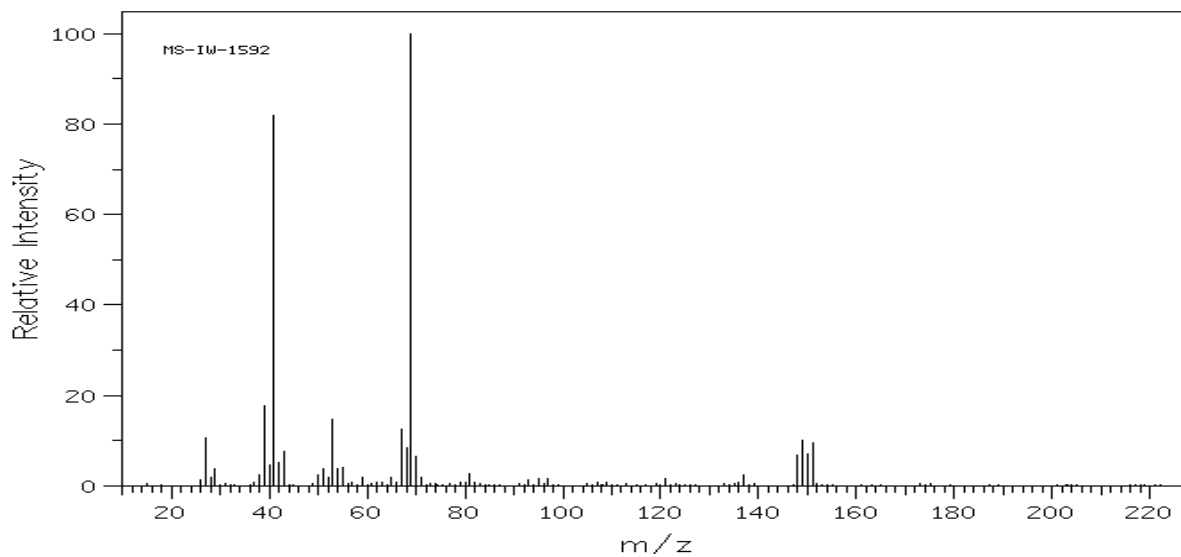
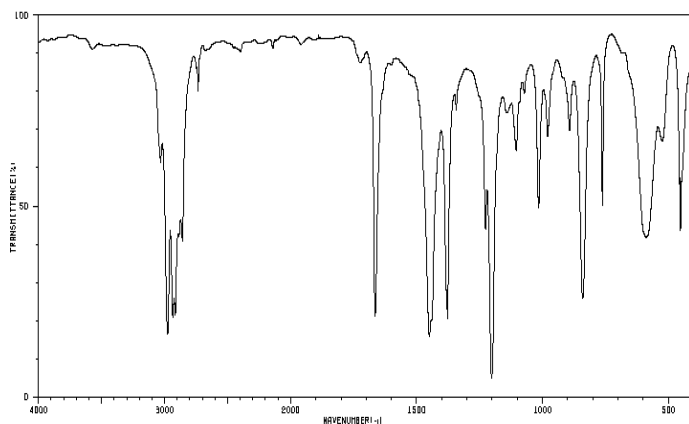
a) The following spectra were taken of molecule C_5H_9X , where X is a halogen.

Which halogen is X?

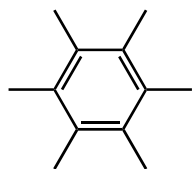
2

Structure of molecule C_5H_9X :

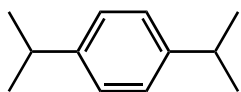
5



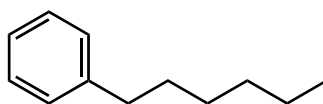
b) Use $^1\text{H-NMR}$ to differentiate among the following $\text{C}_{12}\text{H}_{18}$ isomers.



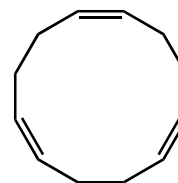
A



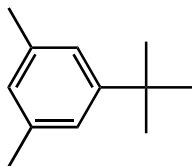
B



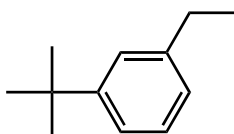
C



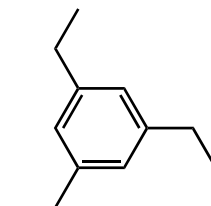
D



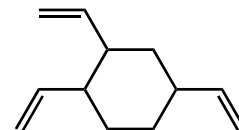
E



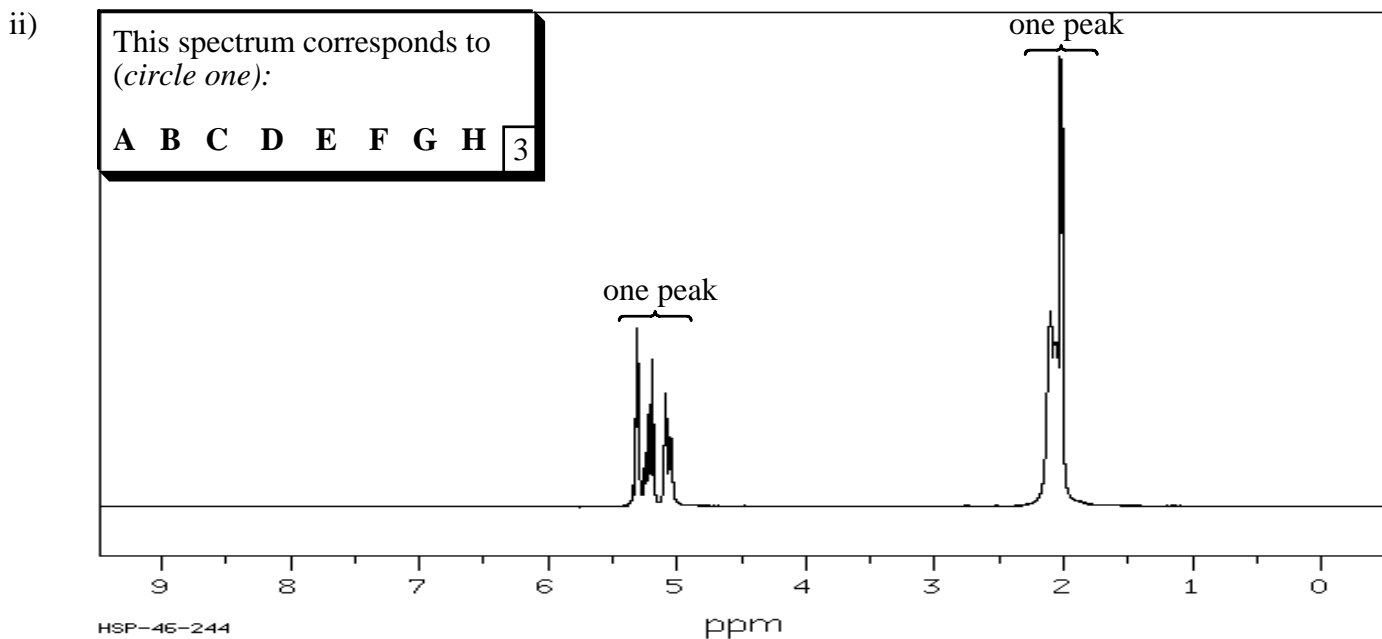
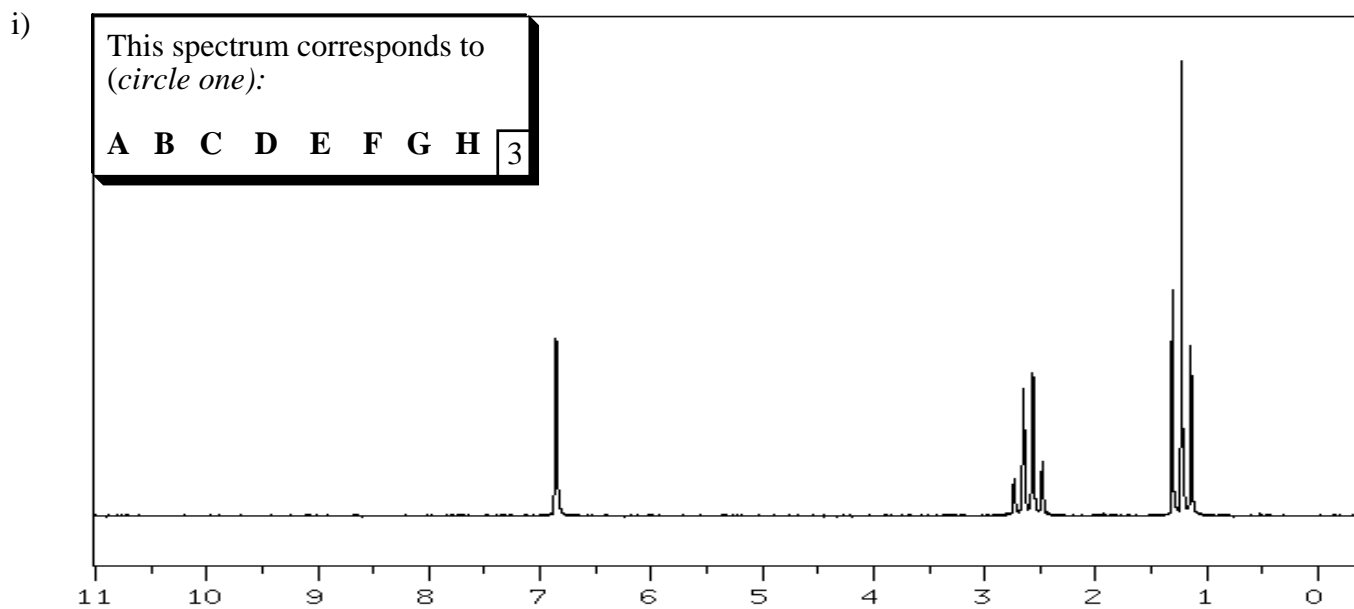
F



G

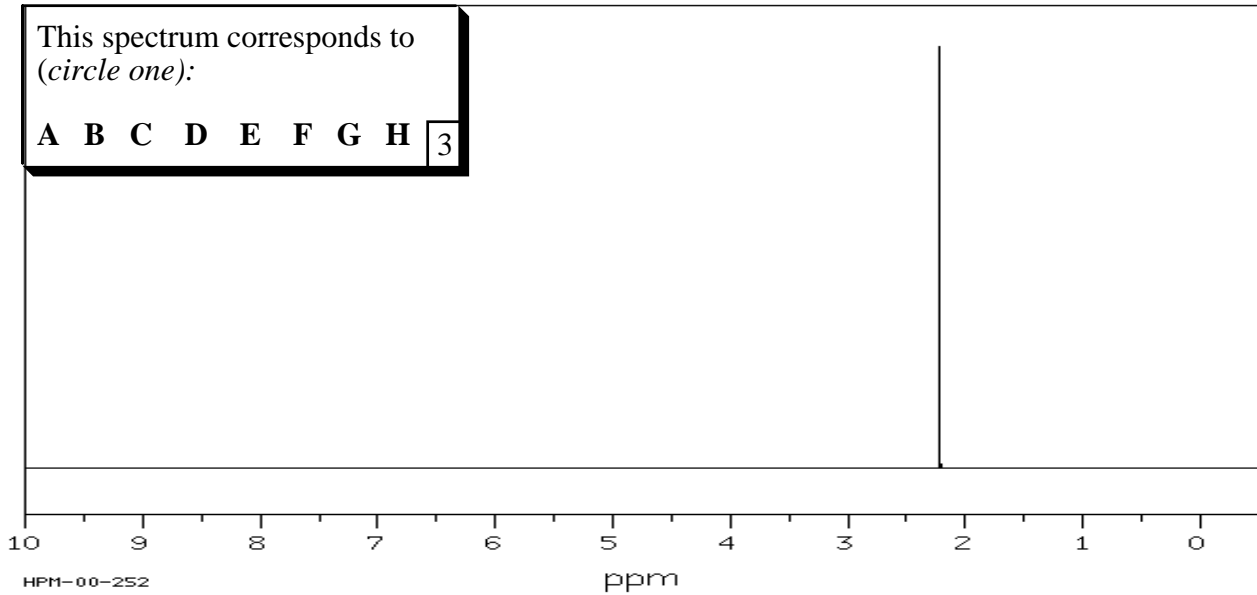


H



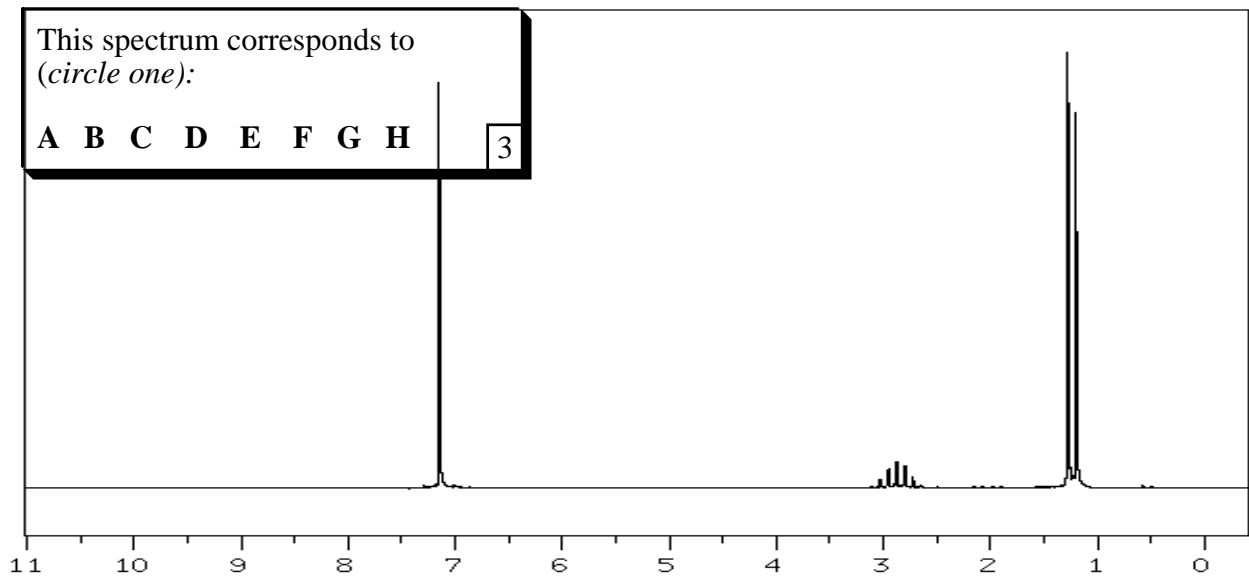
iii)

This spectrum corresponds to
(circle one):
A B C D E F G H



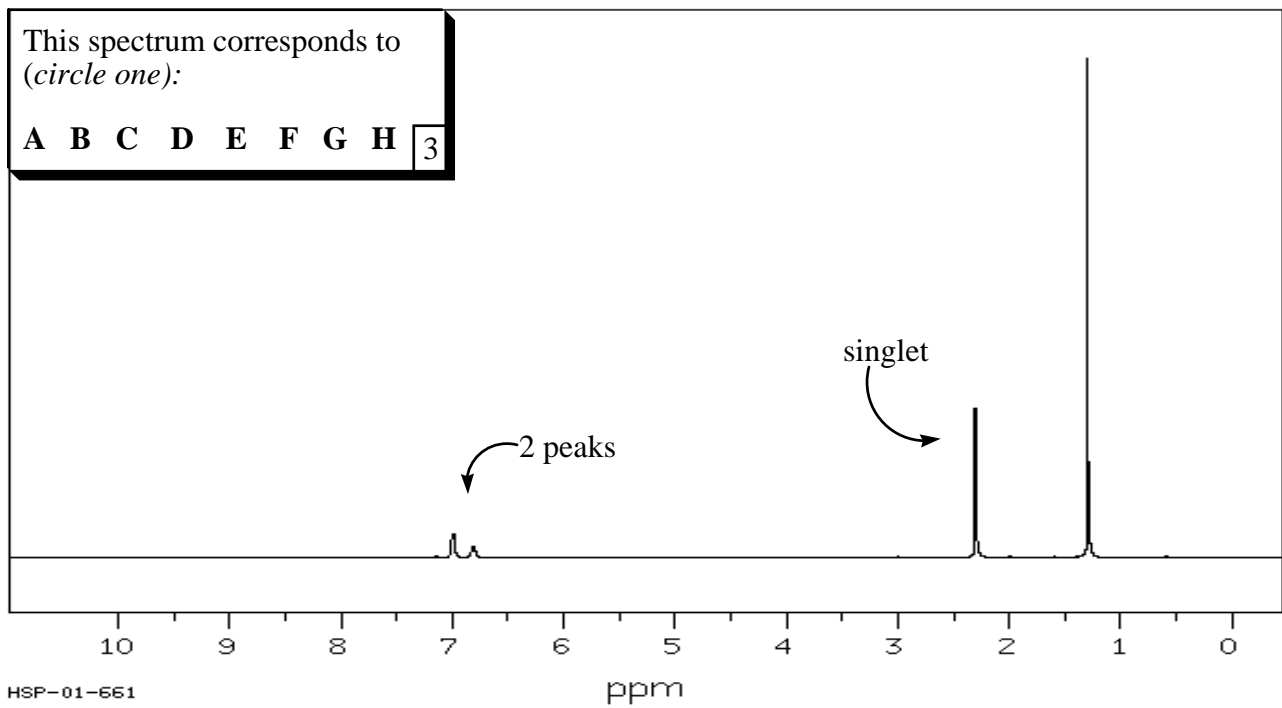
iv)

This spectrum corresponds to
(circle one):
A B C D E F G H



v)

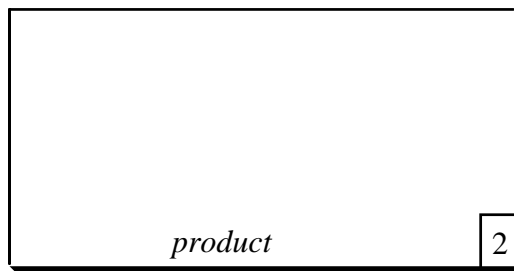
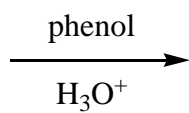
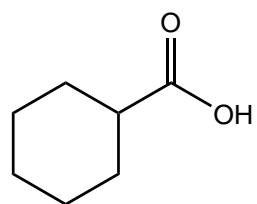
This spectrum corresponds to
(circle one):
A B C D E F G H



III. (20 pts.)

Provide mechanisms and/or products for the following reactions:

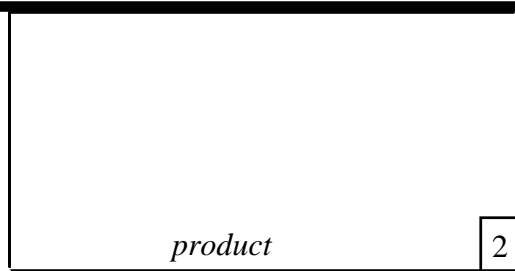
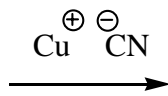
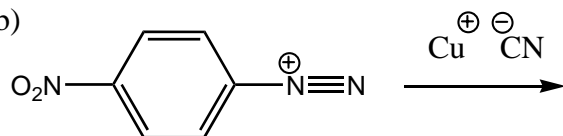
a)



Mechanism:

5

b)

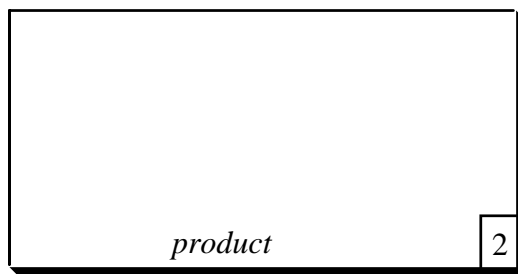
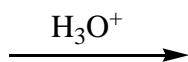
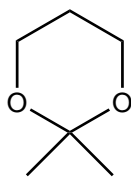


Mechanism:

4

III. (continued)

c)



Mechanism:

5

d) If you have extra time and are bored, draw me a nice picture in this extra space. I'll be especially impressed if it includes an animal in the *Mustelidae* family. I suppose you could also use the space for scrap paper to help with your exam, but what fun is that? (no points)

IV. (10 pts.)

a) Using words and resonance structures, explain why naphthalene is more reactive toward electrophilic substitution than benzene.

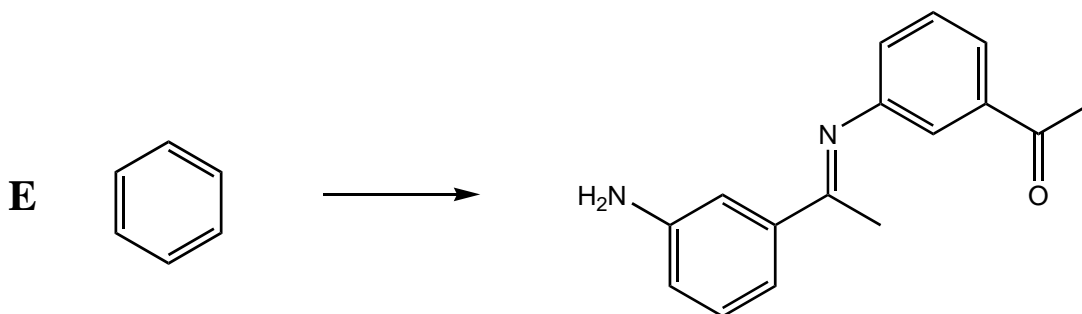
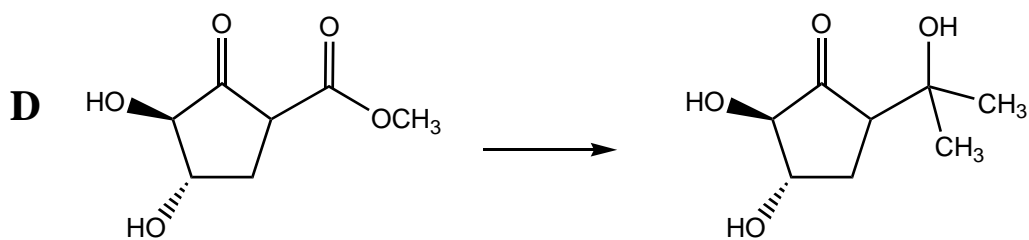
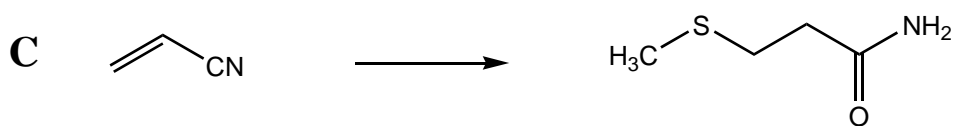
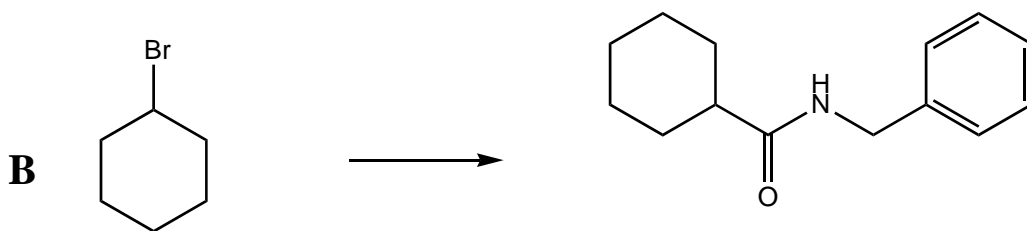
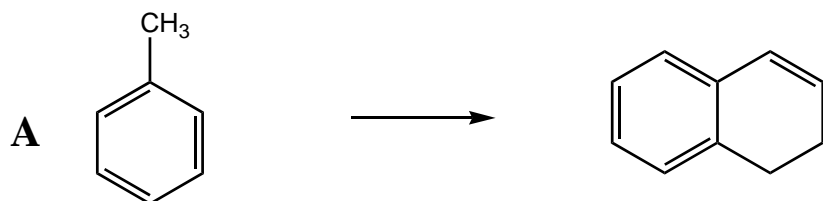
5

b) Using words and structures, explain why ketones are more reactive than esters.

5

V. Synthesis (24 pts.)

Pick **three** of the following transformations and devise a synthesis for each. You do not get extra credit for completing more than 3 syntheses.



V. (continued)

Synthesis 1. (circle your choice) **A B C D E**

8

Synthesis 2. (circle your choice) **A B C D E**

8

Synthesis 3. (circle your choice) A B C D E

8

Bonus!

1. Molecule $C_6H_{12}N_4$ has only one peak in its 1H -NMR spectrum (4.72 ppm, singlet) and only one peak in its ^{13}C -NMR spectrum (74.84 ppm). What is its structure?

structure of $C_6H_{12}N_4$

2

2. Which Wu-Tang member recorded the song "Street Chemistry" on his 2001 album, *Bulletproof Wallets*?

1