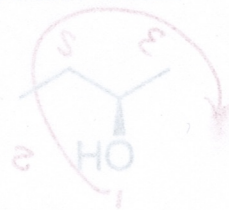


S2019 Organic Chemistry I  
Final Exam

Name (print):

ICu

Name (Sign):



right [2,3,2] below

(2) - butan-1-ol

Instructions

1. Keep the exam closed until you are instructed to begin.
2. The exam consists of 8 question sections. The first thing you should do is make sure that no pages are missing. If a page is missing, notify a proctor immediately.
3. You will have 2 hrs to complete the exam, at which time pencils must be put down. Budget your time wisely.
4. Make sure to show all of your work, and make it clear what your thought process was. Answers should fit in the space provided. If you need to use the back of the sheet of paper, you must make note of it in the space allotted for credit.

Breakdown

1. \_\_\_ / 4

2. \_\_\_ / 18

3. \_\_\_ / 12

4. \_\_\_ / 24

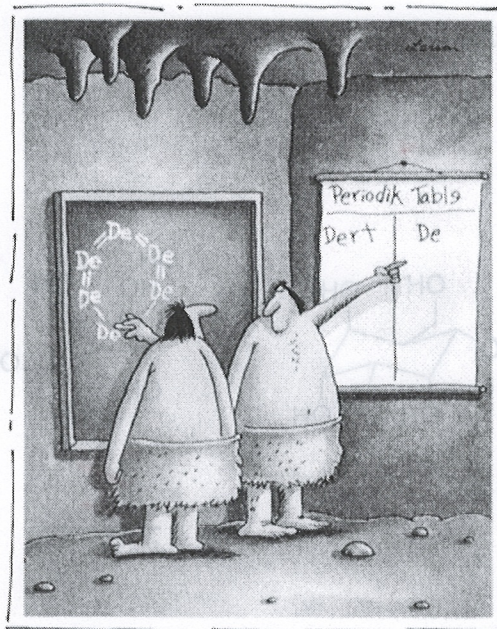
5. \_\_\_ / 14

6. \_\_\_ / 10

7. \_\_\_ / 10

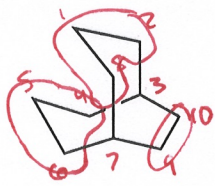
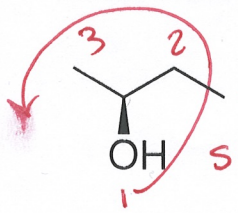
8. \_\_\_ / 8

total \_\_\_ / 100



Early chemists describe  
the first dirt molecule.

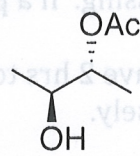
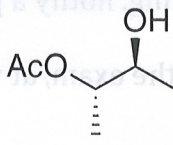
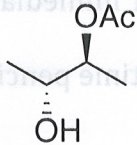
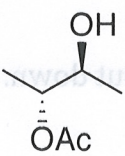
1) **IUPAC** (4 points). Circle ONE of the following molecules and provide the appropriate IUPAC name. Make sure to address stereochemistry if relevant.



(S)-butan-1-ol

bicyclo[3.3.2]decane

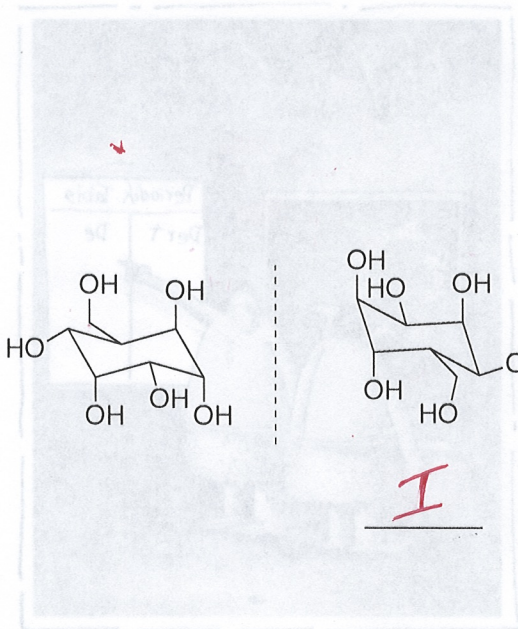
2) **Stereochemistry** (18 points, 9 points each). How do the following isomers relate to the structures shown. Label either enantiomer (E), diastereomer (D), constitutional isomer (C), or Identical (I).



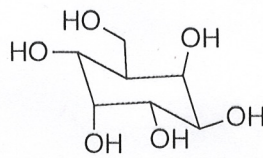
E

D

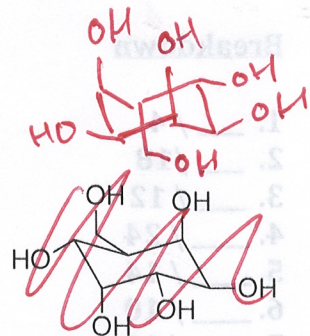
I



I



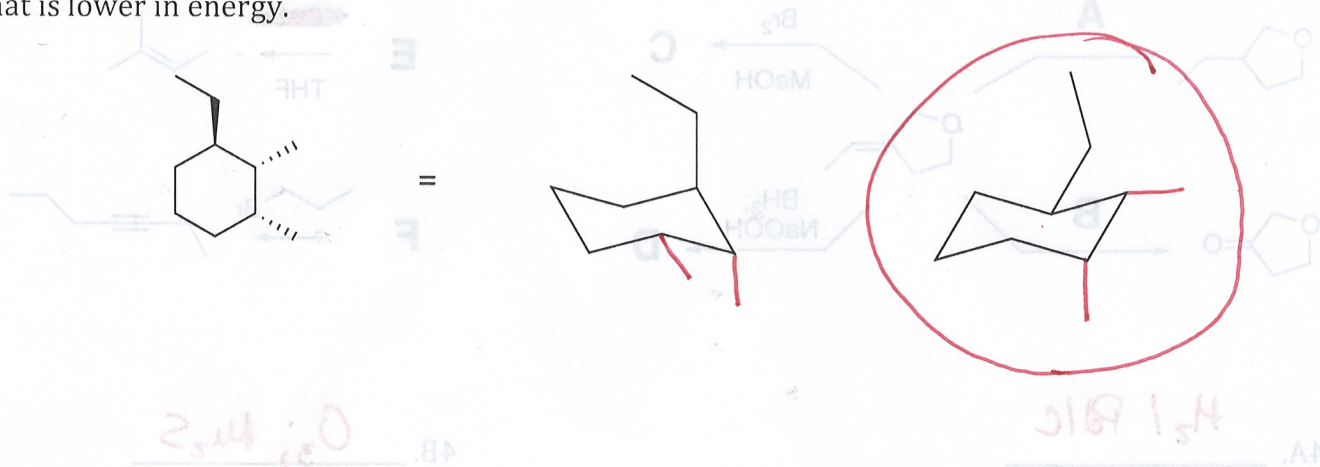
D



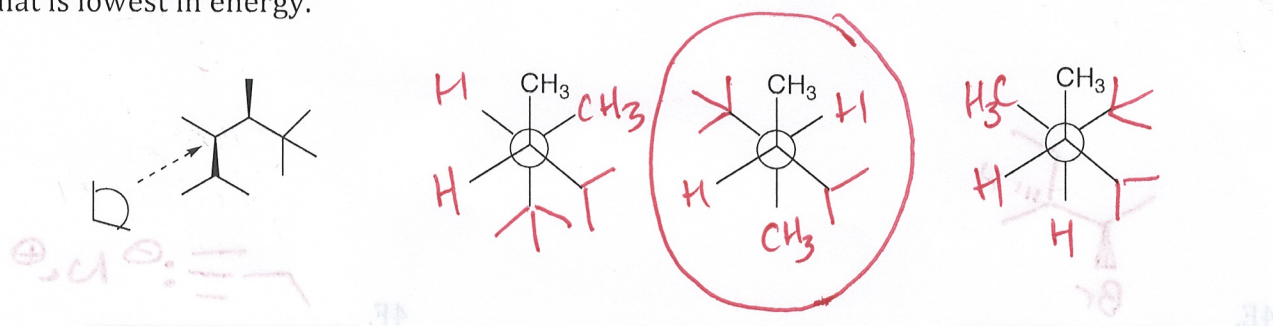
E

3) **Configurational Stability** (12 points, 6 points each).

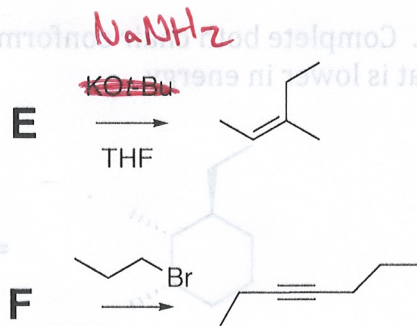
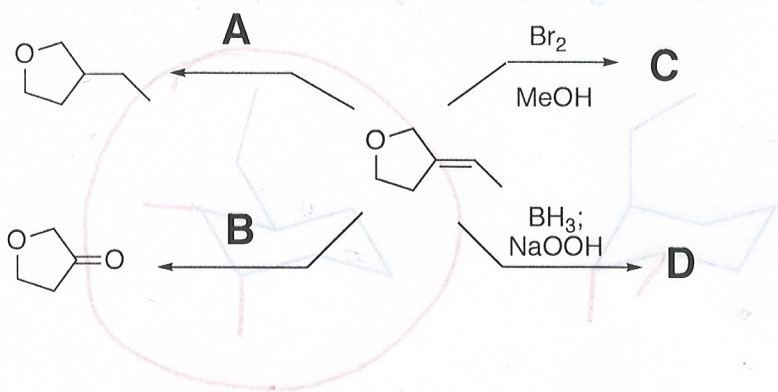
3a. Complete both chair conformations of the following substituted cyclohexane and circle the one that is lower in energy.



3b. Complete the following Newman projections, from the vantage point shown, and circle the one that is lowest in energy.

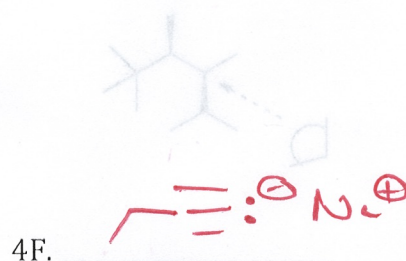
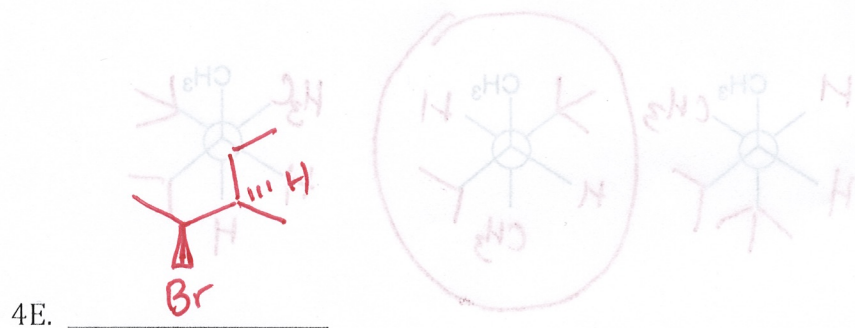
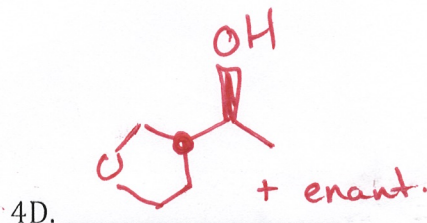
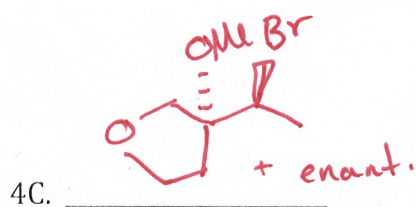


4) Reactions. (24 points, 4 each). Place the reagent (A,B), product (C,D) and starting material (E, F) for the following reactions.



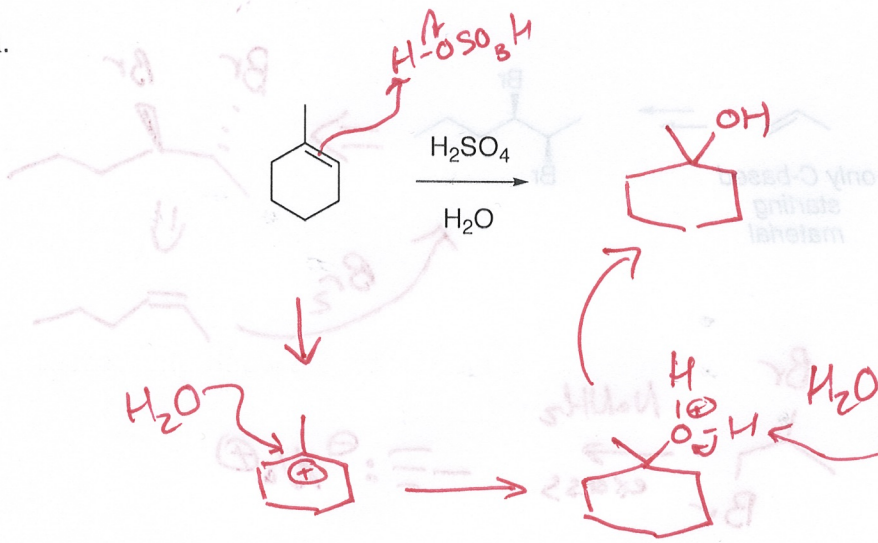
4A. H<sub>2</sub> / Pd/C

4B. O<sub>3</sub>; Me<sub>2</sub>S

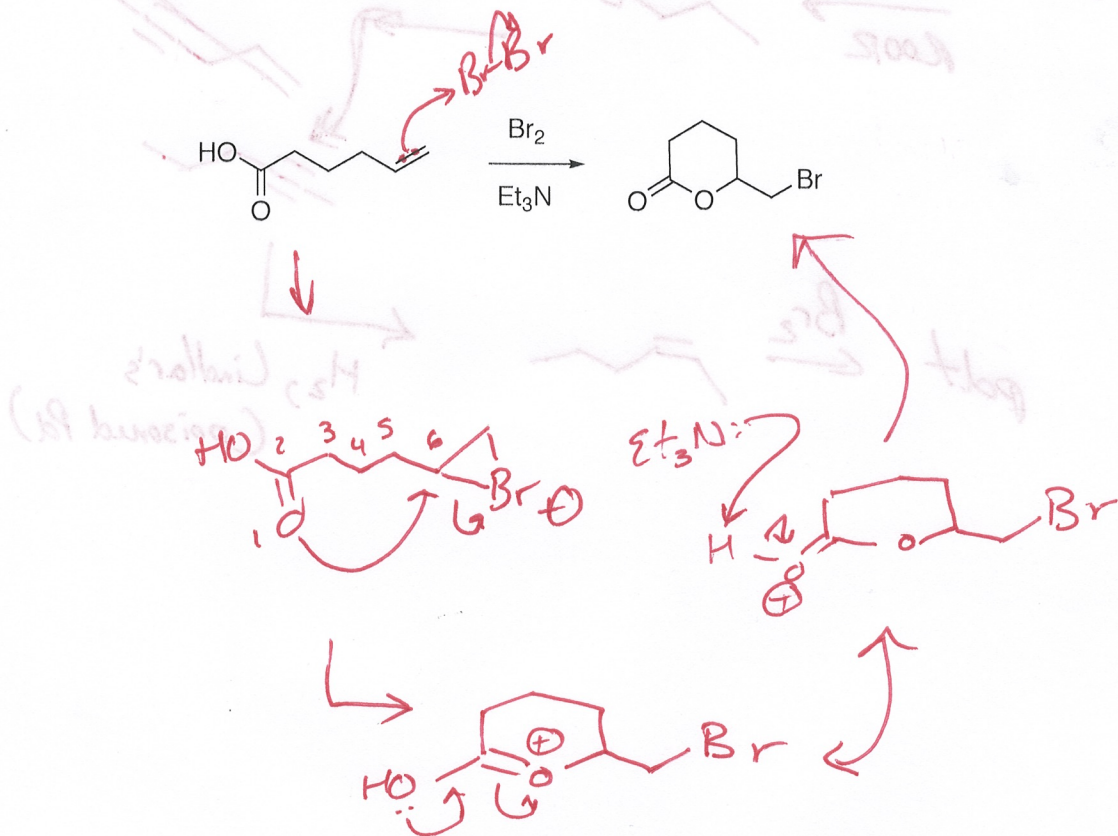


5). **Mechanism.** Show the mechanism for the following reactions (14 points, 7 points each)

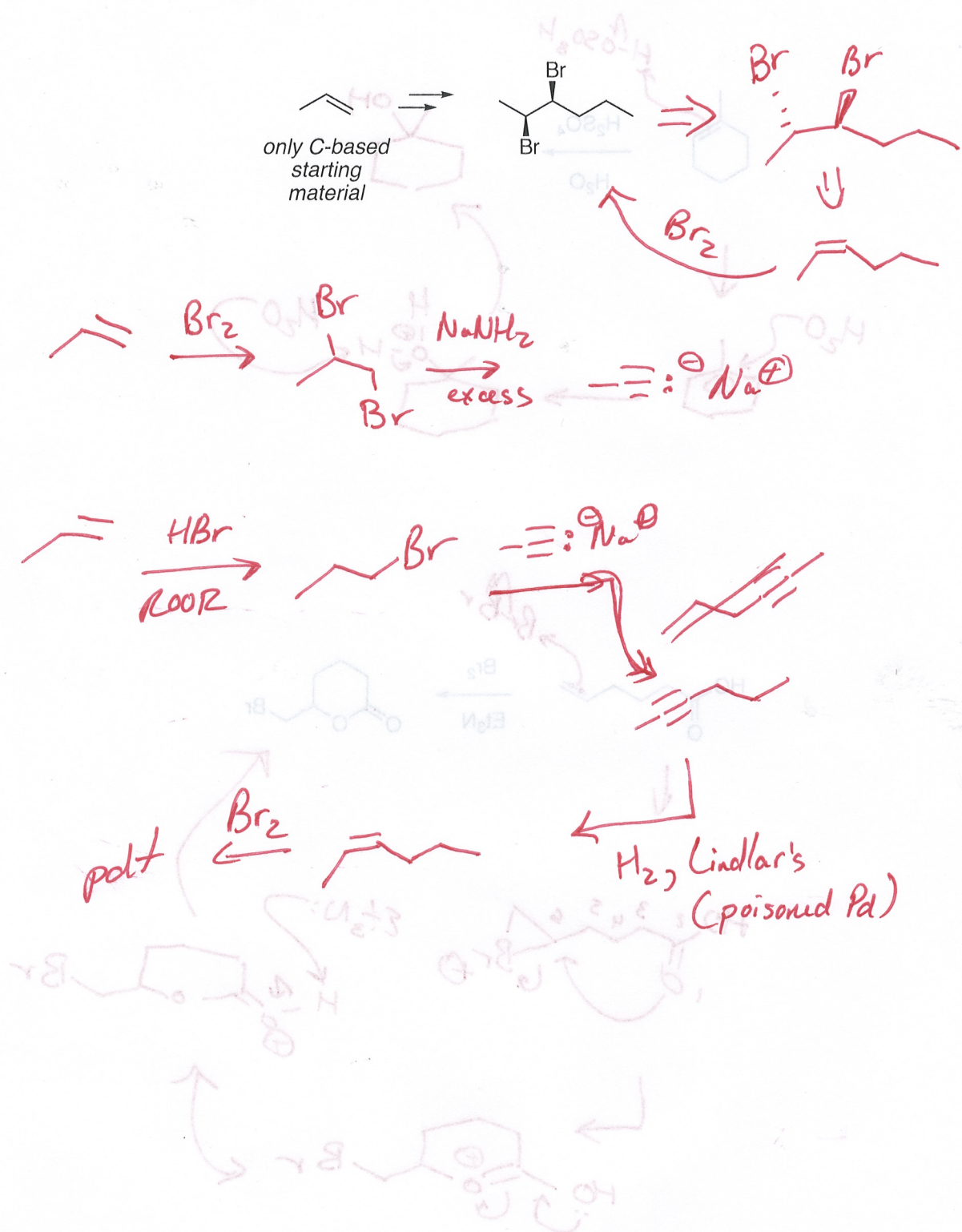
5a.



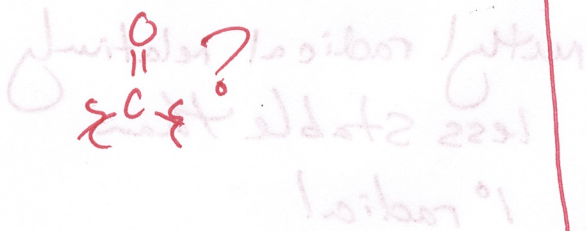
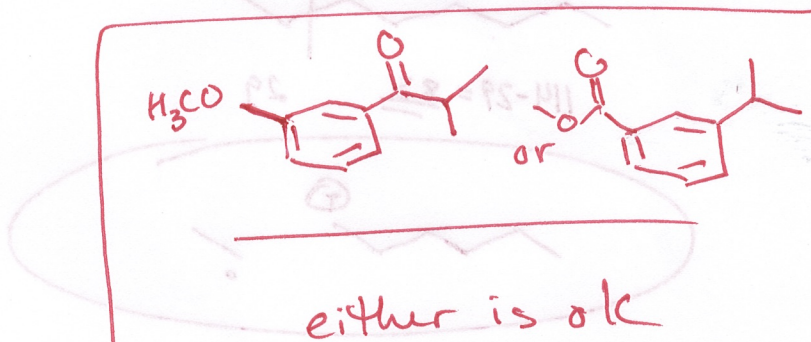
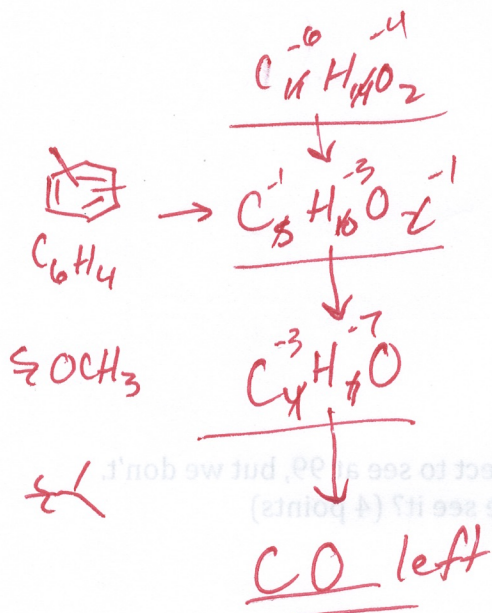
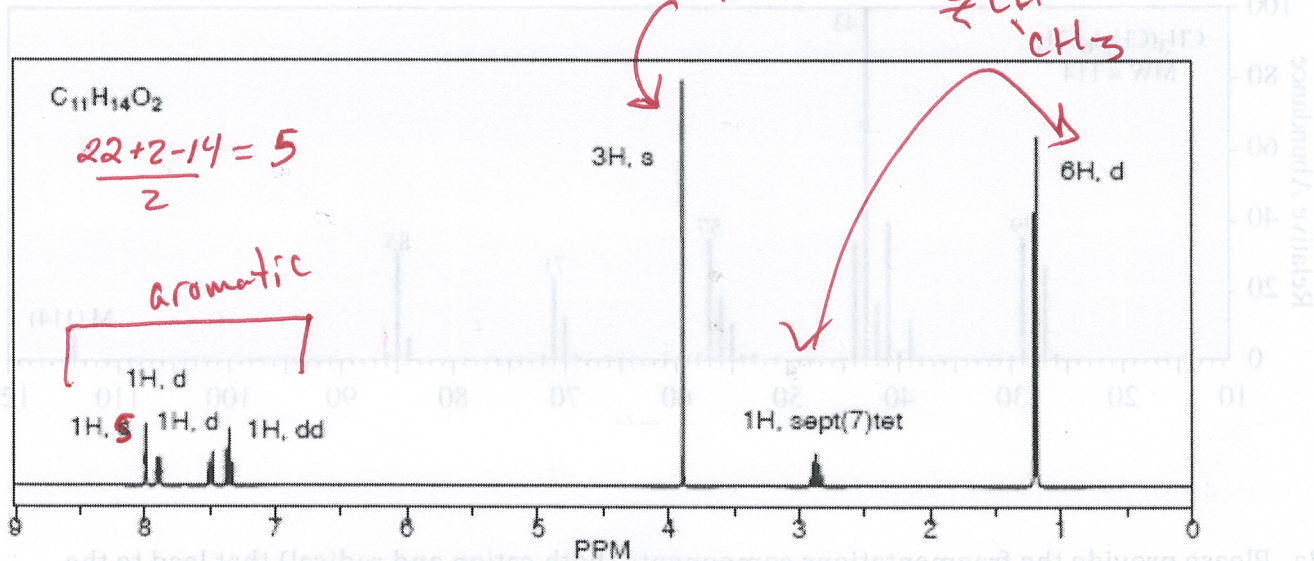
5b.



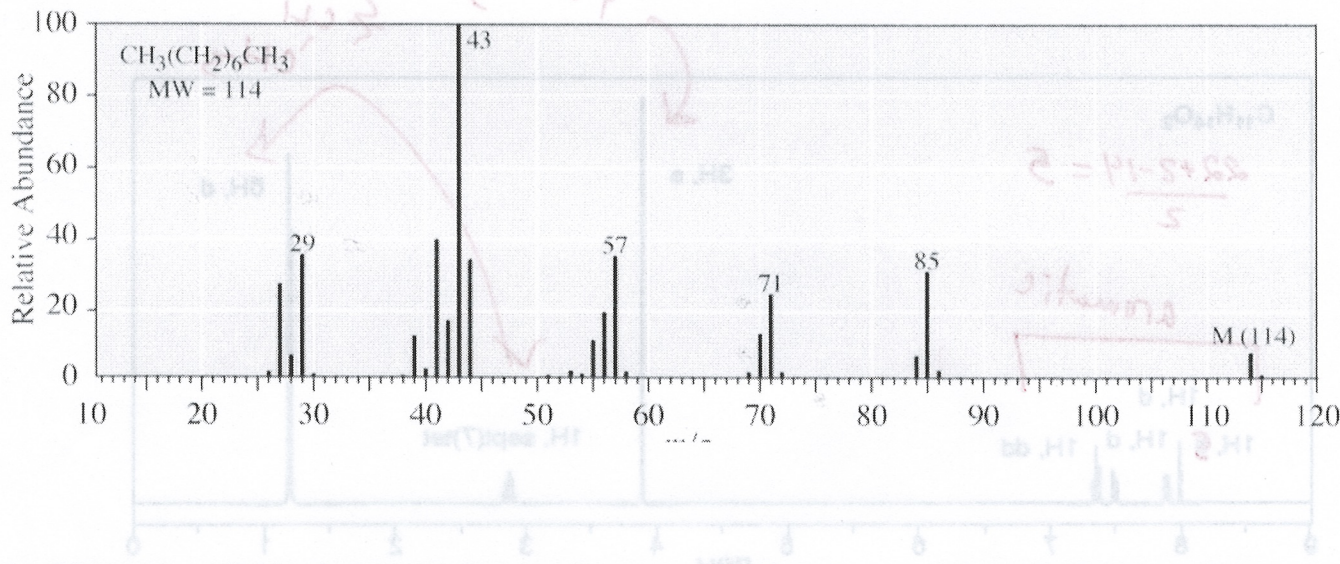
6) **Synthesis.** Propose a series of reactions that would provide the product shown. All carbons in the product must come from 1-propene (10 points)



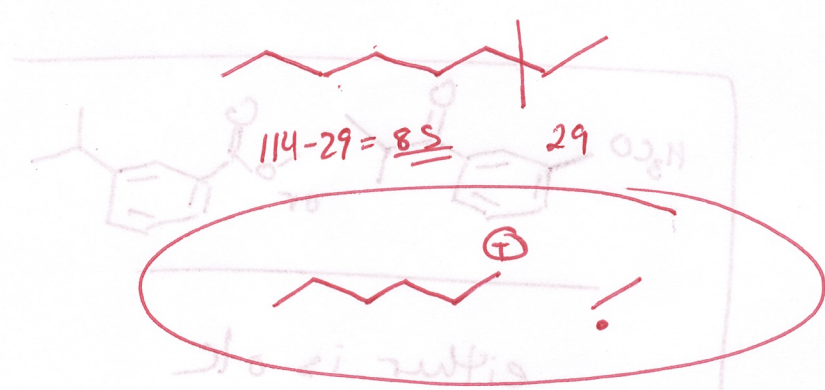
7. NMR structure determination. Please provide a structure that is consistent with the  $^1\text{H}$  NMR and molecules formula shown. (10 points)



8. Mass Spectrometry. Refer to the following mass spec of *n*-octane we went over in class for the following questions. (8 points)



8a. Please provide the fragmentations components (both cation and radical) that lead to the fragment with a mass of 85. (4 points)



8b. In class, we discussed that there was one peak that we might expect to see at 99, but we don't. What is fragment that would be associated with 99, and why don't we see it? (4 points)

