

CHEM 310 Exam 3

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October 29, 2007

Honor Pledge:

In Part V of the Winthrop University Student Conduct Code, it is stated that "A fundamental tenet of all institutions of higher learning is academic honesty. ... Misrepresentation of someone else's work as one's own is a most serious offense in any academic setting. ... Academic misconduct includes but is not limited to providing or receiving assistance in a manner not authorized by the professor in the creation of work to be submitted for academic evaluation including papers, projects, and examinations ..."

By my signature below, I pledge that I did not commit academic misconduct (cheat) on this examination.

KEY

Printed Name

Signature

Part 1 _____/16

Part 2 _____/20

Part 3 _____/33

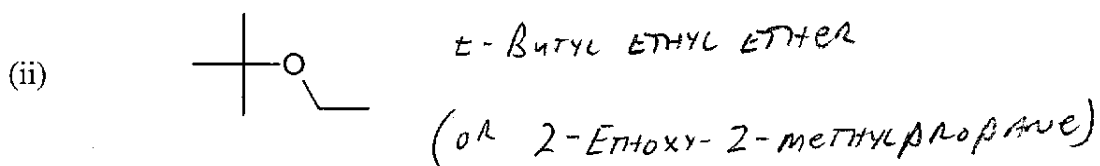
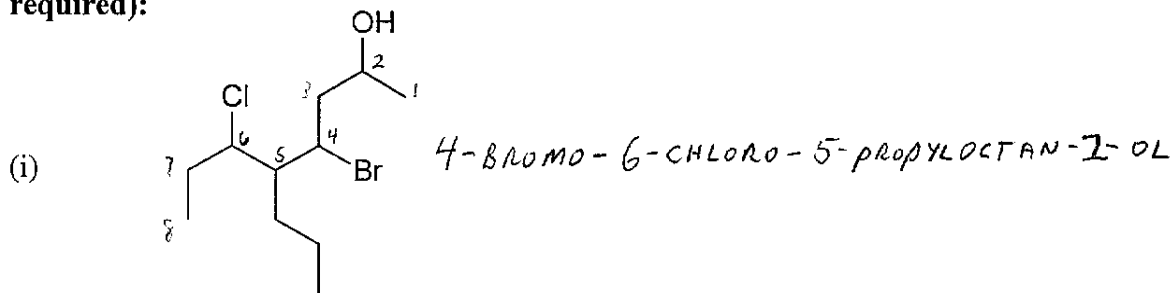
Part 4 _____/24

Part 5 _____/7

Total _____/100

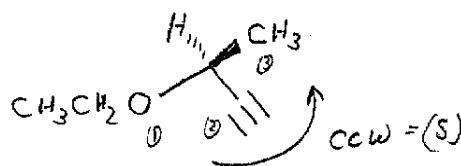
Part 1: Nomenclature (16 pts)

Write IUPAC names for the following compounds (indicate stereochemistry where required):

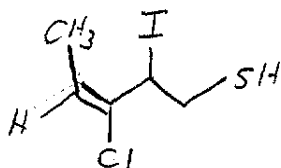


Draw structures corresponding to the following IUPAC names:

(iii) (S)-3-Ethoxybut-1-yne

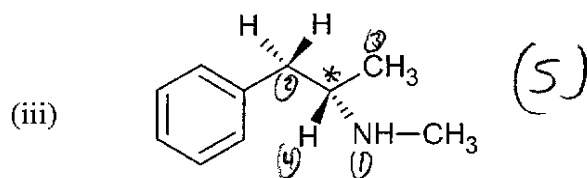
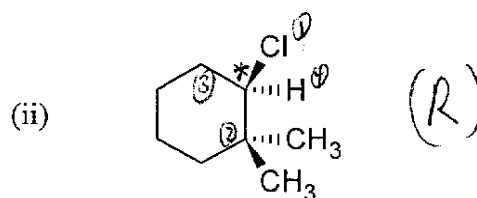
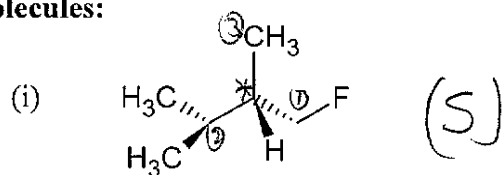


(iv) (E)-3-Chloro-2-iodo-3-penten-1-thiol

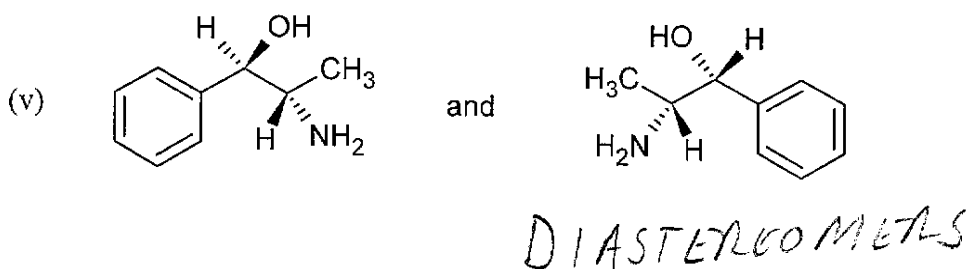
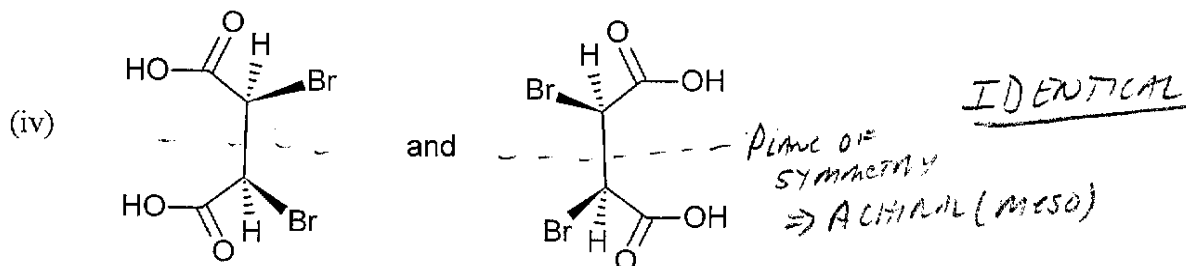


Part 2: Stereochemical Concepts (20 pts)

Assign an (R) or (S) configuration to the stereocenter in each of the following molecules:

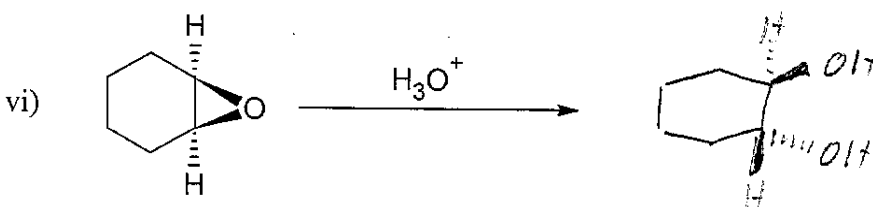
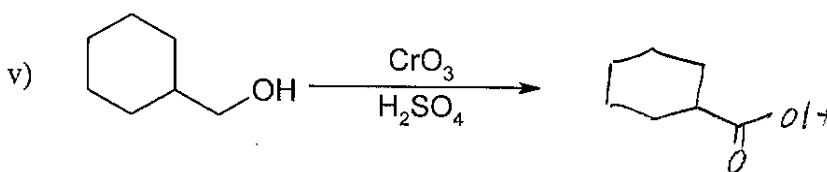
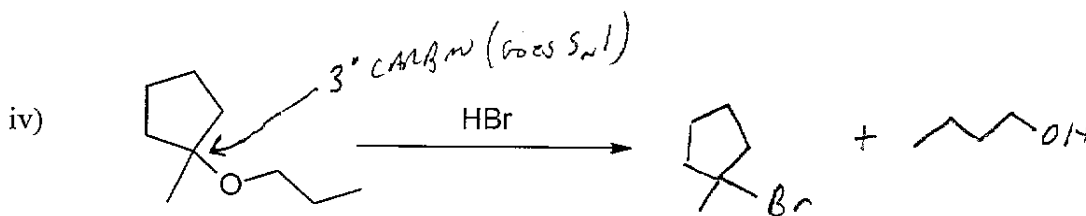
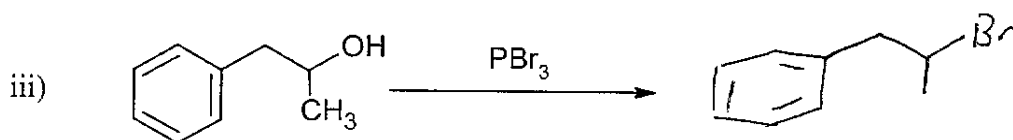
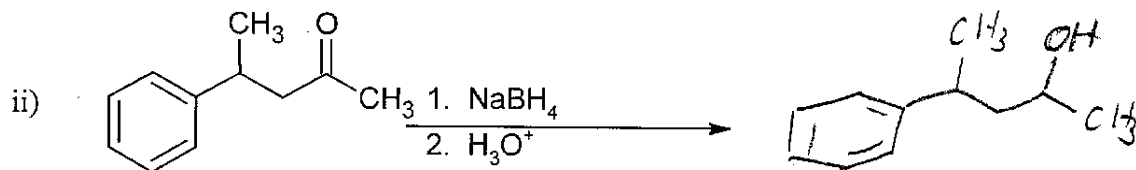
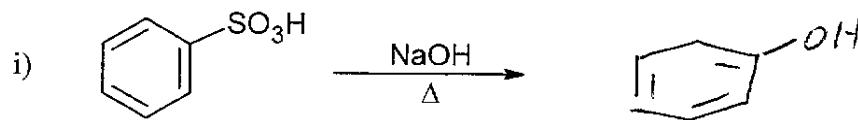


Indicate whether the following molecules in each pair are identical, enantiomers or diastereomers:

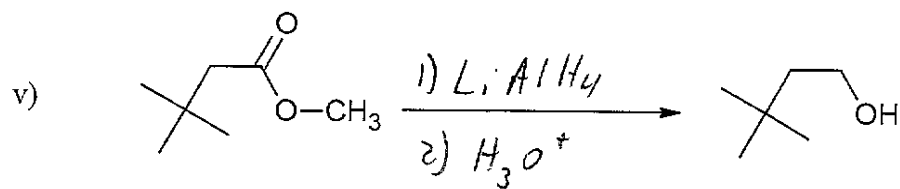
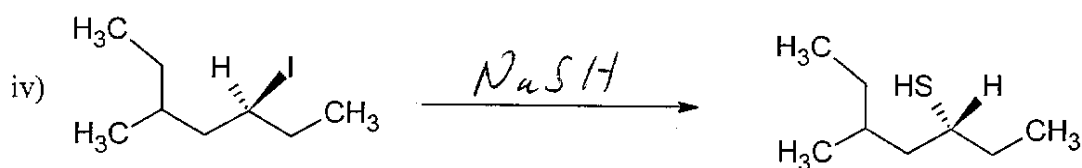
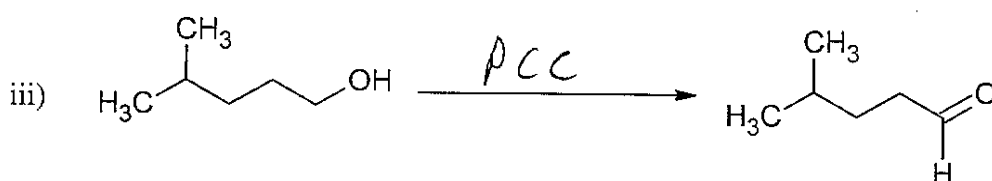
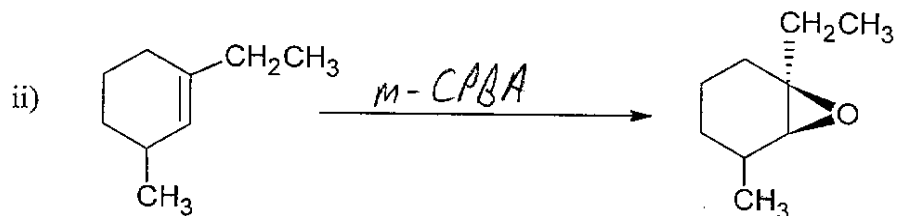
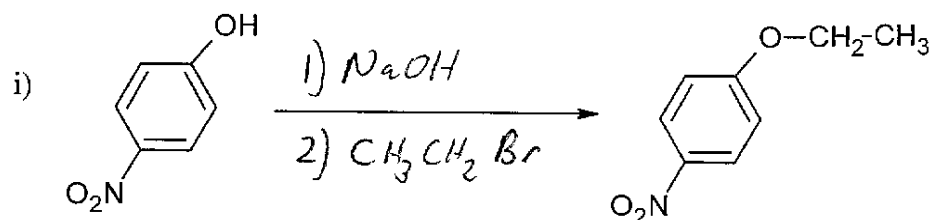


Part 3: Reactions (33 pts):

3a. Provide the major organic product(s) of the following reactions. Indicate stereochemistry where necessary.

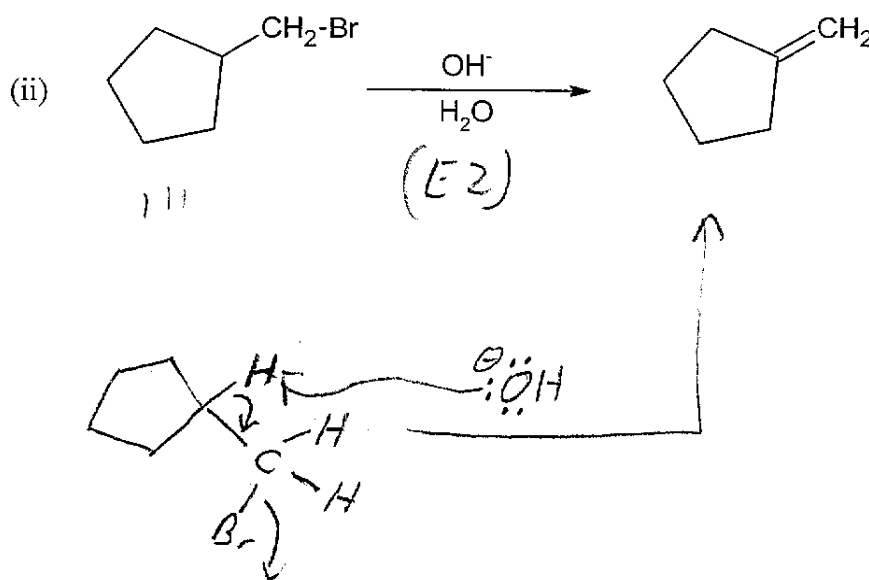
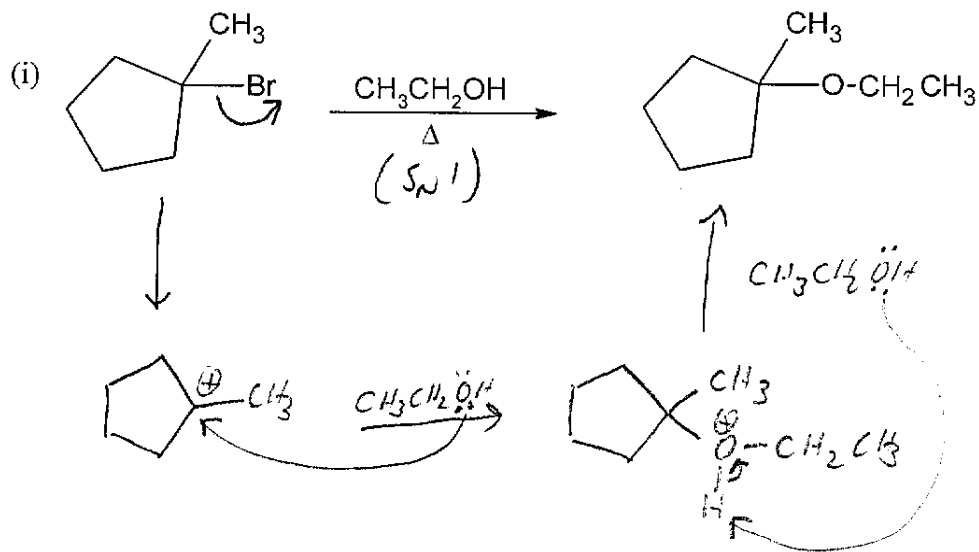


3b. Provide the reagents necessary to accomplish the following transformations:

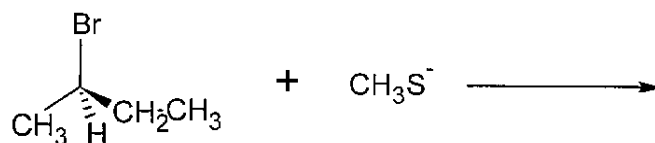


Part 4: Mechanisms and Related Concepts (24 pts)

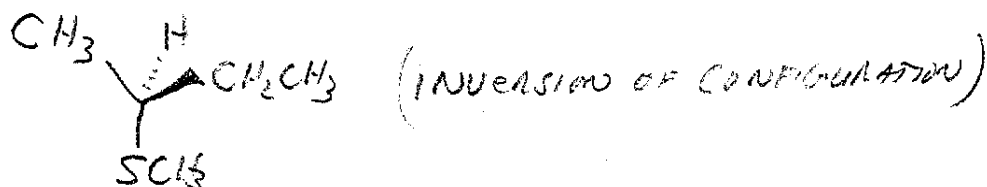
Draw arrow-pushing mechanism for the following reactions and indicate whether the mechanism is S_N2 , S_N1 , E2 or E1.



Answer the following questions about the reaction below, which proceeds by the S_N2 mechanism:



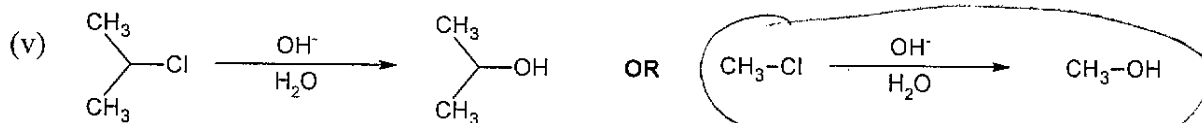
(iii) Draw the product, indicating the proper stereochemistry.



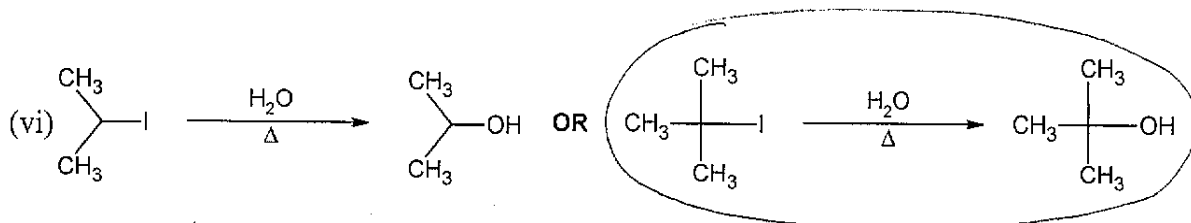
(iv) What effect will doubling the concentration of CH_3S^- have on the reaction rate?

The RATE OF REACTION WILL DOUBLE
 $\text{RATE} \propto [\text{RBr}][\text{CH}_3\text{S}^-]$

Indicate which reaction in each pair is faster, and give your reasoning:



S_N2 : $\text{CH}_3\text{-Cl}$ IS LESS CONGESTED FOR
 BACK-SIDE ATTACK.



S_N1 : 3° CARBOCATIONS ARE MORE
 STABLE THAN 2°

Part 5: Synthesis (7 pts)

Provide a synthesis of each of the following compounds starting from the indicated compound and any other reagents you may need:

