

CHEM 310 Final Exam

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April 30, 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.

Printed Name

Signature

Part 1 _____/35

Part 2 _____/35

Part 3 _____/30

Part 4 _____/60

Part 5 _____/20

Part 6 _____/20

Total _____/200

Part 1: Nomenclature and Functional Groups (35 pts):

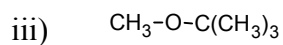
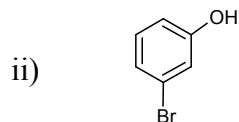
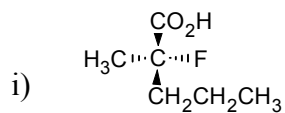
1A. Draw structures corresponding to the following IUPAC names (4 pts each):

i) (E)-3-Methylpent-2-ene

ii) 1,3-Diphenylpropan-2-one

iii) Ethyl hexanoate

1B. Write IUPAC names for the following compounds (indicate stereochemistry where required, 5 pts. each):



1C. Propose structures for molecules that fit the following descriptions (2 pts. each):

i) An amide containing 4 carbons

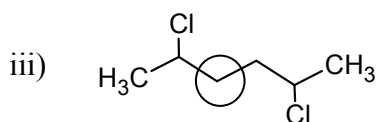
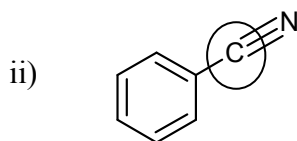
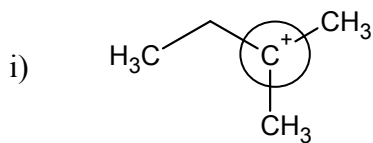
ii) An alkyne containing 5 carbons

iii) A cycloalkene with a trisubstituted double bond

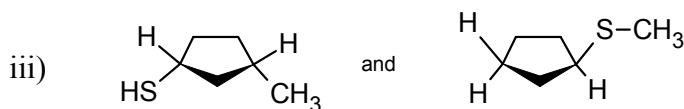
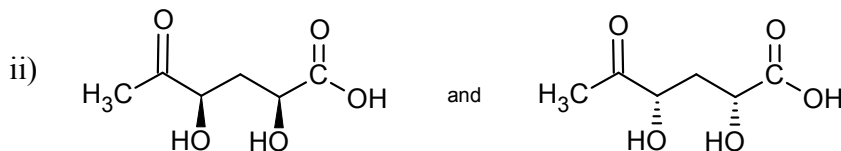
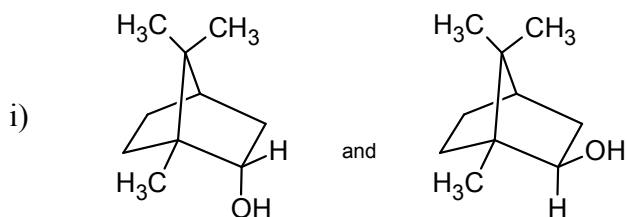
iv) A secondary alkyl halide

Part 2: Structure, Bonding, Stereochemistry, Conformational Analysis (35 pts):

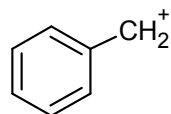
2A. Provide the hybridization of *and* the approximate bond angles around the circled atom in the following molecules or ions: (4 pts each):

HybridizationBond Angle

2B. Indicate whether the compounds in each pair are identical, constitutional isomers, enantiomers, or diastereomers. (3 pts. each):

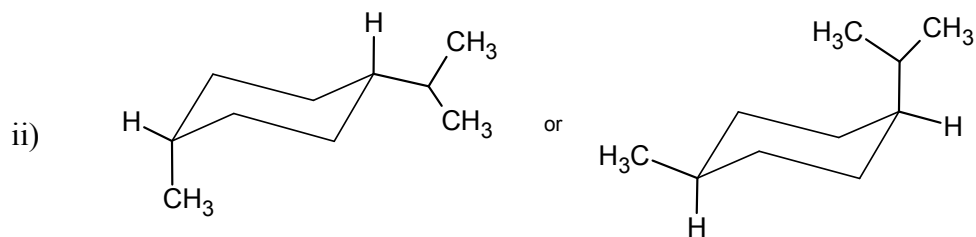
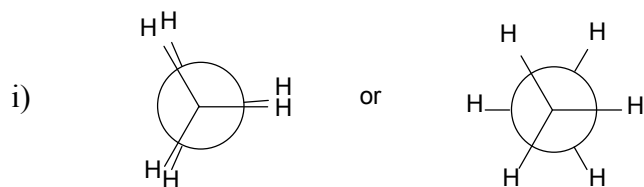


2C. The benzyl cation is a resonance stabilized intermediate in many organic reactions. Draw three additional resonance forms for the benzyl cation (6 pts):



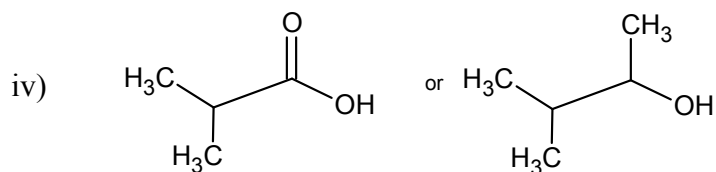
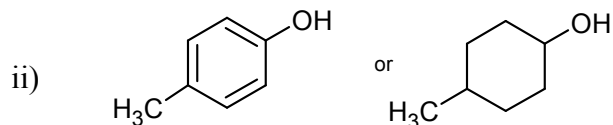
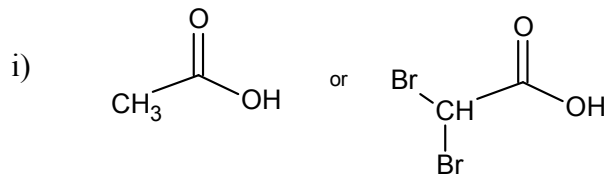
Benzyl Cation

2D. Circle the more stable conformation in each pair and explain your answer (4 pts each):

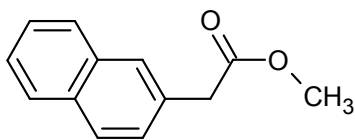
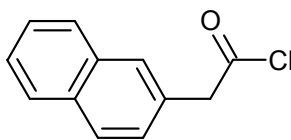
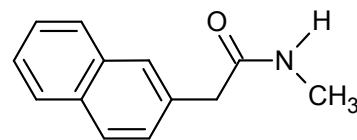


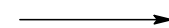
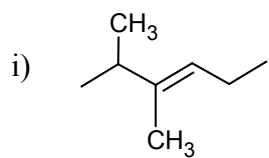
Part 3: Acids and Bases; Structure/Reactivity Relationships (30 pts):

3A. Circle the stronger acid in each pair and explain your answer: (4 pts each):

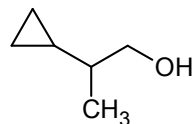
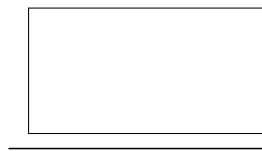
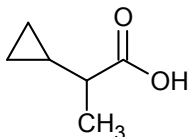


3B. Rank the following compounds in order of reactivity toward nucleophilic acyl substitution (1 = fastest, 3 = slowest) (4 pts):

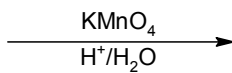
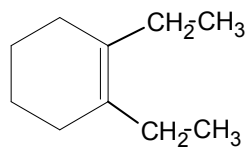
**A****B****C**

Part 4: Provide the Reagent(s) or Product(s) (60 pts):

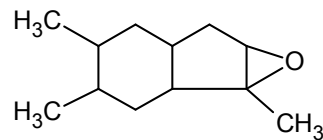
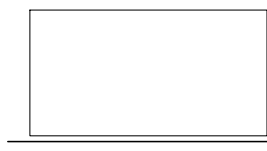
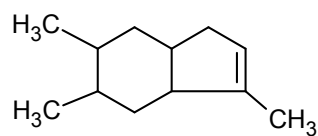
ii)



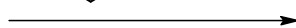
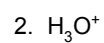
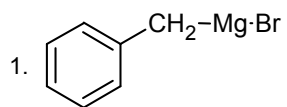
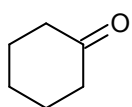
iii)



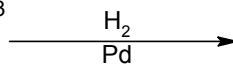
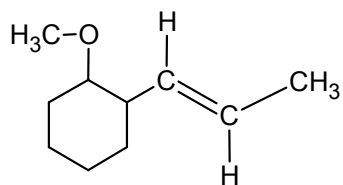
iv)

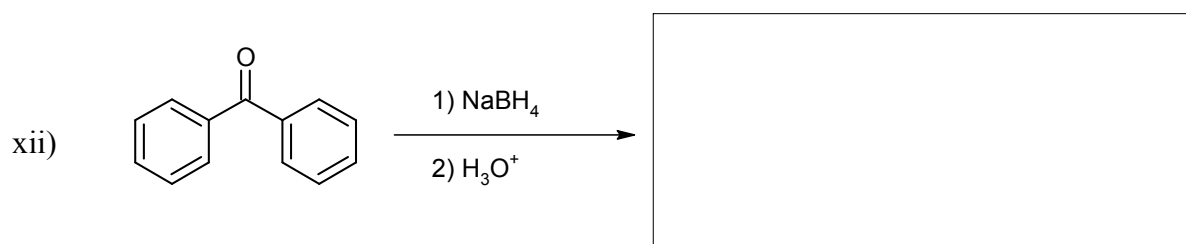
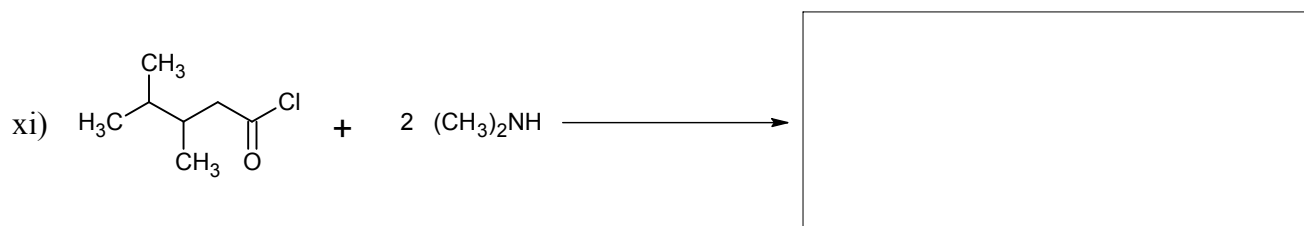
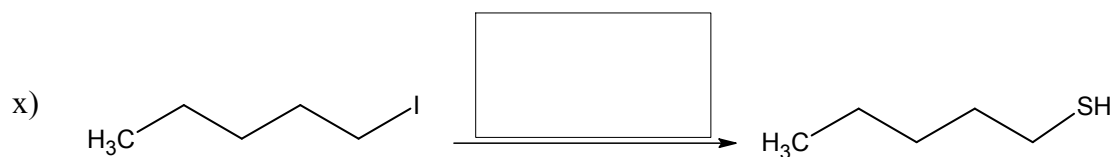
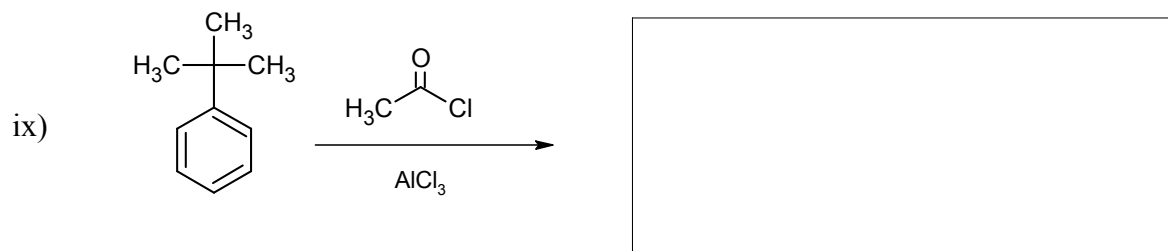
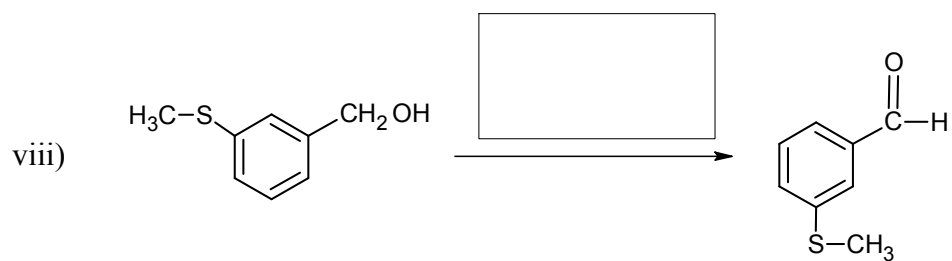
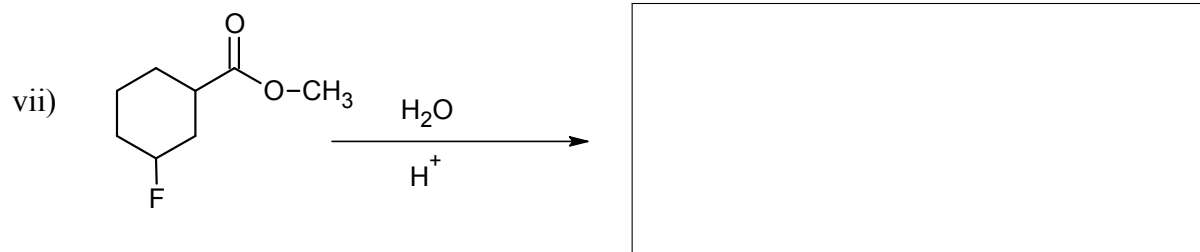


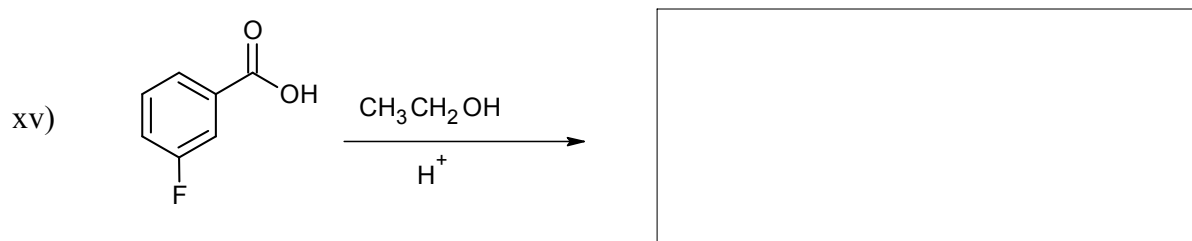
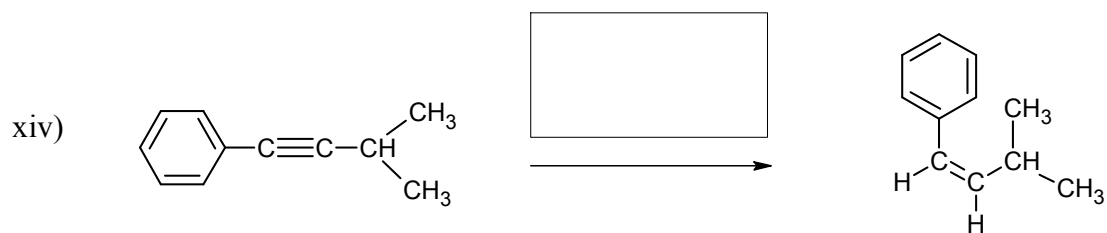
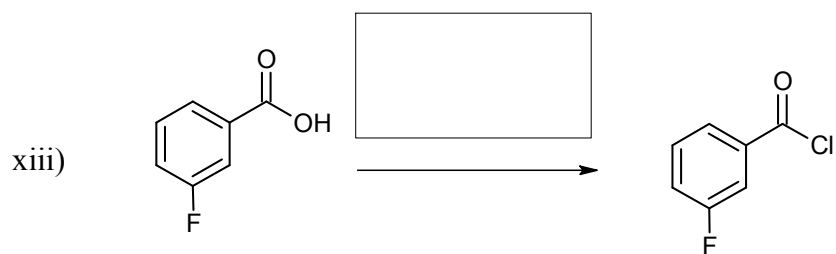
v)



vi)

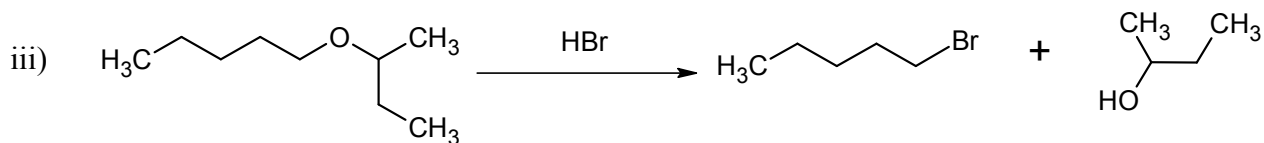
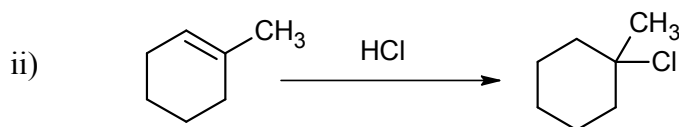
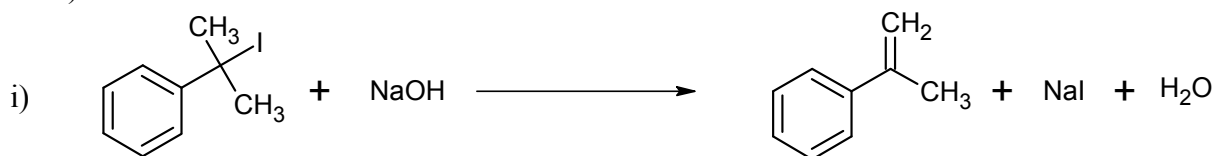






Part 5: Reaction Mechanisms (20 pts):

5A. Provide complete arrow-pushing mechanisms for the following transformations (5 pts. each):



5B. When (R)-3-methylhexan-3-ol is heated in aqueous acid (H_3O^+), racemic 3-methylhexan-3-ol is formed. Propose an explanation (5 pts.).

Part 6: Synthesis (20 pts):

Propose a synthesis of each of the following compounds starting from the indicated compound and any other reagents you need (5 pts. each):

