EXAM 4

CHEMISTRY 220a

Friday, December 3, 2004

NAME (print): _____

TA:_____ Day:_____ Time:_____

Take a few moments to look over the exam. Answer each question on the exam paper.

Important clues, points, and structures are in **bold**.

Do all **preliminary** drawing or computations on the work sheets at the end of the exam. The work sheets will not be graded

The exam is 55 minutes.

STOP writing and hand in your exam when you are asked to do so.

REMEMBER: Neatness is to your advantage.

1. Structure (25 pts) _____

2. Synthesis (25 pts) _____

3. Reactions (25 pts) Do 4 of 5. _____

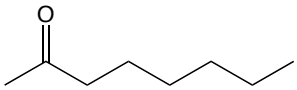
4. Potpourri (25 pts) Do 4 of 5. _____

_____

Total (100 pts)

1. **Structure:** (25 pts.) When compound **A** ($C_9H_{18}O_2$) is treated with two equivalents of Grignard reagent **B**, two alcohols are isolated: 3-pentanol **C** and 2-methyl-3-ethyl-3-pentanol (**D**). When **A** is treated with excess $LiAlH_4$, alcohol **C** is formed along with the primary alcohol, isobutyl alcohol (**E**). What are the structures **A-E**? Explain and illustrate.

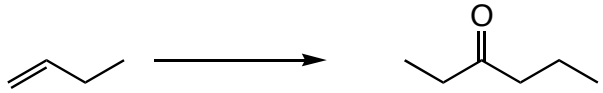
2. **Synthesis:** (25 pts.) A chemist requires a sample of 2-octanone. Unfortunately, it is the weekend and the stockroom is closed. She finds in the laboratory the following organic compounds: 1-butanol (n-butyl alcohol), methanol, and ethylene. She designs a synthesis of **1** using these three building blocks. She discovers that the required reagents are in the lab. Illustrate her plan, or your's.



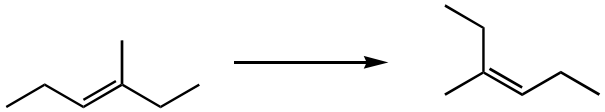
1

3. **Reactions:** (25 pts.) Provide the reaction conditions in **4 of 5** of the following chemical transformations. Several steps may be required. If you do all five problems, **cross out** the one you do not want graded.

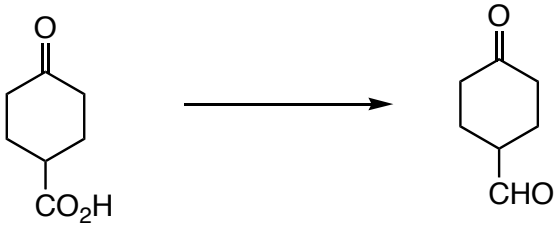
a)



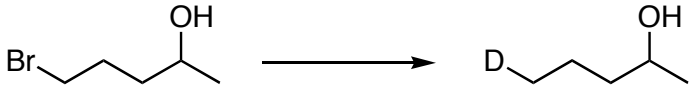
b)



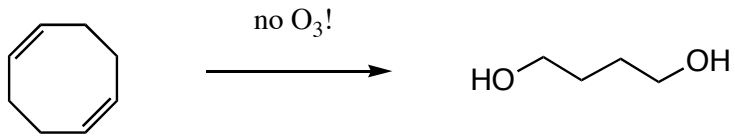
c)



d)

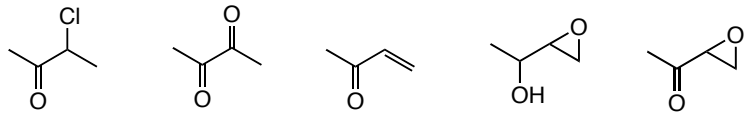


e)



4. **Potpourri:** (25 pts.) Complete **4 of 5** of the following. If you do all five problems, **cross out** the one you do not want graded.

a) **Circle** the compound(s) that are the most highly oxidized.



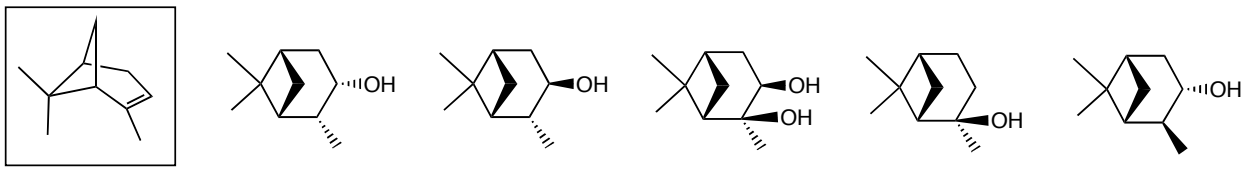
b) **Circle** the compounds that react with Grignard reagents.

cholesterol limonene methyl salicylate benzaldehyde THF

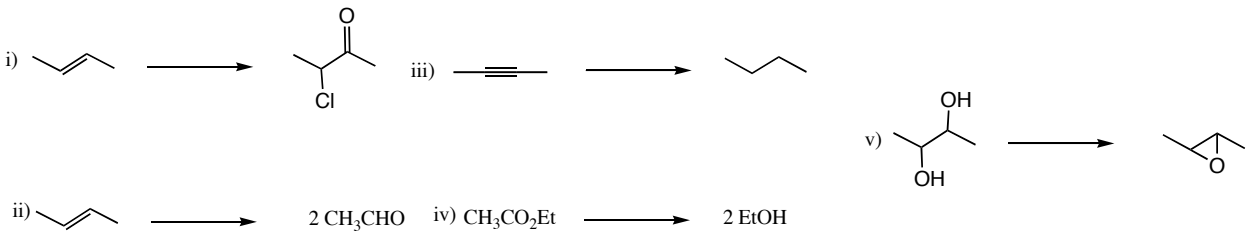
c) **Circle** the "alcohol" with the lowest pKa value.

Ethanol F_3CCH_2OH PhOH $ClCH_2CH_2OH$ methanol

d) **Circle** the major hydroboration product derived from α-pinene (boxed).



e) **Circle** the chemical reaction(s) that involve a 4-electron change in oxidation level.



Name:_____

Work Sheets

Name:_____

Work Sheets

Name:_____

Work Sheets