

EXAM 4
CHEMISTRY 220a
Friday, December 2, 2005

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) _____

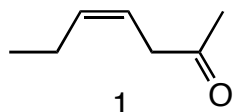
3. Reactions (25 pts) Do 4 of 5. _____

4. Potpourri (25 pts) _____

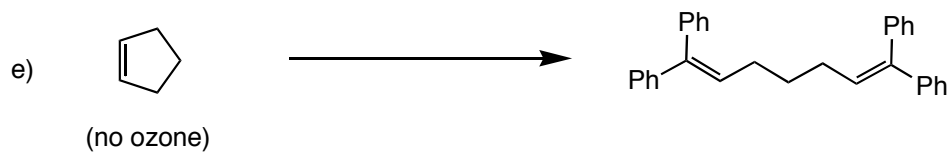
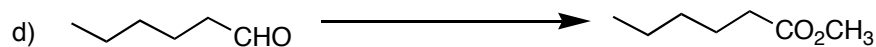
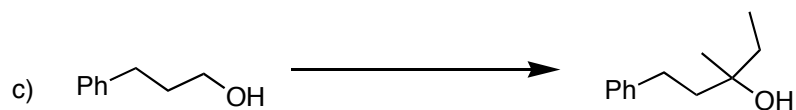
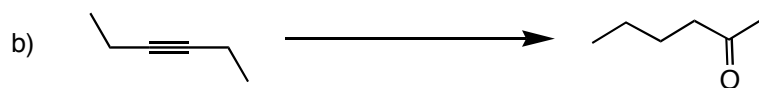
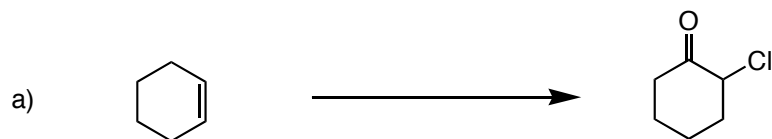
Total (100 pts)

1. **Structure:** (25 pts.) Optically active ester **A** ($C_{10}H_{20}O_2$) is treated with $LiAlH_4$ to produce a **single alcohol**, (\pm)-**B**. When the ester is exposed to excess Grignard reagent **C**, two alcohols are isolated in equal amounts: alcohol **D** ($C_7H_{16}O$) and (*S*)-**B**. What are the structures **A-D**? Why is **B** racemic in the first experiment? Be sure to include absolute stereochemistry where applicable.

2. **Synthesis:** (25 pts.) A chemist requires a sample of (Z)-4-hepten-2-one (**1**). Unfortunately, it is the weekend and the stockroom is closed. She finds in the laboratory the following organic compounds: 2-butyne and propene. She designs a synthesis of **1** using these building blocks. She discovers that the required reagents are in the lab. Illustrate her plan, or your's.

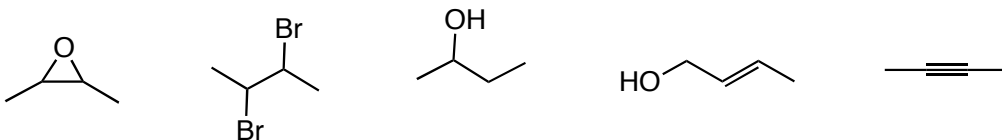


3. **Reactions:** (25 pts.) Provide the reaction conditions in **4 of 5** of the following chemical transformations. Several steps may be required. If you do all five problems, **cross out** the one you do not want graded.



4. **Potpourri:** (25 pts.) complete each of the following questions.

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



b) One mole of chromium (VI) will oxidize how many moles of isopropanol. (**Circle**)

0.50

0.67

1.00

1.33

1.50

c) **Circle** the reactions that employ a catalyst for their successful completion.

2-butyne \rightarrow 2-butanone $\text{RCO}_2\text{H} \rightarrow \text{RCO}_2\text{CH}_3$ 2-butyne \rightarrow 1-butyne1-butyne \rightarrow 2-butyneisopropanol \rightarrow acetone

d) The heat of formation of 2-hexyne is +25.7 kcal/mol. **Circle** the 2-alkyne whose heat of formation is approximately 0 kcal/mol.

2-butyne

2-undecyne

2-octyne

2-tetradecyne

2-pentyne

Name: _____

6

Work Sheets

Name: _____

7

Work Sheets

Name: _____

8

Work Sheets