EXAM 3

CHEMISTRY 220a

Friday, November 5, 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) ______

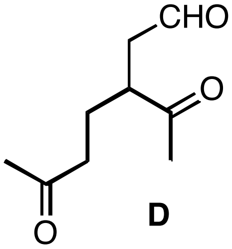
3. Reactions (25 pts) ______

4. Potpourri (25 pts) ______

____

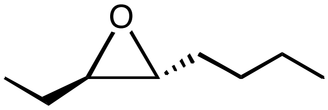
Total (100 pts)

1. **Structure:** (25 pts.) Compound (*S*)-**A** ($C_{10}H_{16}$) reacts with H_2 in the presence of Pd to form achiral **B** ($C_{10}H_{20}$) and achiral **C** ($C_{10}H_{20}$). Ozonolysis and dimethyl sulfide reduction of **A** affords the single enantiomer **D** and formaldehyde. What are the structures **A-D**? Explain and illustrate. Be certain to illustrate the absolute stereochemistry for **A** and **D**.



D

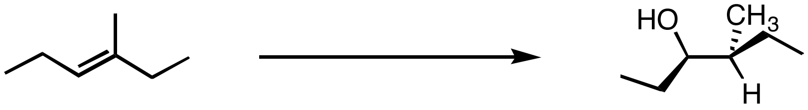
2. **Synthesis:** (25 pts.) A chemist requires a sample of (±)-epoxide **1**. She designs and executes a synthesis of the epoxide using 1-butyne as her sole source of carbon. All other reagents are available to her. Show how she may have accomplished her goal.



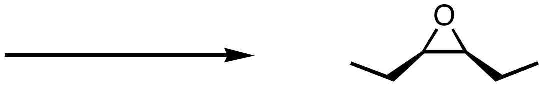
1

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. **Pay attention to stereochemistry**.

a)

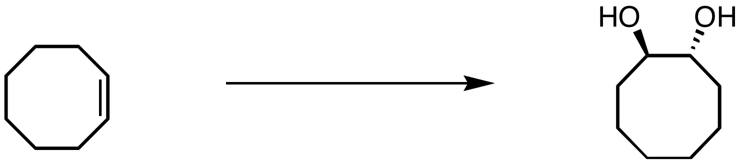


b) 3-hexyne



c) $CH_3C\equiv CCH_2CH_3$

d)

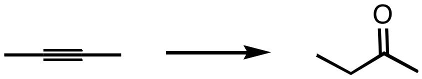


e) 4-octyne → meso-4,5-dichlorooctane

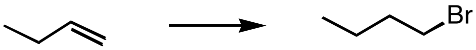
4. **Potpourri:** (25 pts.) Complete **4 of 5** of the following. If you do all five problems, **cross out** the one you do not want graded.

a) Provide (over the arrow) the **catalytic agent** in each of the following single-step reactions.

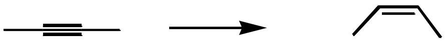
i)



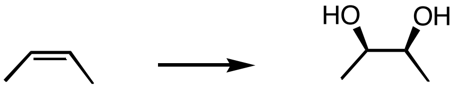
ii)



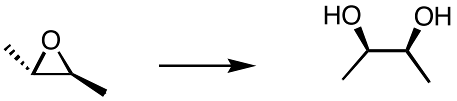
iii)



iv)



v)



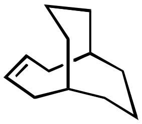
b) **Circle** the reagents that are expected to give meso compounds with (Z)-5-decene .

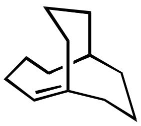
Br_2 Br_2/H_2O peracid OsO_4/H_2O_2 $CH_2I_2/Zn(Cu)$

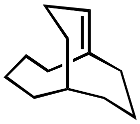
c) The heat of formation of 2-hexyne is +25.7 kcal/mol. **Circle** the most likely heat of formation of 1-hexyne.

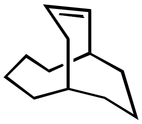
+29.2 +25.7 +25.2 +20.2 -29.2

d) **Circle** the compound(s) in violation of Bredt's Rule.









none
of
these

e) (**Circle** all that apply.) Hydroboration and oxidation of 2-methyl-2-butene affords an alcohol that is:

optical-active racemic secondary tertiary d,l

Name:____

Work Sheets

Name:____

Work Sheets

Work Sheets