EXAM 3

CHEMISTRY 220a

Friday, November 8, 2002

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

There is a Periodic Table on the last page of the exam.

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 (20 pts) ______

2. Synthesis (20 pts) ______

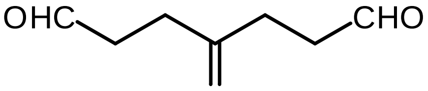
3. Reactions (30 pts) ______

4. Potpourri (30 pts) ______

____

Total (100 pts)

1. **Structure:** (20 pts.) Compound **A** (C_9H_{14}) reacts with two moles of H_2 in the presence of Pd or Pt to form **B**. Compound **B** is found to be **not** identical with 1-cyclobutylpentane. Ozonolysis of **A** and subsequent reduction with dimethyl sulfide affords keto dialdehyde **D** and compound **E**. What are the structures **A-E**? Explain and illustrate.

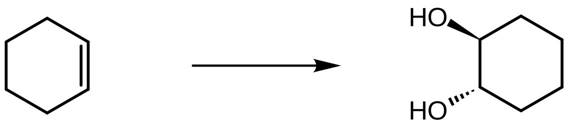


D

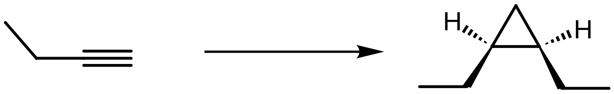
2. **Synthesis:** (20 pts.) A chemist requires a sample of racemic 4,5-octanediol ($C_8H_{18}O_2$). She designs and executes a synthesis of the diol using acetylene (C_2H_2) and propene (C_3H_6) as her sources of carbon. All other reagents were available to her. Show how she may have accomplished her goal.

3. **Reactions:** (30 pts.) In each of the following chemical transformations, provide the reaction conditions or the products. Several steps may be required. **Pay attention to stereochemistry**.

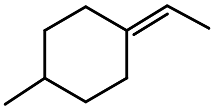
a)



b)



c)

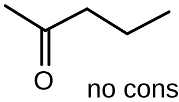


1) B_2H_6 →
2) H_2O_2, aq. NaOH

A + **B**

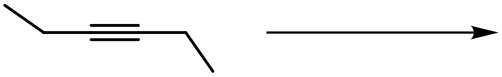
(diastereomers)

d) 2-pentyne →



no constitutional isomers

e)



meso-3,4-dichlorohexane

4. **Potpourri:** (30 pts.) **Circle** the best answer(s) in each of the following.

a) The reactions that are conducted in the presence of a catalytic reagent.

Hg^{++} hydration of acetylenes

dihydroxylation with OsO_4/H_2O_2

anti-Markovnikov addition of HBr to alkenes

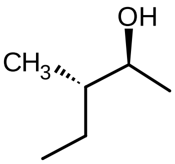
Lindlar reduction

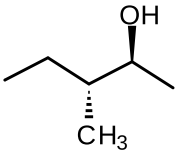
hydroboration

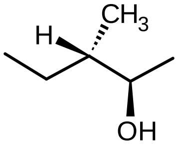
b) Racemates are expected in the reaction of (Z)-5-decene with

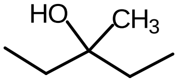
Br_2 Br_2/H_2O peracid OsO_4/H_2O_2 $CH_2I_2/Zn(Cu)$

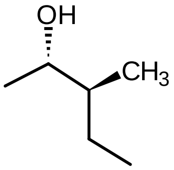
c) The structure(s) that represent the **correct stereochemistry** from the hydroboration of (E)-3-methyl-2-pentene.



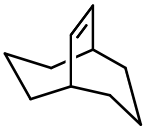


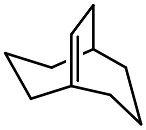


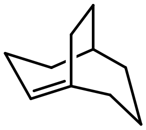


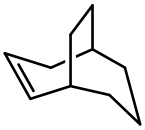


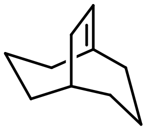
d) The compound(s) in violation of Bredt's Rule



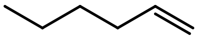


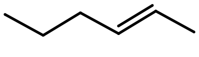


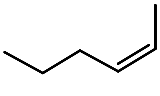


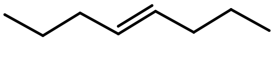


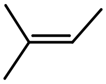
e) The compound(s) with the **smallest** heat of hydrogenation











Name:____

Work Sheets

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Periodic Table