MAKE-UP EXAM

CHEMISTRY 220a

Friday, December 13, 2002

NAME (print): _____

TA:_____ Section Day:_____ Section Time:_____

The exam is 55 minutes; it covers Chapters 1-11.

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

Important clues and instructions 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.

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

REMEMBER: Neatness is to your advantage.

1. (20 pts) _____

2. (20 pts) _____

3. (20 pts) _____

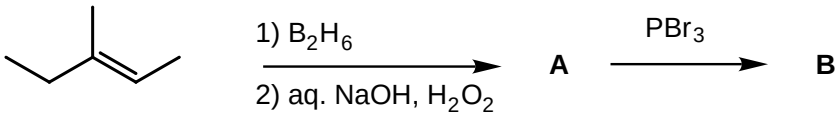
4. (20 pts) _____

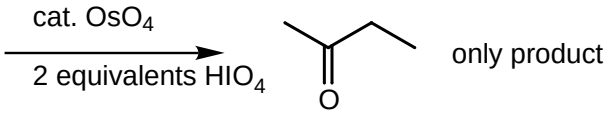
5. (20 pts) _____

_____

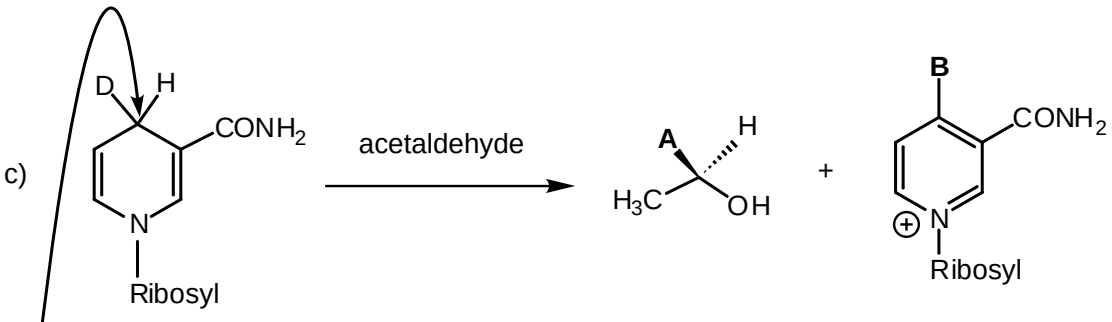
Total (100 pts)

1. (20 pts.) **Do 4 of 5.** Provide the missing information in each of the following reactions. **Pay attention to stereochemistry**.

a) 

b) **A** or **B** 

only product

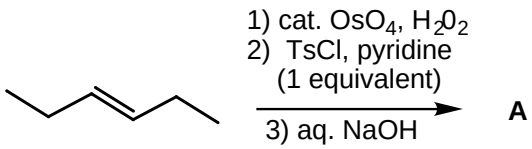
c) 

(S)-configuration
NADH

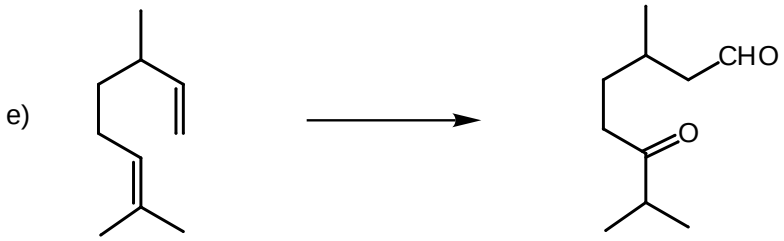
What atoms are **A** and **B**?

NAD^+

d)



e)



2. (20 pts.) Two enantiomers have equal and opposite specific rotations of 120°. If a mixture of the two enantiomers has a specific rotation of +80°, How much (percent) of the dextro- and laevorotatory enantiomers are present? What is the optical purity of the mixture? Show work.

3. (20 pts.) An overall chemical reaction (**A** → **C**) having an intermediate **B** is exothermic by 20 kcal/mol and the first step is endothermic by 3 kcal/mol. Illustrate this reaction with an energy diagram taking into account the Hammond Postulate. Indicate the rate limiting step in the reaction? What is ΔH^o for the second step?

4. (20 pts.) Design a synthesis of 3-ethyl-2-pentene (C_7H_{14}) from ethylene and formaldehyde as your source of carbon atoms. All reagents are available to you. [Note: Ethylene has an even number of carbons; C_7H_{14} has an odd number.]

5. (20 pts.) Ozonolysis and dimethyl sulfide reduction of alkene **A** (C_7H_{14}) provides **B** and **C**. Mercuric sulfate catalyzed hydration of 1-pentyne affords only **D** while hydration of 2-pentyne gives **C** and **D**. What are the structures **A**-**D**? Explain.

Work Sheets

Work Sheets

Work Sheets

Periodic Table