

Seat No. \_\_\_\_\_

Name KEY

*(Please* **CLEARLY PRINT** your name and **CIRCLE** your last name)

**CHEMISTRY 331**

**Sections A & B**

**EXAM III**

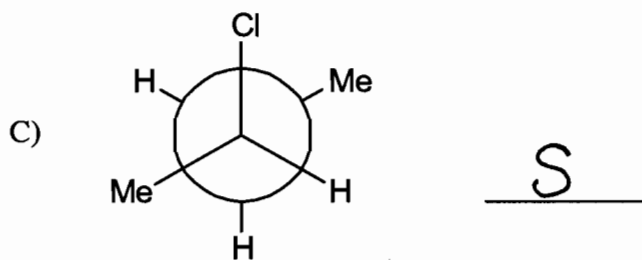
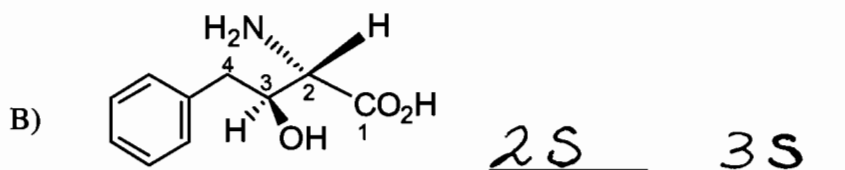
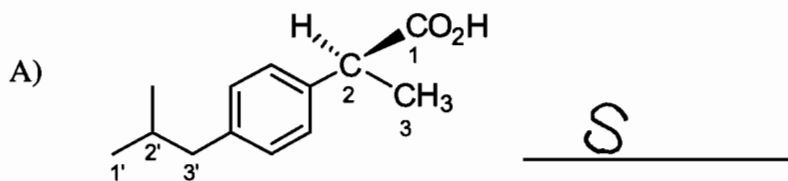
Tuesday, November 3, 2009

- I. ( 8 points) \_\_\_\_\_
- II. ( 8 points) \_\_\_\_\_
- III. (18 points) \_\_\_\_\_
- IV. (15 points) \_\_\_\_\_
- V. (10 points) \_\_\_\_\_
- VI. ( 4 points) \_\_\_\_\_
- VII. (10 points) \_\_\_\_\_
- VIII. (16 points) \_\_\_\_\_
- IX. (10 points) \_\_\_\_\_
- X. ( 1 point) \_\_\_\_\_

\_\_\_\_\_

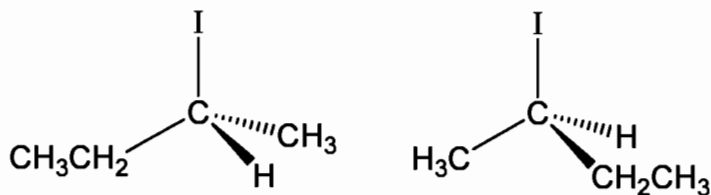
TOTAL(100 points) \_\_\_\_\_

I. (8 pts.) Mark with an \* the chiral centers of the following molecules and assign R or S configurations.



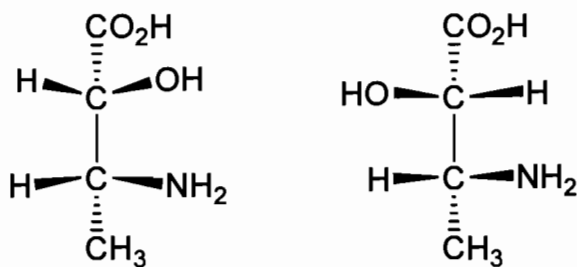
II. (8 pts.) Provide the stereochemical relationship of each of the following pairs.

A)



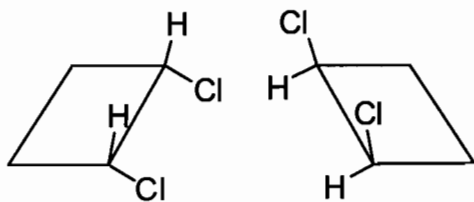
identical

B)



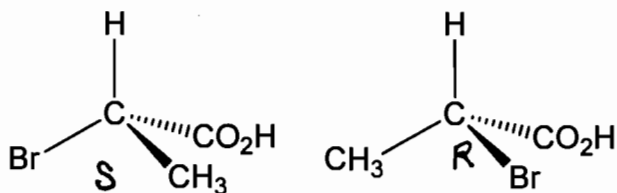
diastereoisomers

C)



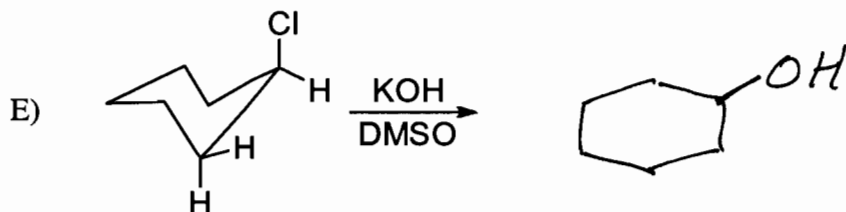
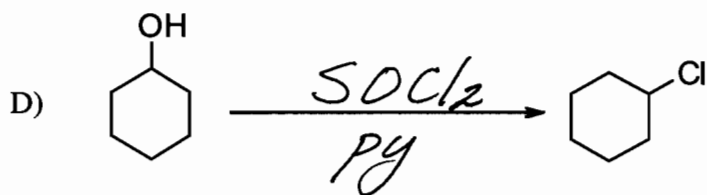
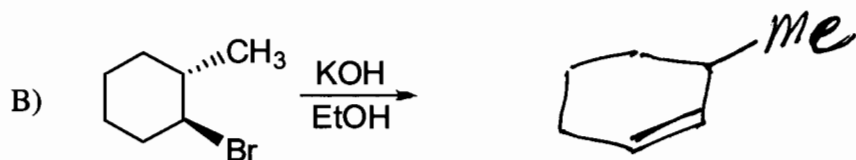
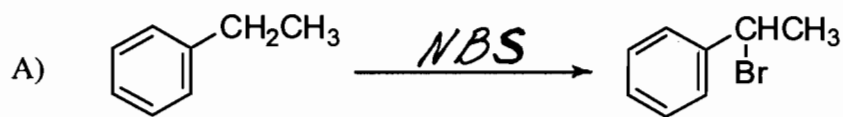
identical (meso)

D)

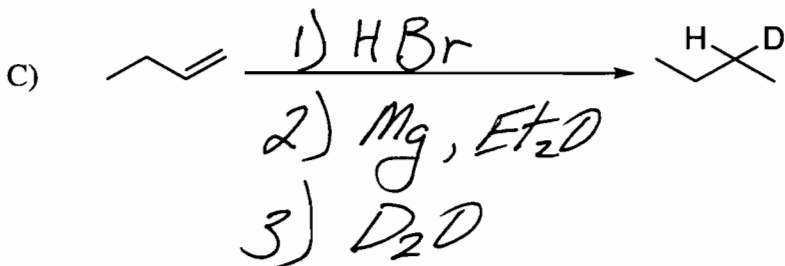
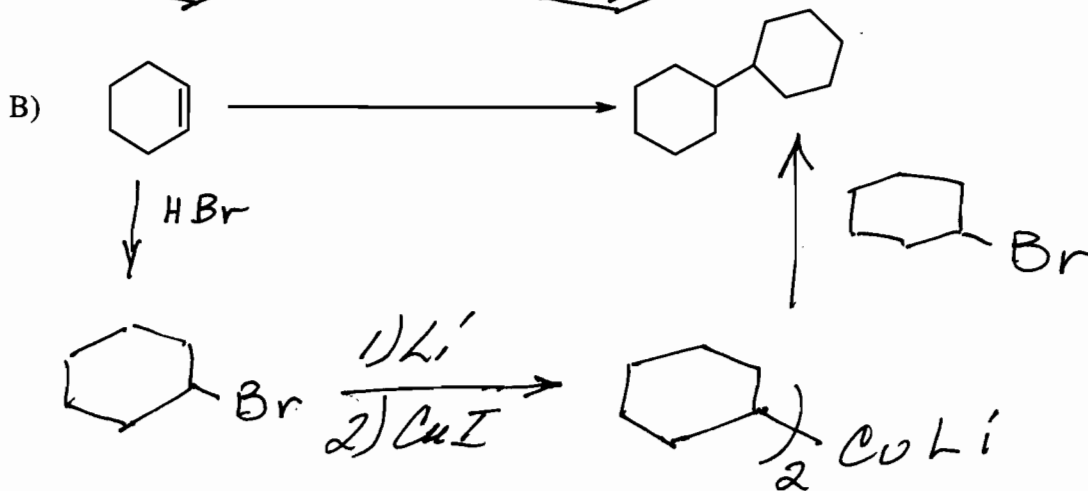
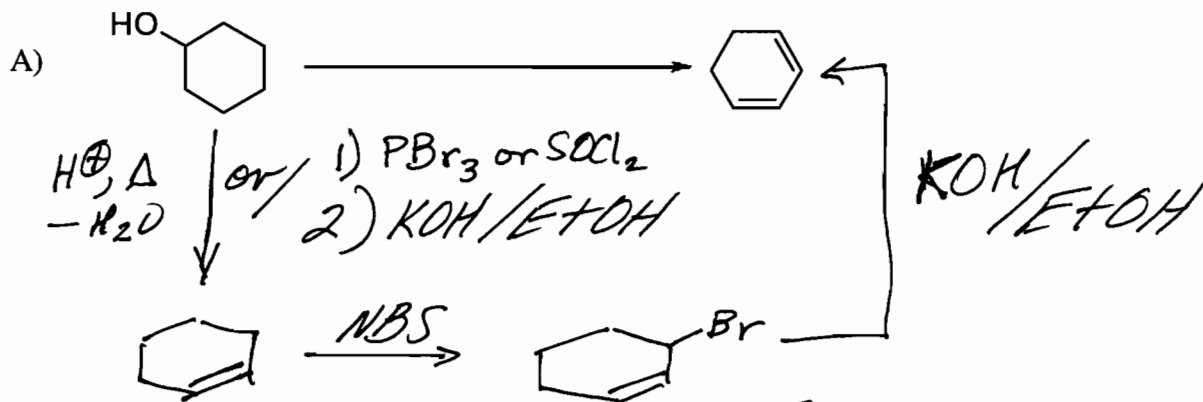


enantiomers

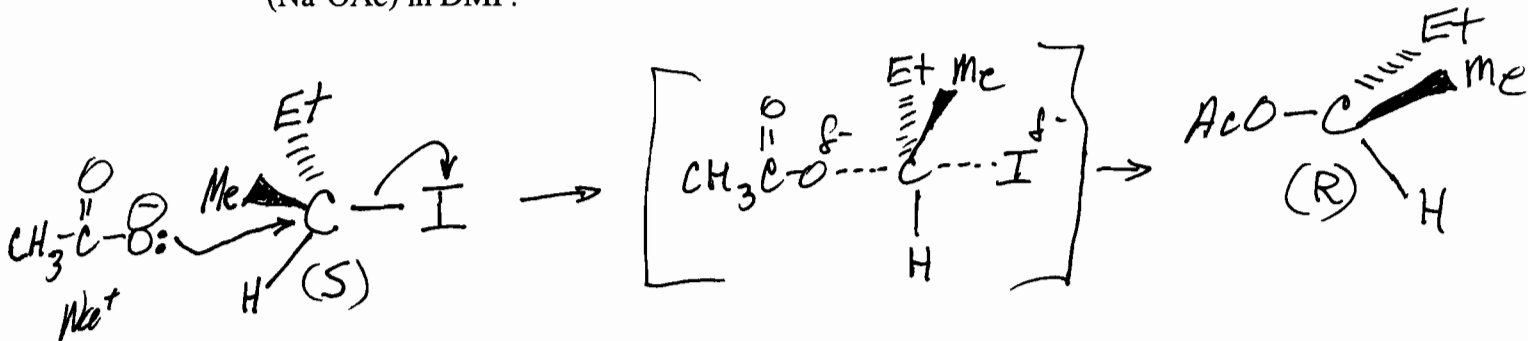
III. (18 pts.) Complete the following equations.



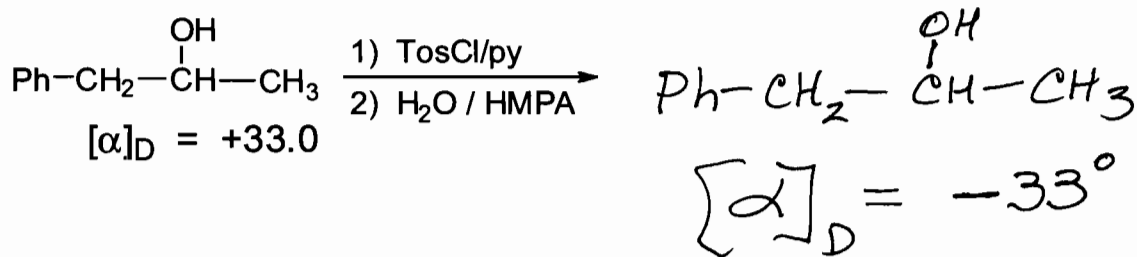
IV. (15 pts.) Show how you would perform the following transformations. Assume that all necessary inorganic reagents are available. Any necessary organometallic reagents must be constructed from the starting organic compound.



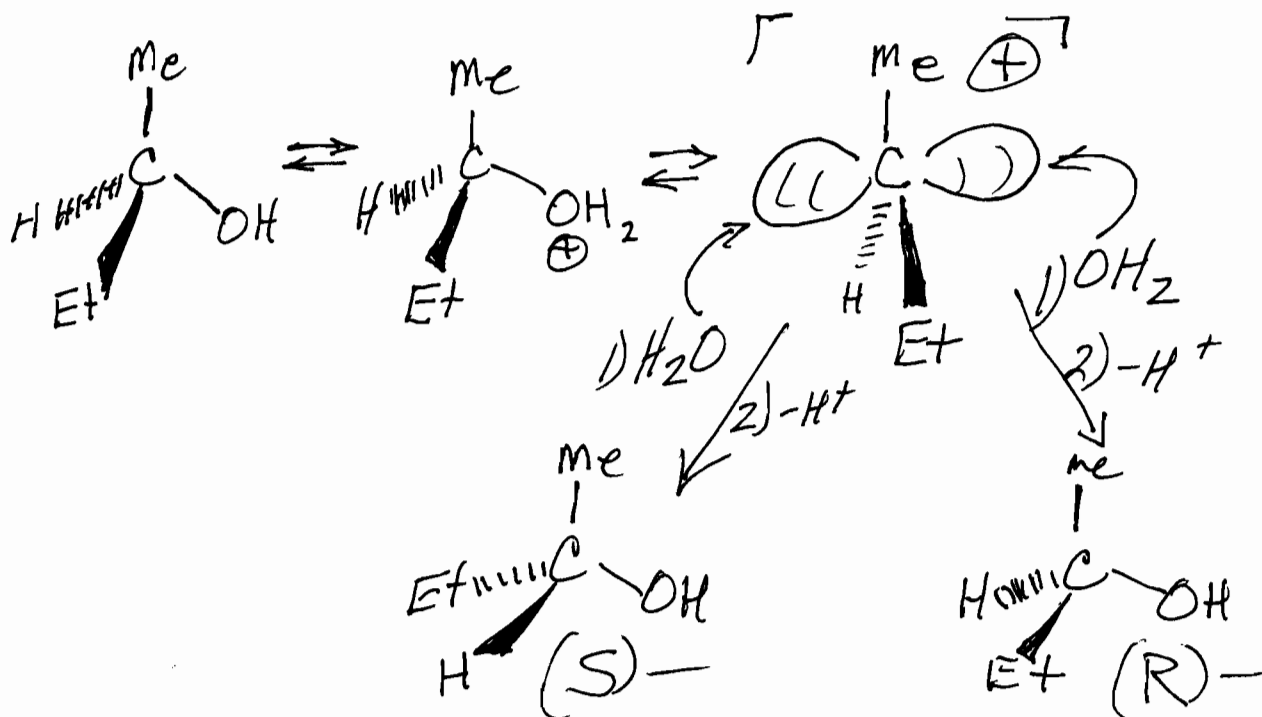
- V. (10 pts.) Provide a detailed, stepwise mechanism showing any necessary e-pair movement and any pertinent stereochemistry of the  $S_N2$  reaction of (S)-2-iodobutane and sodium acetate ( $\text{Na}^+\text{OAc}$ ) in DMF.



- VI. (4 pts.) Provide the alcohol product and its anticipated  $[\alpha]_D$  of this reaction sequence.



- VII. (10 pts.) 2R-2-butanol slowly racemizes in dilute  $\text{H}_2\text{SO}_4$ . Write a mechanism for this process.



VIII. (16 pts) **Circle** the one which

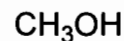
A) is most nucleophilic



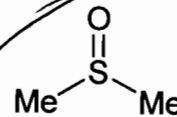
or



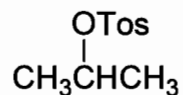
B) is better  $\text{S}_{\text{N}}^2$  solvent



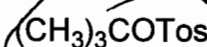
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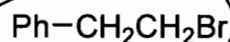
C) most likely to undergo an  $\text{S}_{\text{N}}^1$  reaction



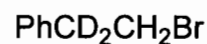
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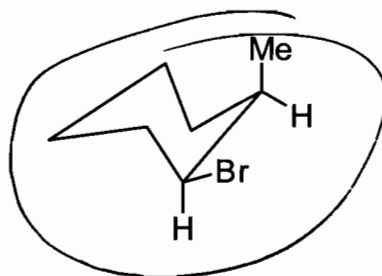
D) would undergo an  $\text{E}_2$  elimination faster



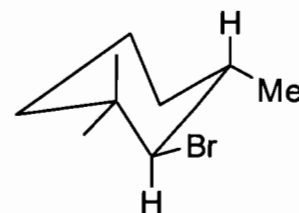
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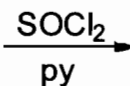
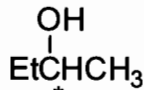
E) would undergo an  $\text{E}_2$  elimination to give 1-methylcyclohexene



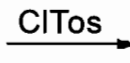
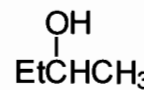
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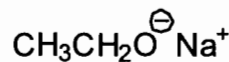
F) would undergo inversion of configuration



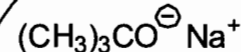
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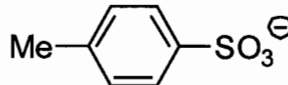
G) would be the less likely to act as a nuc. In an  $\text{S}_{\text{N}}^2$  reaction



or



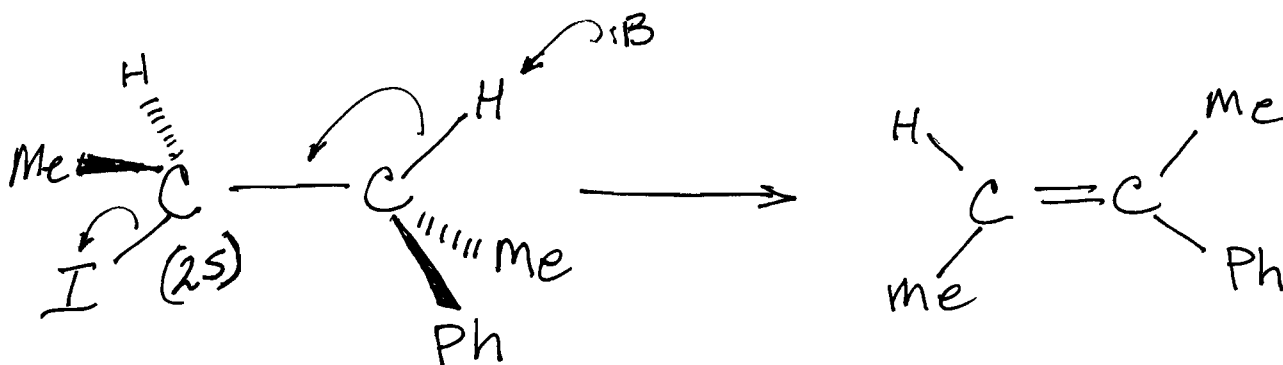
H) would be the best leaving group For an  $\text{S}_{\text{N}}^1$  reaction



or



IX. (10 pts) Draw (3R, 2S)-2-iodo-3-phenylbutane using wedge / dotted line 3D drawings and draw and name the major alkene product that will be produced from E<sub>2</sub> elimination of HI.



X. (1 pt.) For one point work one of the following problems:

A) Who was buried in Grant's Tomb?

*Hopefully Grant!*

B) Why is the person who invests your money called a "broker"?

*I wish I didn't know!*

C) What disease did cured ham actually have?

*C<sup>o</sup> Swine flu?*

D) Can a hearse carrying a corpse legally drive in the car pool lane?

*Worth a try.*