

Seat No. _____

Name KEY
(Please print your name and **circle** your last name)

CHEMISTRY 331

EXAM III

Section A

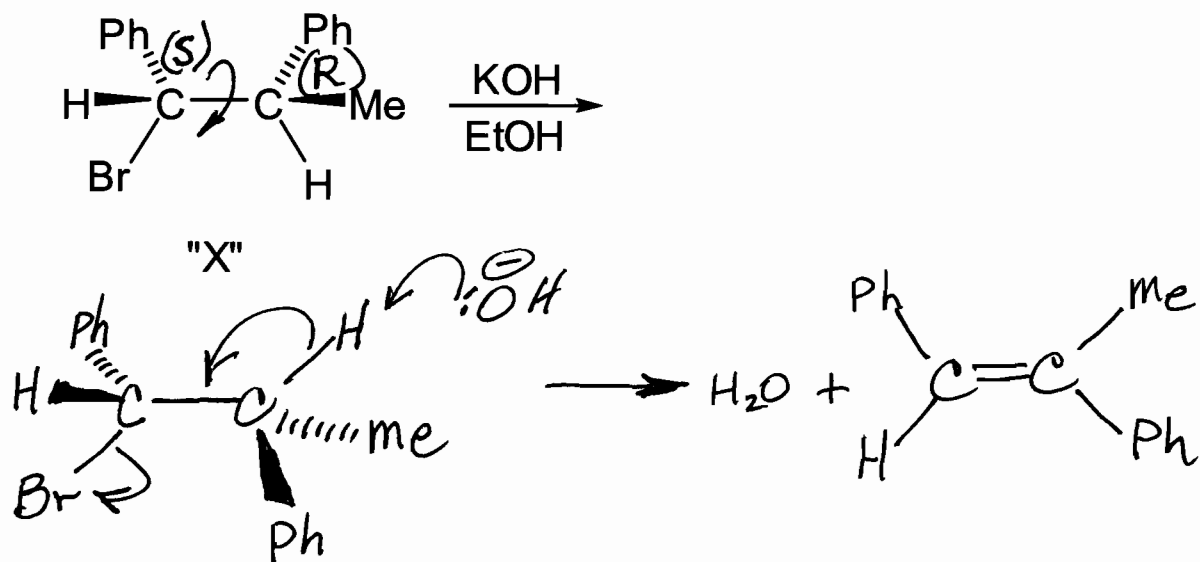
Wednesday, November 5, 2008

- I. (10 points) _____
- II. (15 points) _____
- III. (30 points) _____
- IV. (15 points) _____
- V. (5 points) _____
- VI. (5 points) _____
- VII. (5 points) _____
- VIII. (15 points) _____

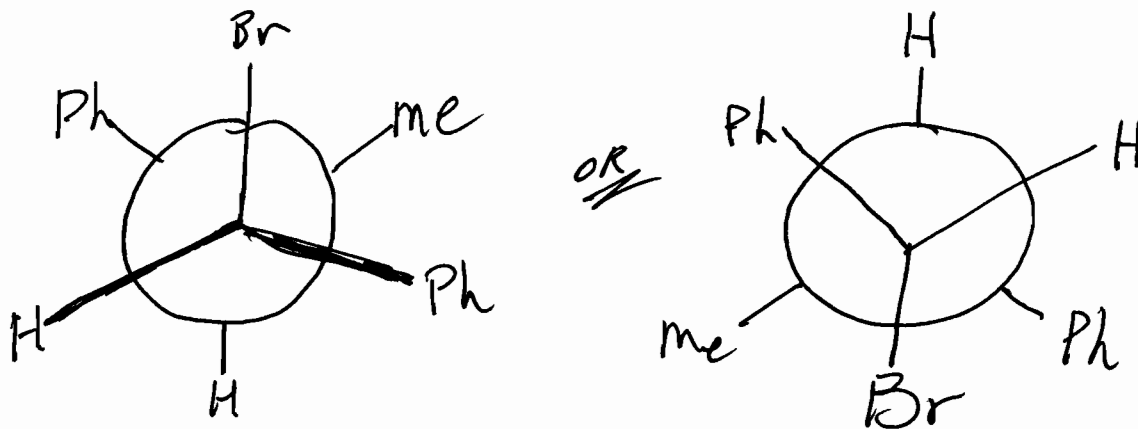
TOTAL(100 points) _____

I. (18 pts.) An SN1 substitution reaction is facilitated by a polar protic solvent while a polar aprotic solvent favors an SN2 substitution reaction. Nucleophilicity increases as one goes down a column in the periodic table. The conjugate base of a strong acid is a good leaving group in an SN2 reaction. That base-induced elimination reactions produce predominantly the more substituted alkene is referred to as Zaitsev's rule. Both SN1 reactions and E1 reactions proceed through the same intermediate. E2 reactions require an anti periplanar geometry of the departing groups. An E2 rxn. shows a deuterium isotope effect on its rate.

- II. (15 pts.) A) Write the expected product and a stepwise mechanism for the E₂ elimination of HBr from "X". Show e-pair movement with curved arrows.

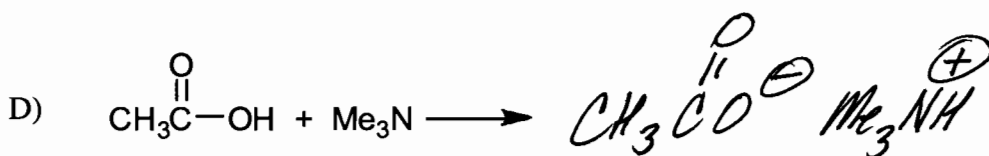
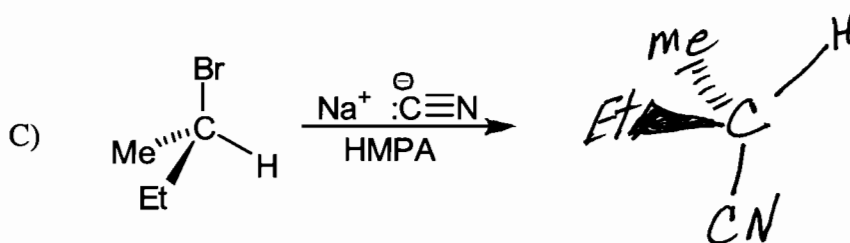
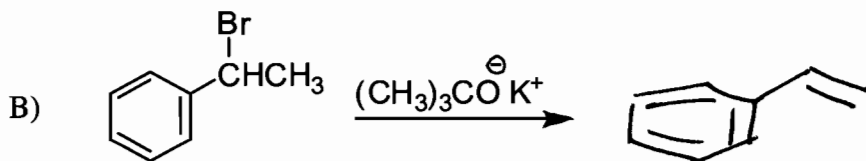


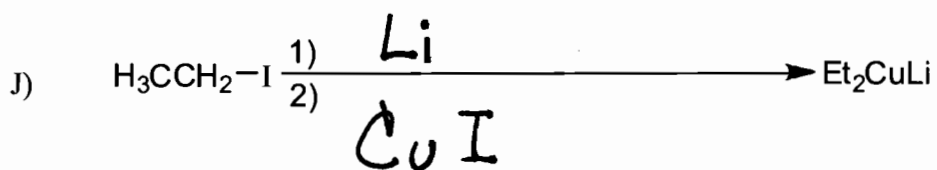
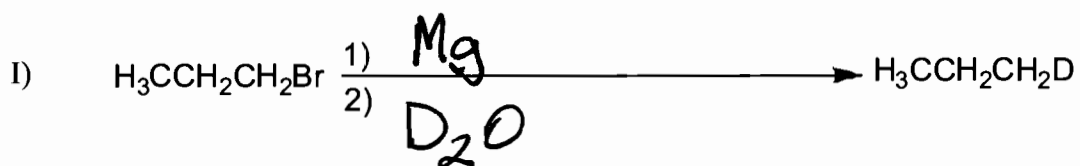
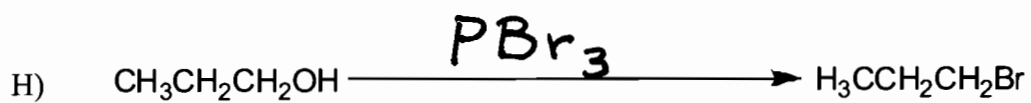
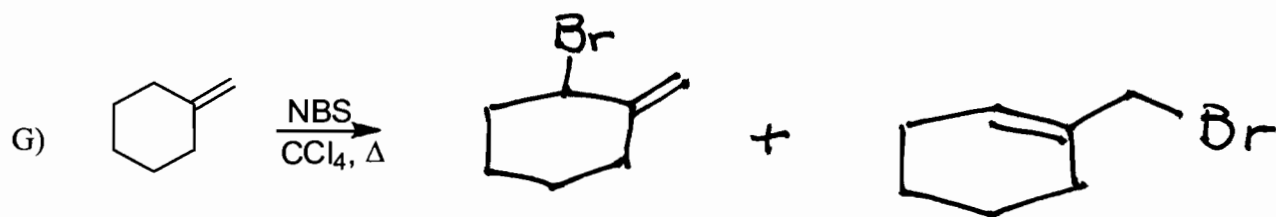
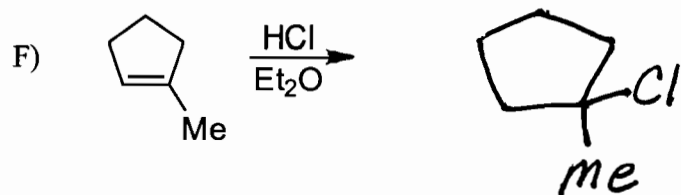
- B) Sighting down the C₁-C₂ bond draw the Newman projection of the conformation required for this reaction to proceed.



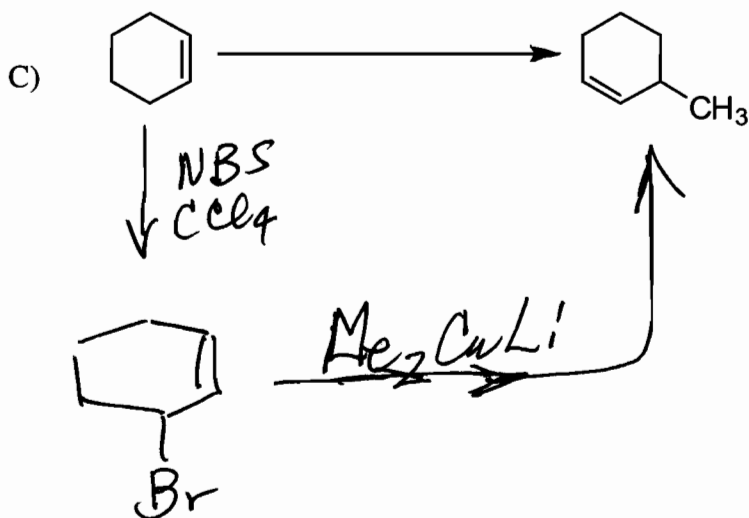
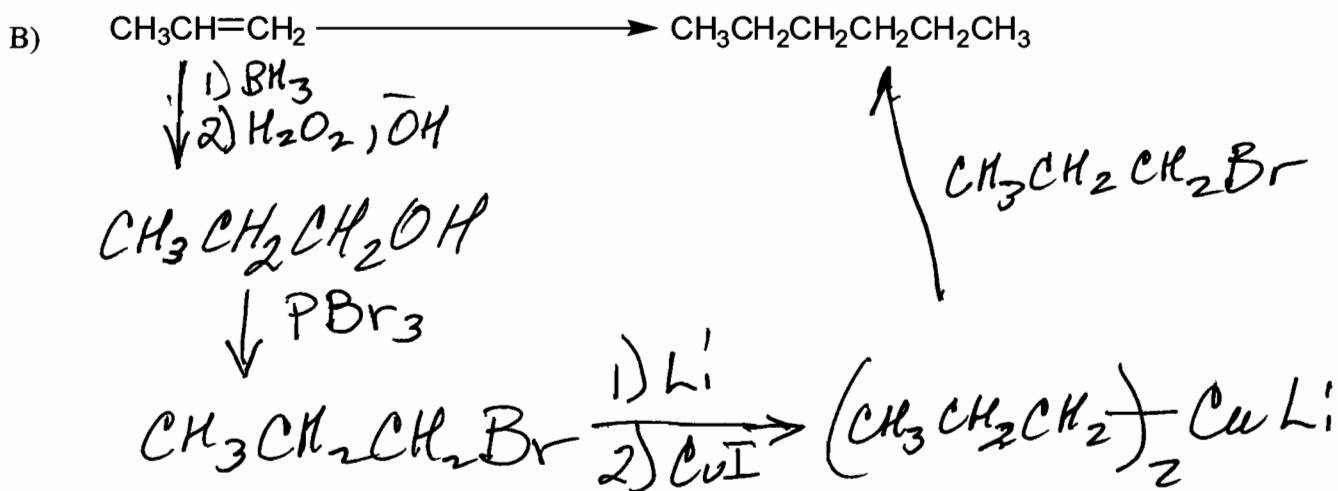
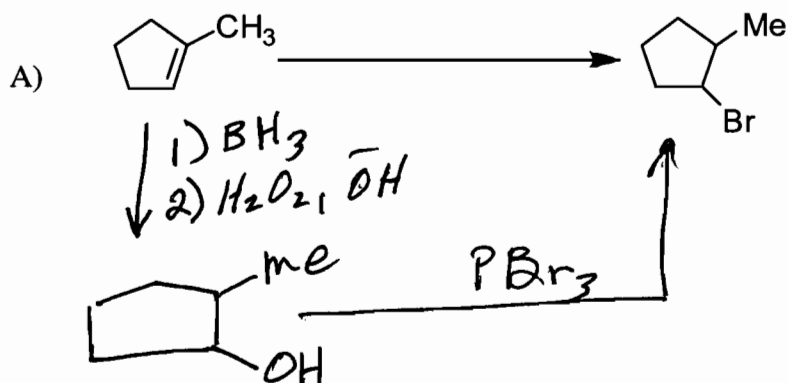
- C) Assign R- or S- configurations to all chiral centers in "X". No need to redraw. Simply indicate R- or S- on the drawing in IIA.

III. (30 pts.) Complete the following equations.





IV. (15 pts.) Show how you would perform the following transformations.



V. (5 pts.) Circle each of the following items which are chiral:

Shoe

Screw

Shirt

Glove

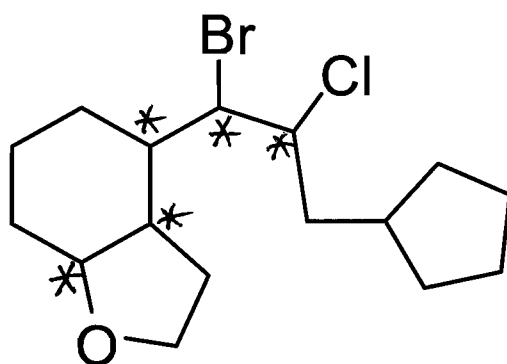
Hammer

Tongue Depressor

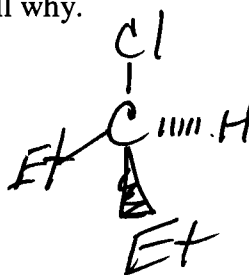
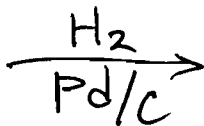
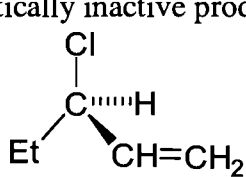
ear

2-bromopentane

VI. (5 pts.) Place an asterisk at each of the chiral carbons in this molecule.



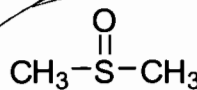
VII. (5 pts.) Hydrogenation (H_2 , Pd/c) of optically pure (R)-3-chloro-1-pentene produces an optically inactive product. Show and/or tell why.



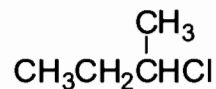
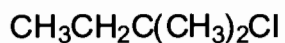
No chiral center.
∴ opt. inact.

VIII. (15 pts) circle the one in each pair which is more likely to:

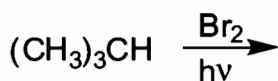
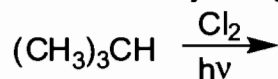
A) facilitate an SN2 reaction as a solvent.



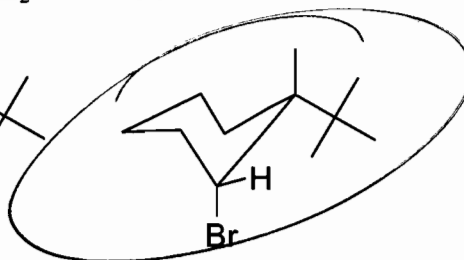
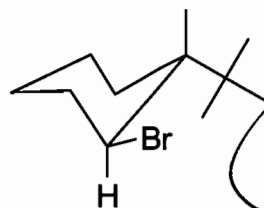
B) Undergo an SN1 reaction



C) give almost exclusively a single monohalogenated product.



D) undergo a base-induced E₂ elimination.



E) undergo an inversion in a substitution rxn.

