

Seat No. _____

LAST NAME _____

FIRST NAME _____

There are 8 pages to this exam. Check to make sure you have a complete exam.

PLEASE ALSO PRINT YOUR NAME ON THE TOP OF
THE **BACK** OF THE LAST PAGE OF THE EXAM

CHEMISTRY 331

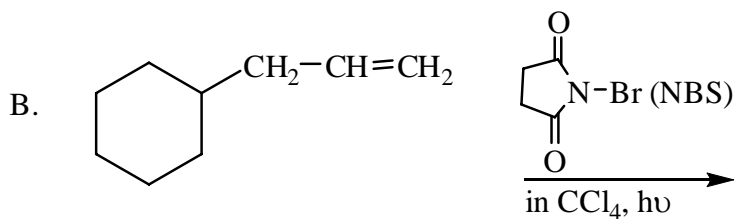
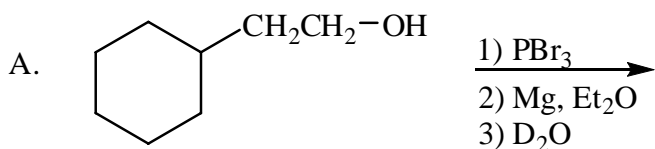
EXAM IV

Spring 2007, April 4, 2007

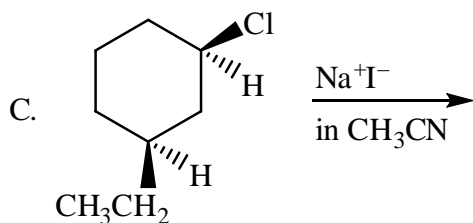
I.	(30 points)	<input type="checkbox"/>	<input type="checkbox"/>	_____
		A-E (15 pts)	F-J (15 pts)	
II.	(12 points)			_____
III.	(18 points)			_____
IV.	(16 points)	<input type="checkbox"/>	<input type="checkbox"/>	_____
		A (8 pts)	B,C (8 pts)	
V.	(9 points)			_____
VI.	(15 points)	<input type="checkbox"/>	<input type="checkbox"/>	=====
		A (7 pts)	B (8 pts)	
TOTAL	(100 points)			_____

THE FINAL EXAM IS SCHEDULED FOR MONDAY, APRIL 30, FROM 7:30-9:30 A.M. ANY STUDENT WITH 3 EXAMS ON APRIL 30 SHOULD E-MAIL THE CHEM 331 INSTRUCTOR BEFORE APRIL 13 WITH THE LIST OF COURSE CONFLICTS.

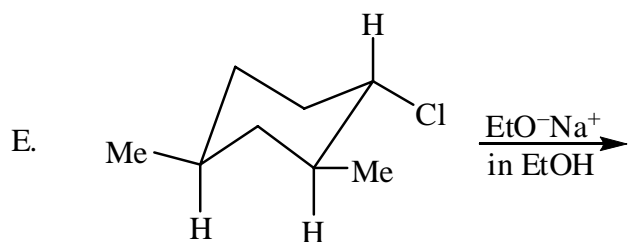
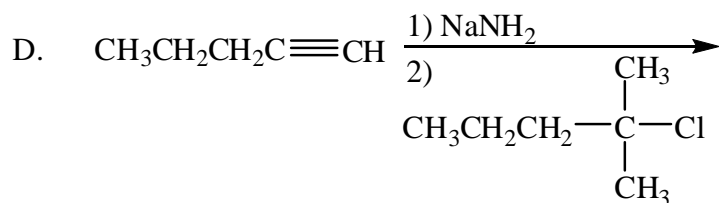
I. (30 pts) Complete the following equations giving all organic product(s). Stereochemistry must be clearly indicated in reactions which are stereoselective.



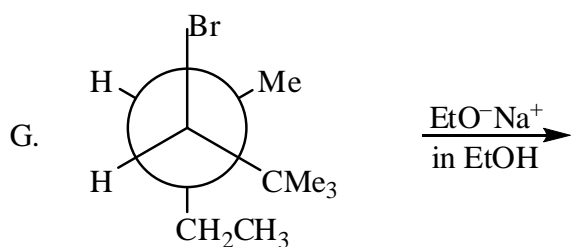
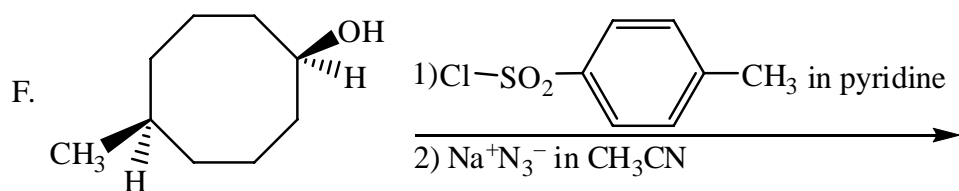
(It is not necessary to show cis-trans isomers)



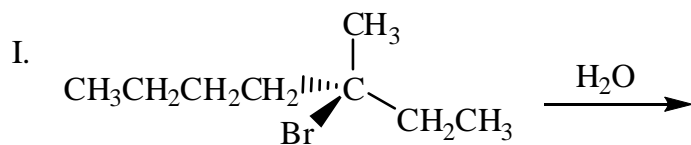
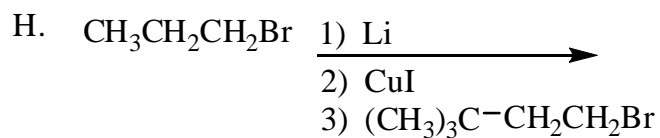
[no sp^2 carbon atoms in product(s)]



[no O in product(s)]

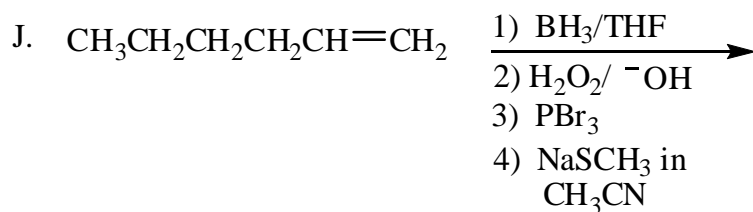


[only one product; no O in product]

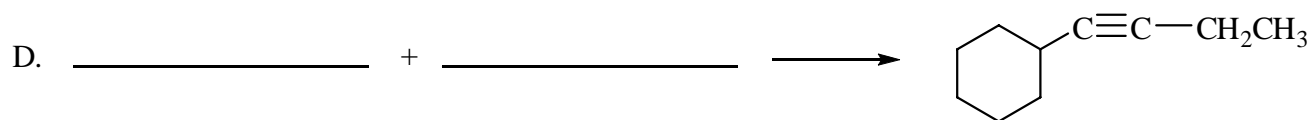
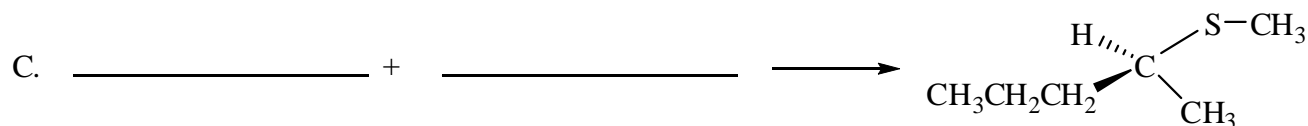
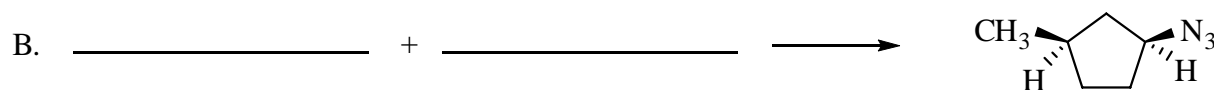
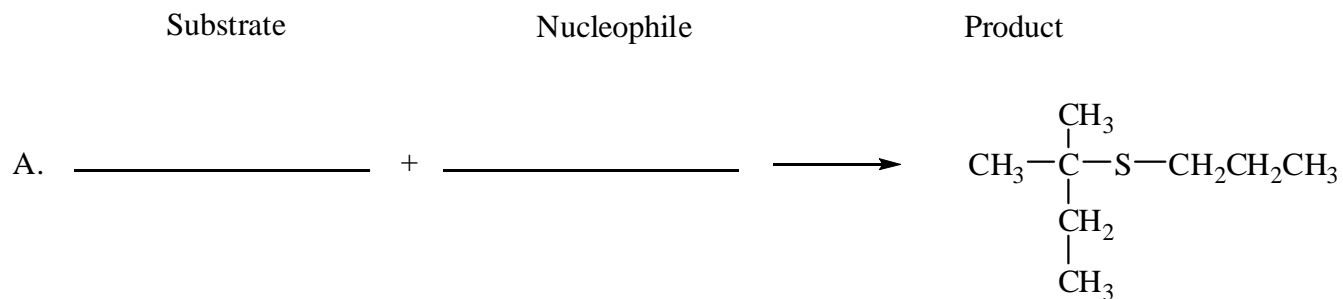


(pure single enantiomer)

[no sp^2 carbon atoms in product(s)]

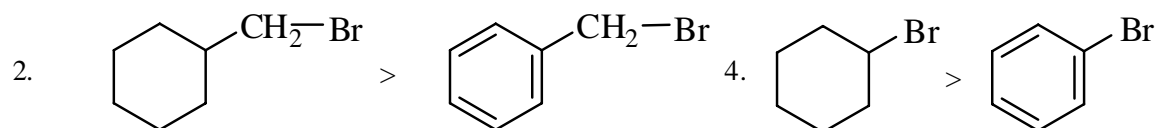
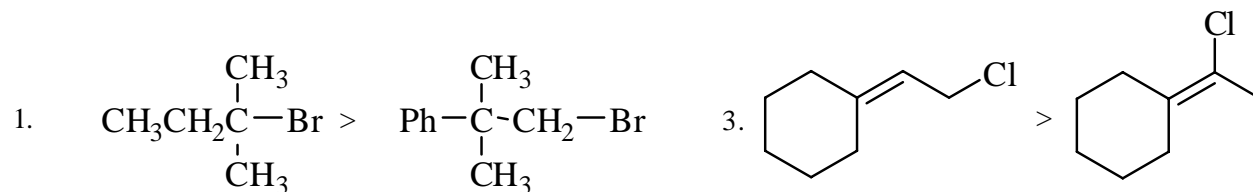


II. (12 pts) Prepare the following compounds by an S_N2 reaction by choosing a satisfactory substrate and nucleophile for each reaction (stereochemistry must be clearly indicated when necessary).

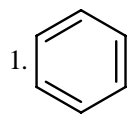


III. (18 pts) Circle the best answer.

A. Which is **NOT** true for S_N1 relative reactivities?



B. Which of the following is the best solvent for S_N1 reactions?



2. Hexane

3. CCl_4

4. 70% H_2O , 30%
 CH_3CH_2-OH

C. Which of the following is the best nucleophile in an S_N2 reaction?

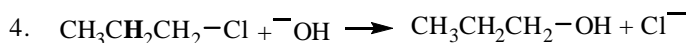
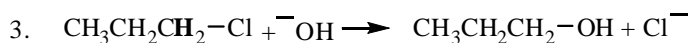
1. CH_3-O-H

2. Br^-

3. Cl^-

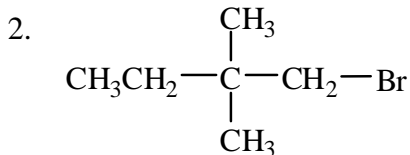
4. F^-

D. Which of the following reactions shows the largest deuterium isotope effect when the bold hydrogens are replaced with deuterium?

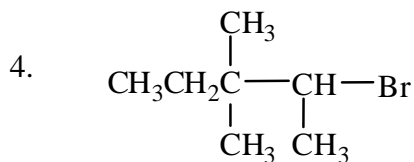


E. Which is the **least** reactive compound in an S_N2 reaction?

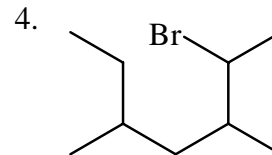
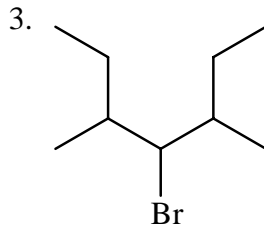
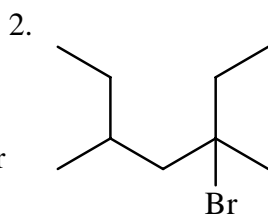
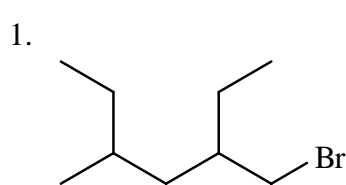
1. $CH_3CH_2CH_2CH_2Br$



3. $CH_3CH_2CH_2\underset{\substack{| \\ CH_3}}{CH}-Br$

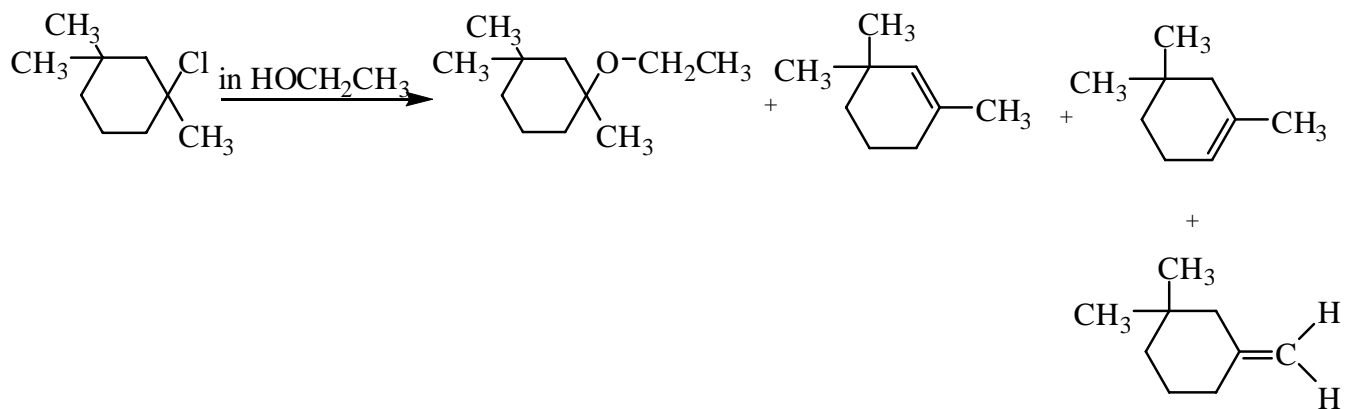


F. Which of the following compounds give the most alkene products (count a pair of cis-trans isomers as two products) in an $E2$ reaction?

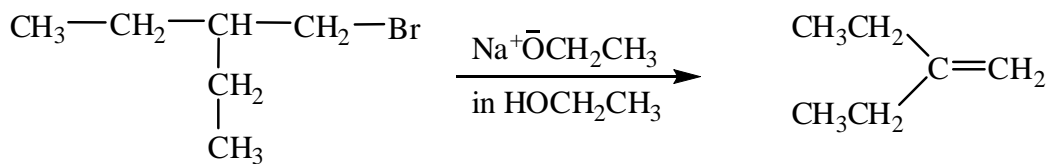


IV. (16 pts)

A. (8 pts) Give a reasonable mechanism for the following reaction.



B. (4 pts) In the box provided draw the **transition state** (geometry must be clear) of the rate-limiting step of the following reaction.

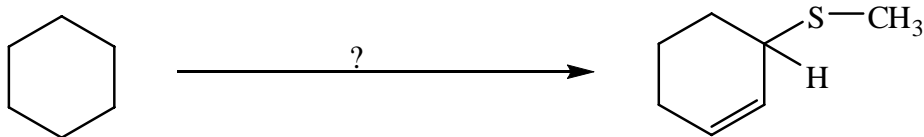


C. (4 pts) Complete the rate equation for the reaction shown in B.

Rate of disappearance of $\text{RBr} =$

VI. (15 pts) Beginning with the starting material indicated, show how to achieve each of the following syntheses by showing all the reactions that are needed (for each reaction, give the starting material, conditions over the arrow, and the products). You may use any inorganic compound or organic compound with 2 carbons or fewer.

A. (7 pts)



B. (8 pts)

