

CHEMISTRY 241 EXAMINATION III  
TUESDAY, November 23, 1999  
6:30 - 7:50 P.M.  
Professor William P. Dailey

NAME: \_\_\_\_\_

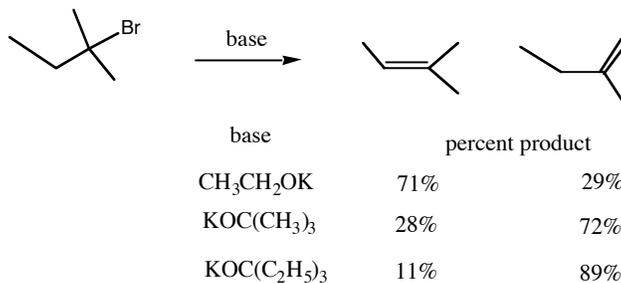
SOCIAL SECURITY NUMBER: \_\_\_\_\_

QUESTIONS	POINTS	SCORE
1.	10	_____
2.	7	_____
3.	8	_____
4.	7	_____
5.	8	_____
6.	14	_____
7.	16	_____
8.	20	_____
9.	10	_____
	TOTAL	_____

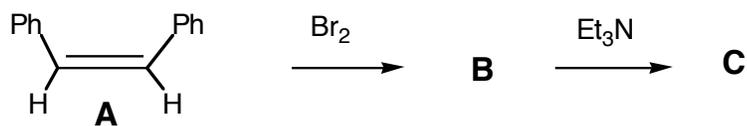
**READ ALL QUESTIONS CAREFULLY BEFORE ANSWERING THEM.  
BE SURE TO INDICATE STEREOCHEMISTRY WHERE APPROPRIATE**

1. (10 Points) Reaction of either *cis*-2-butene or *trans*-2-butene with HCl gives the same product, 2-chlorobutane. However the reaction of *cis*-2-butene is faster than that of *trans*-2-butene. Using an appropriate arrow pushing mechanism and simple energy diagrams explain these results.

2. (7 Points) Provide mechanistic reasoning to explain the following experimental data.

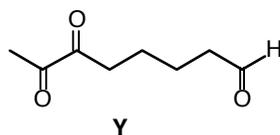


3. (8 points) Compound **A** reacts with bromine to give compound **B**. Compound **B** reacts with one equivalent of triethylamine to give compound **C**. Give the structure for each compound and draw a Fischer projection for compound **B**.



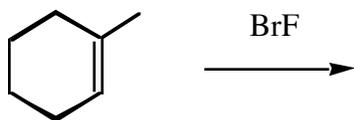
4. (7 Points) Optically active 1-deuterio-1-butanol retains its optical activity when dissolved in neutral water. However, when a drop of sulfuric acid is added, racemization quickly occurs. Explain these observations with appropriate mechanisms.

5. (8 points) Compound **X**,  $C_9H_{14}$ , when treated under catalytic hydrogenation conditions takes up two equivalents of hydrogen and gives (1-methylethyl)-cyclohexane. When **X** is treated with ozone followed by dimethyl sulfide, compound **Y** is produced in addition to  $CH_2O$ . What is the structure of **X**?

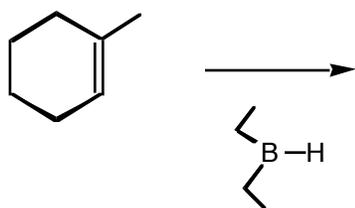


6. (14 Points) Draw the product and propose mechanisms for the following reactions using the curved arrow formalism. **Clearly indicate the stereochemistry in the final product.**

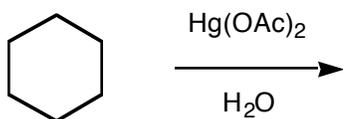
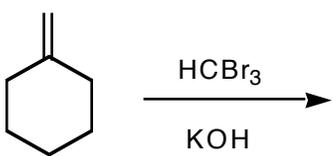
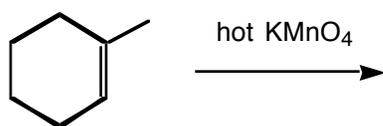
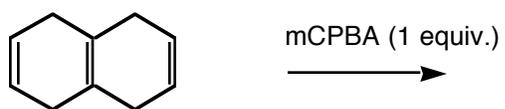
a.



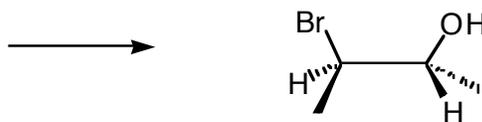
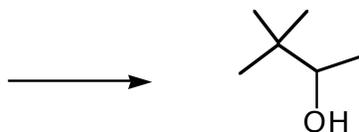
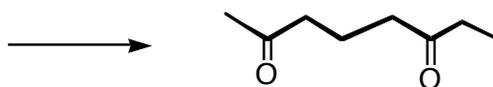
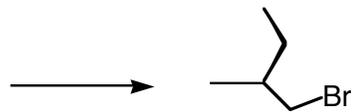
b.



7. (16 Points) Complete the following reactions. If no reaction will occur, then say so.



8. (20 points) Starting with **any alkene containing only carbon and hydrogen** show how the following compounds can be prepared. (Give the structure of the starting alkene and the reagents required.)



9 (10 points) Propose a synthesis of the following racemic compound **starting with any alkane containing 6 or fewer carbon atoms**. Be sure to include any reagents.

