

CHEMISTRY 241 FINAL EXAMINATION  
TUESDAY, December 21, 1999  
6:30 - 8:30 P.M.  
Professor William P. Dailey

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

\_\_\_\_\_

SOCIAL SECURITY

NUMBER: \_\_\_\_\_

SCORE	QUESTIONS	POINTS	
	1.	12	_____
	2.	12	_____
	3.	16	_____
	4.	10	_____
	5.	30	_____
	6.	24	_____
	7.	27	_____
	8.	15	_____
	9.	12	_____
	10.	15	_____
	11.	15	_____
	12.	<u>12</u>	_____
		possible 200 points	
		TOTAL	_____

READ ALL QUESTIONS CAREFULLY BEFORE ANSWERING THEM.  
BE SURE TO INCLUDE STEREOCHEMISTRY IF APPROPRIATE !

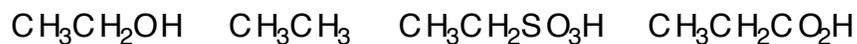
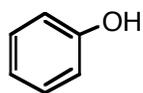
1. (12 points) Explain how the presence of water during the chromic acid oxidation of a primary alcohol to an aldehyde allows for further oxidation to carboxylic acid.

2. (12 points total) a. Briefly describe the difference between basicity and nucleophilicity.

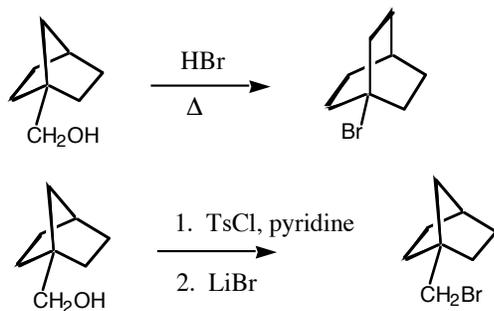
b. Describe in physical terms what is meant by the polarizability of an atom.

c. Provide an example of a stereoselective reaction.

d. Number (1 to 5) the following compounds in order of increasing acidity.  
(1=least acidic, 5=most acidic)

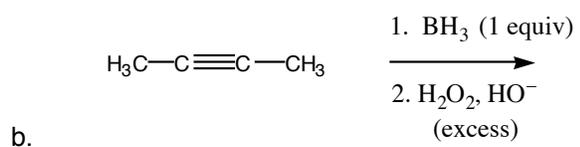
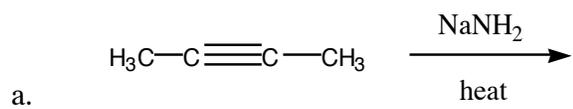


3. (16 points) Using appropriate mechanistic reasoning, explain why the alcohol shown below yields two different products depending on the reaction conditions.

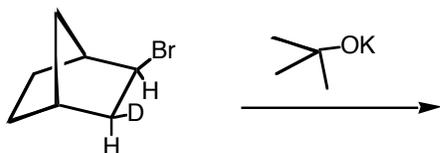
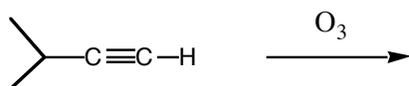
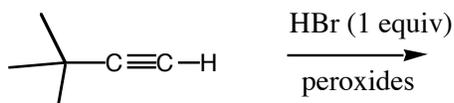
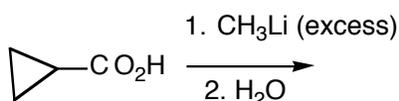
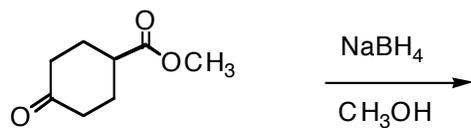
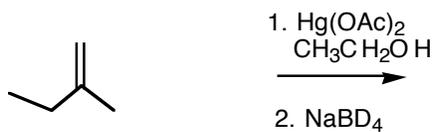


4. (10 Points) Describe the trend of acidities in the series ethane, ethene, and ethyne. Provide an estimate for the  $\text{pK}_a$  of the protons in each hydrocarbon and provide a rationalization for the trend in acidity.

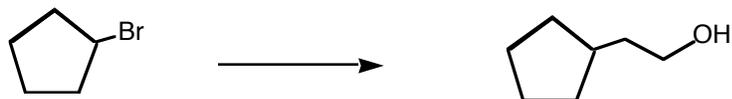
5. (30 Points) For the following reactions, predict the product(s) and propose a mechanism using the curved arrow formalism. Use only the reactants shown.

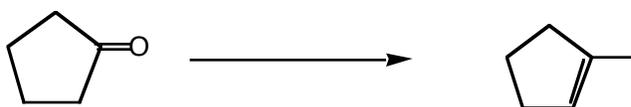
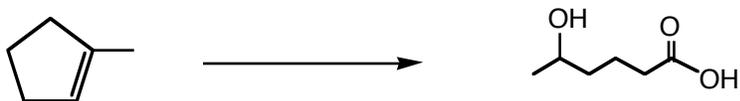


6. (24 points) Complete the following reactions. If no reaction is expected, then say so.



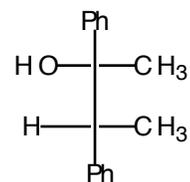
7. (27 points) Provide the reagents necessary to carry out the following transformations. More than one step may be required.



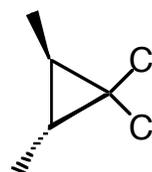


8. (15 points) Provide the structure of the organic compound and the reagent(s) that would produce **only** the following compounds.

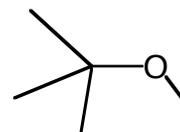
a. The epoxide and reagent(s) that would only produce



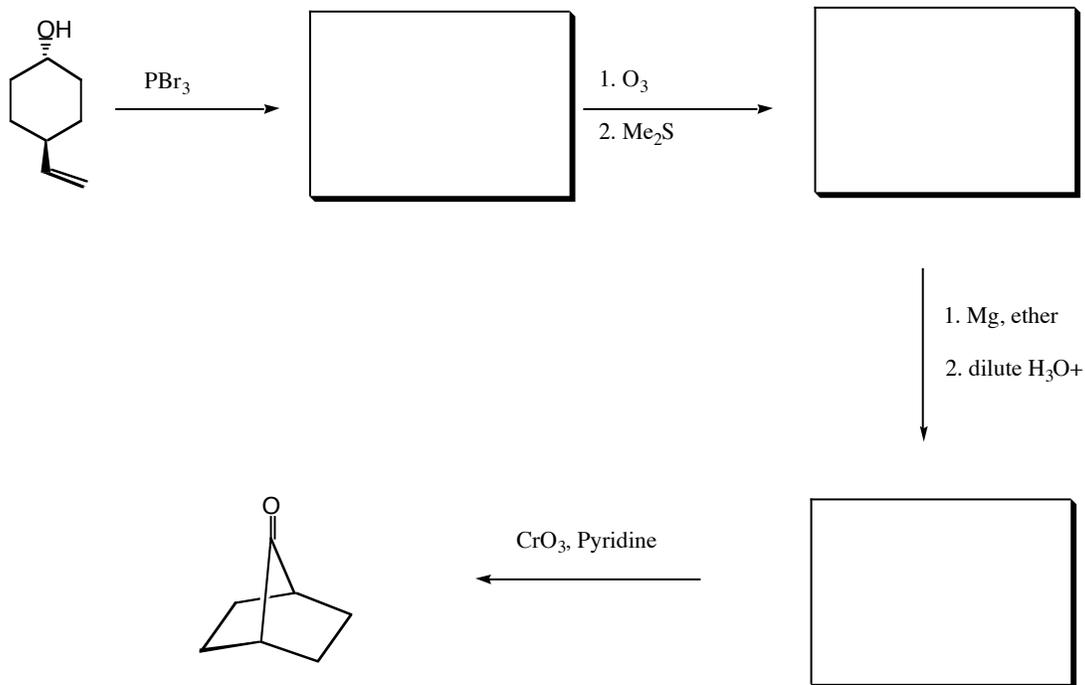
b. The alkene and reagent(s) that would only produce



8(cont)c. The alkyl halide and reagent(s) that would only produce

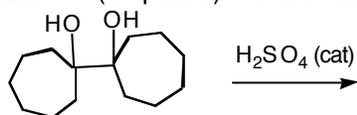


9. (12 points) Provide complete structures for the intermediates in the following synthesis of bicyclo[2.2.1]heptanone. Be sure to include stereochemistry, if relevant.



10. (15 points) Reactions in which new carbon-carbon bonds are formed are extremely important in synthetic organic chemistry. Give three *different* methods of forming carbon-carbon bonds and provide an example for each.

11. (15 points) Predict the product and propose a mechanism for the following reaction.



12. (12 points) Compared to acid chlorides, acid fluorides are much less reactive towards nucleophiles. Explain why this is so.