

Chemistry 116 Sec. A (7:50-8:50)
Exam No. 4
“Radical Halogenations, Substitution and Elimination”
December 3, 2004

Instructions: You will have 60 min. to complete the exam. At the 60 min. mark, I will request that all remaining test takers cease writing, turn their exams over, and pass them to their rightmost isle. If you finish within 55 min. you may turn in the exam at the front of the room prior to leaving. If you finish in the final 5 min. of class, please turn your exam over and remain seated until I call for the remaining exams to be turned in. *In fairness to all, anyone still working on the exam after “time” is called will receive a grade of zero!*

Be sure to read the instructions for each question. It may be helpful to skim the entire exam and solve the easier questions first.

Exam Agreement: I, _____, have read and agree
(Please print)
to abide by the instructions above. On my honor, I have neither given nor accepted any help during this exam.

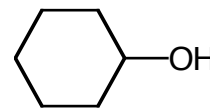
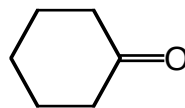
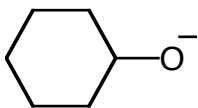
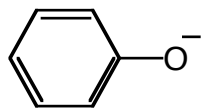
Signature: _____

College: _____

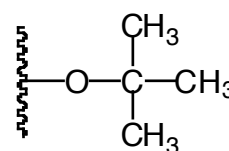
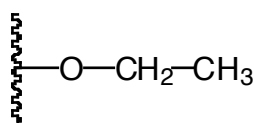
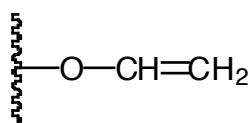
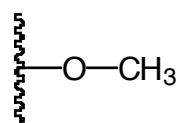
**DO NOT OPEN THIS EXAM UNTIL
INSTRUCTED TO DO SO**

1. Circle the answer that best fits each description and provide an explanation (using pictures & words) for your decision using only the space provided. (5 points each)

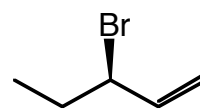
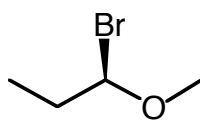
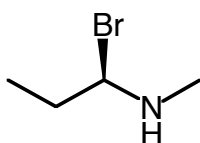
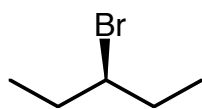
A) The best nucleophile in an aprotic solvent.



B) The best leaving group in a protic solvent.

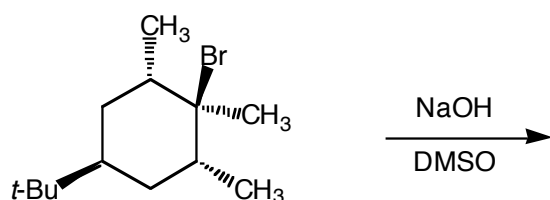


C) The fastest substitution reaction.

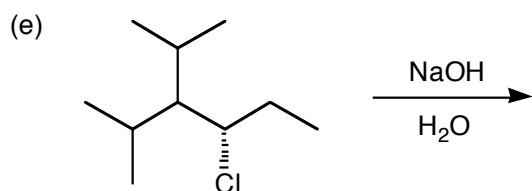
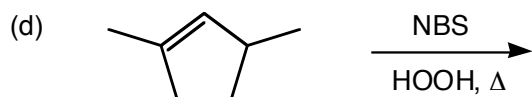
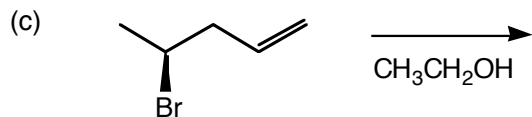
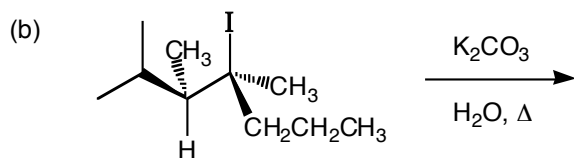


2) Predict the *major* organic product of each of the following reactions and circle it. If more than one product is equally favored, draw and circle each product. (7 points each)

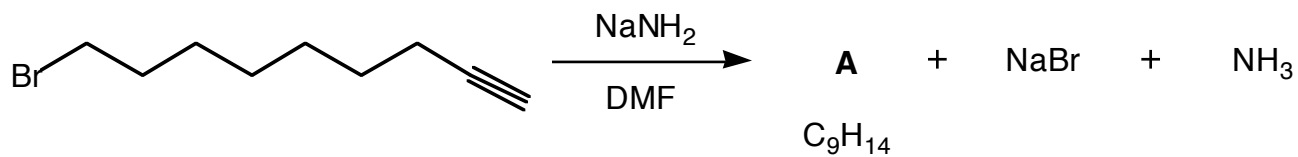
(a)



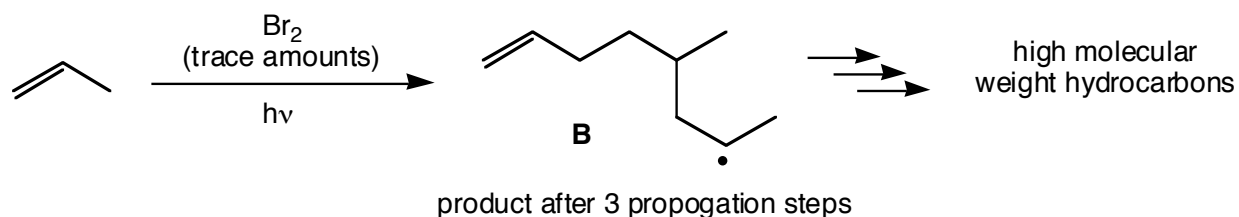
Predict the products (cont'd)



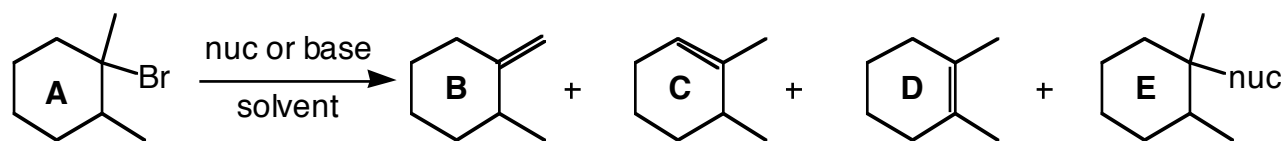
3) The following reaction gives an organic product (A) which *does not contain an alkene*. Provide a structure for A and provide a mechanism for its formation. *Note: you must provide the intermediates of each step and their charges (if any) for full credit. (10 points)*



- 4) In an attempted to perform the following radical halogenation, a chemist made the mistake of only using a trace (tiny) amount of molecular bromine. Instead of the usual alkyl bromide, he obtained hydrocarbons of unusually high molecular weight as products. Intermediate B is what was formed after only a few propagation steps. Provide a mechanism that accounts for the formation of B. *Note: you do not need to provide any termination steps, but you do need to label the initiation and propagation steps.* (12 points)

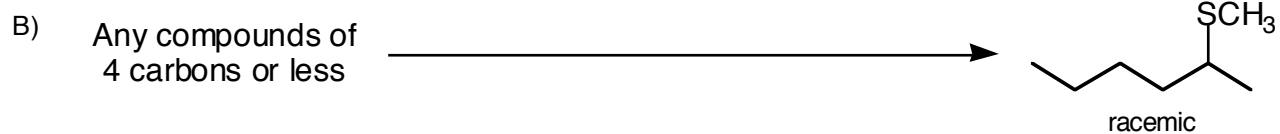
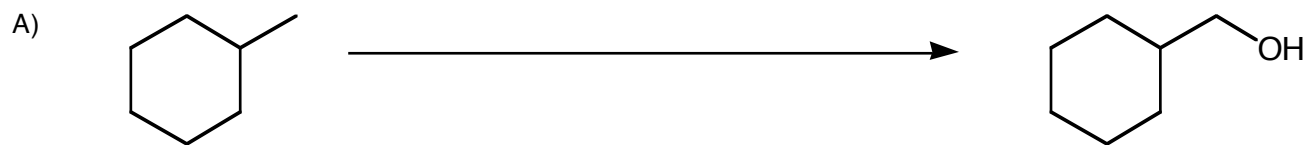


- 5) Refer to the reaction shown and answer true (T) or false (F) to each statement. (2 points each)



- ___ a) It is possible to produce **B** as the major product with the appropriate combination of **A** (with respect to stereochem), base, and solvent.
- ___ b) It is possible to produce **C** as the major product with the appropriate combination of **A** (with respect to stereochem), base, and solvent.
- ___ c) It is possible to produce **D** as the major product with the appropriate combination of **A** (with respect to stereochem), base, and solvent.
- ___ d) The rate of formation of **E** can be increased by increasing the concentration of nucleophile.
- ___ e) **E** can never be racemic regardless of the choice of **A** (with respect to stereochem), base, and solvent.

6) Propose a synthesis (sequence of reactions) for each of the following transformations. *Be sure to include the products of each step for full credit.* (5, 8, and 5 points, respectively)



Name: _____

Grading Summary

Page	Point Value	Points Earned
2	22	
3	38	
4	22	
5	18	
	Total Score =	