

**Chemistry 116 Sec. A (8:00-8:50)**  
**Exam No. 3**  
**“Alkynes, Resonance, and Aromaticity”**  
**November 16, 2001**

**Instructions:** You will have 50 min. to complete the exam. At the 50 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 45 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 to  
(Please print)  
abide by the instructions above. On my honor, I have neither given  
nor accepted any help during this exam.

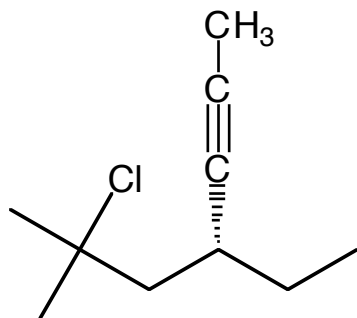
**Signature:** \_\_\_\_\_

**College:** \_\_\_\_\_

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

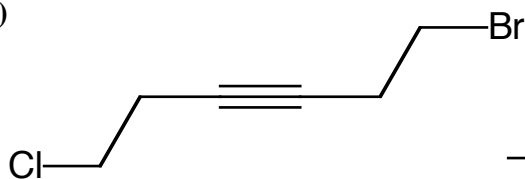
1) Provide an unambiguous name for each of the following molecules. (12 points)

A)



\_\_\_\_\_

B)

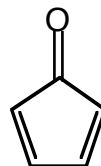


\_\_\_\_\_

2) For many years, chemists have attempted to synthesize the two molecules shown below. Molecule **A** was easy to synthesize, but to this date, molecule **B** has been impossible to synthesize. Explain why this is an unusual result. Then using pictures *and* words, explain why **B** is so difficult to make, while **A** is a piece-of-cake. (10 points)



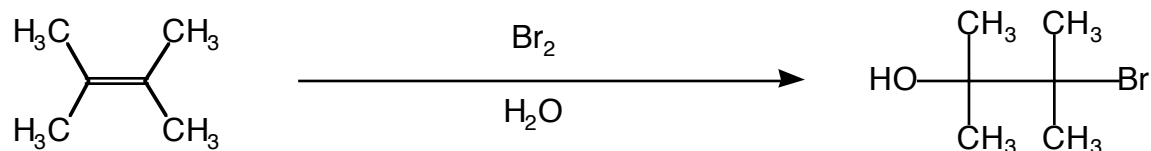
**A**



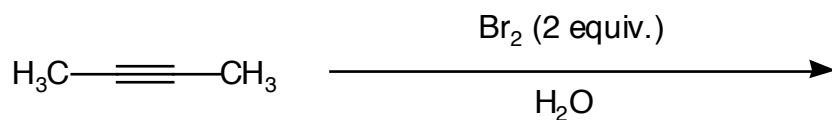
**B**

- 3) We've seen that many of the reagents that react with alkenes also react with alkynes. However, some alkene reactions are not equally applicable to alkynes. Two reactions are shown below. Provide a mechanism for reaction **A**. Then provide a mechanism for reaction **B** that explains why the alkyne *does not add* two Br's and two OH's. Of course, you will need to predict the product that *does* form in reaction **B**. (22 points)

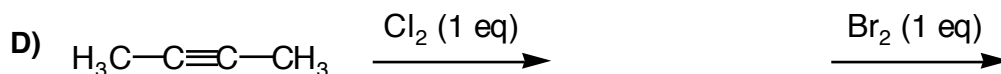
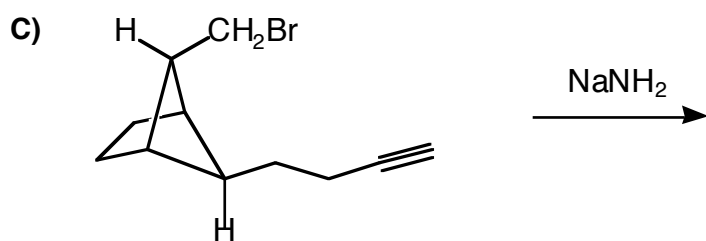
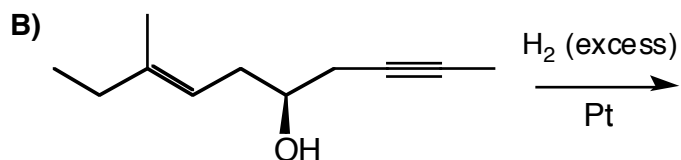
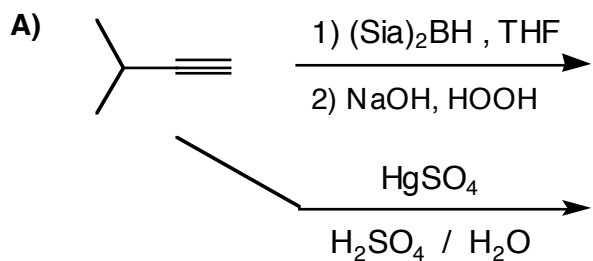
**Reaction A**



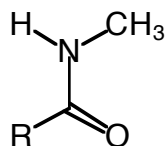
**Reaction B**



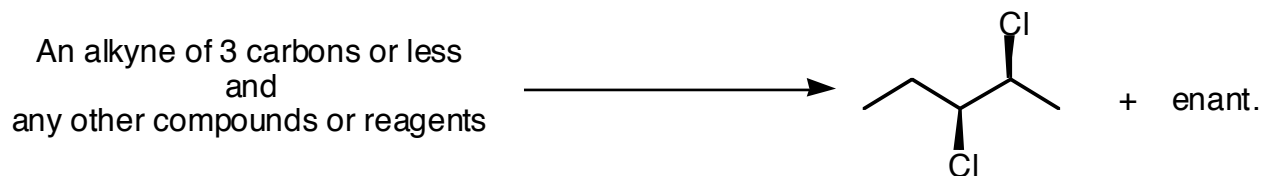
4) Predict the major organic product of each of the following reactions. (26 points)



5) In her research, Dr. Hatcher-Skeers works with compounds known as amides. Her research group has found that at lower temperatures, amides like the one shown below actually appear to be two different molecules, while at higher temperatures only one molecule is visible. Use pictures *and* words to explain this phenomenon. (8 points)



- 6) Provide a synthesis for the following transformation. Show the products of each step for full credit. (10 points)



- 7) Molecule **A** is an optically active compound with a mol. formula of  $C_8H_{12}$ . It reacts with an excess of HBr to yield **B**, an optically active compound with a formula of  $C_8H_{14}Br_2$ . When **A** is subjected to cat. hydrogenation using an excess of  $H_2$  gas, it yields **C**, an optically inactive compound (MF =  $C_8H_{16}$ ). Both dissolving metal reduction and Lindlar's hydrogenation of **A** yield the same optically active molecule, **D** (MF =  $C_8H_{14}$ ). Provide structures for **A-D** below. (12 points)

## Grading Summary

<b>Page</b>	<b>Point Value</b>	<b>Points Earned</b>
2	22	
3	22	
4	34	
5	22	
	<b>Total Score =</b>	