

CHE 230 001
Organic Chemistry 1
Exam 3
November 18, 2013

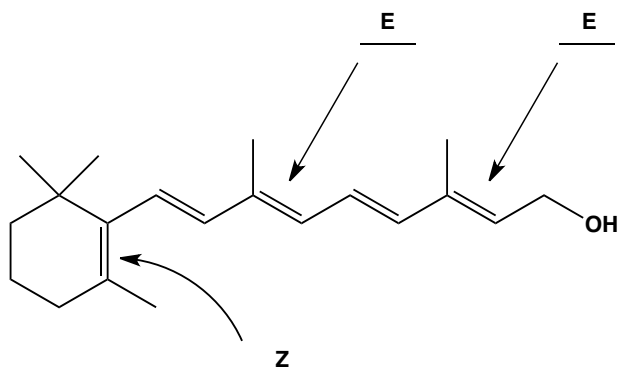
Name: KEY

Student number:

Before you begin this exam: **First:** You are allowed to have a simple model set at your seat. Please put away all other materials. Calculators will not be needed. **Second:** Place your student identification on your desk. A proctor will come around to check everyone's ID. **Third:** Read through the entire exam. Your goal, as always, is to score as many points as possible. Do not waste time on problems that you can't do if there are others that look easy. **Fourth:** READ EACH QUESTION CAREFULLY. Be sure you answer the question that is asked. **Fifth:** This exam must be turned in by 8:50 AM SHARP. There will be no extensions, so budget your time carefully.

- | | | |
|----|------------|-------|
| 1. | 12 points | _____ |
| 2. | 8 points | _____ |
| 3. | 10 points | _____ |
| 4. | 25 points | _____ |
| 5. | 10 points | _____ |
| 6. | 15 points | _____ |
| 7. | 12 points | _____ |
| 8. | 8 points | _____ |
| | 100 points | _____ |

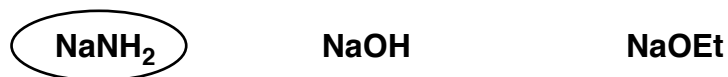
1. (12 points) Assign the *E/Z* configuration to the indicated C=C bonds in vitamin A, below.



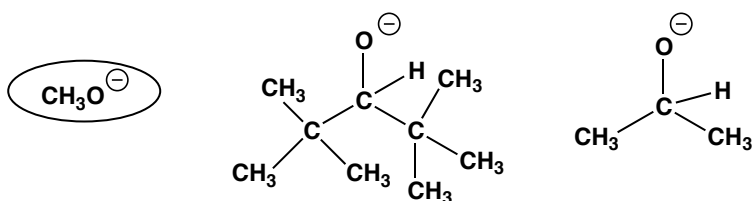
Vitamin A

2. (8 points) In series a), circle the strongest base. In series b), circle the strongest nucleophile. Assume dipolar aprotic solvents in all cases.

a) In this series, circle the strongest base:

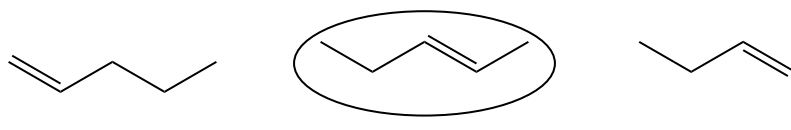


b) In this series, circle the strongest nucleophile:

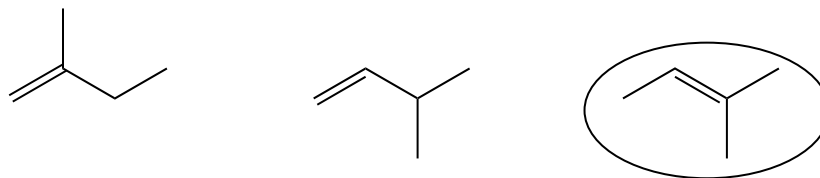


3. (10 points) In each series below, circle the most stable alkene.

a)

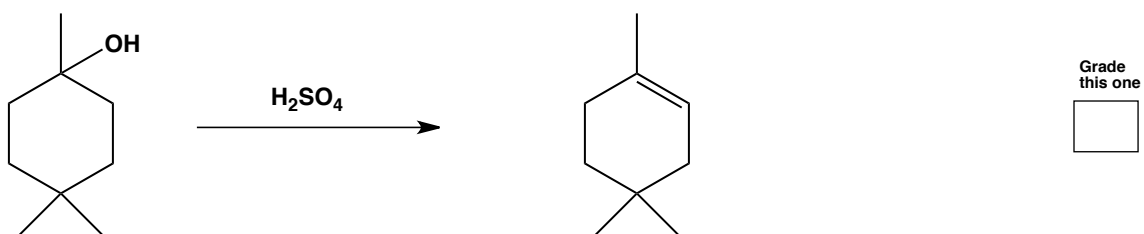


b)

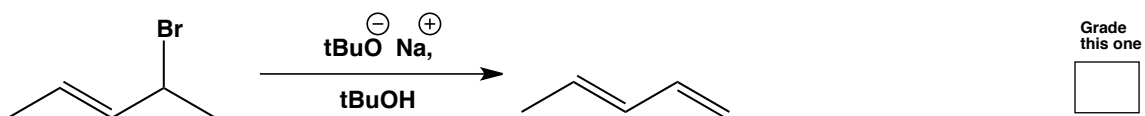


4. (25 points) Each of the reactions below will produce one *major* organic product. Draw that (major) product **FOR ANY 5 OF THE REACTIONS BELOW**. Indicate which problems you want graded.

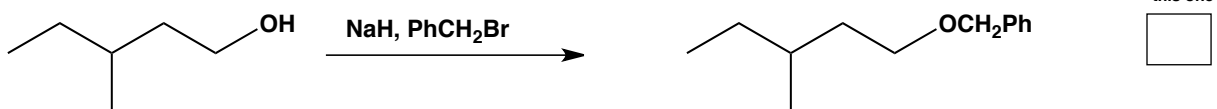
a)



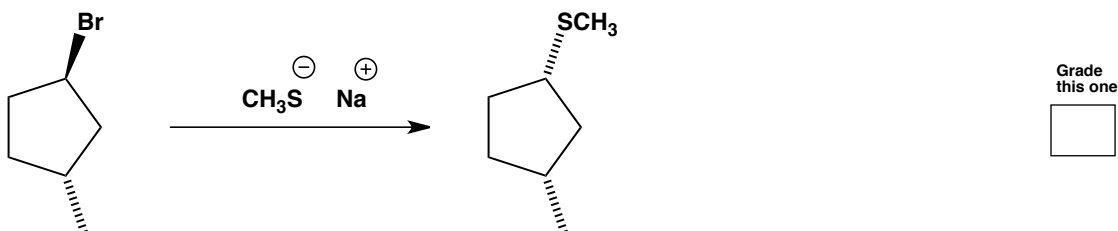
b)



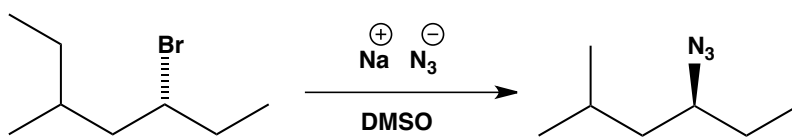
c)



d)



e)



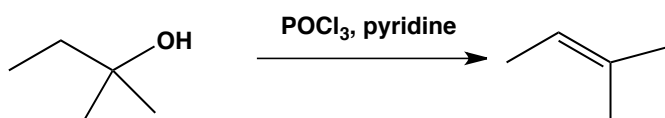
Grade this one

f)



Grade this one

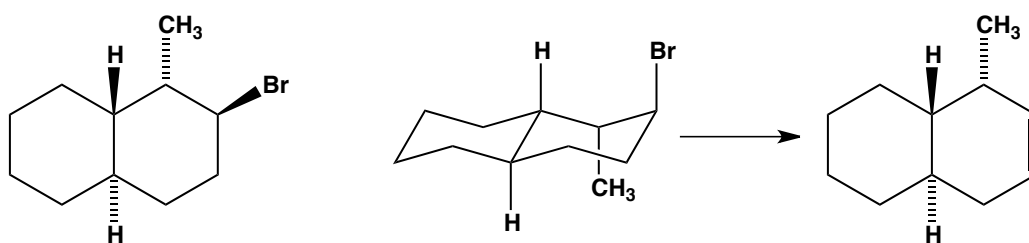
g)



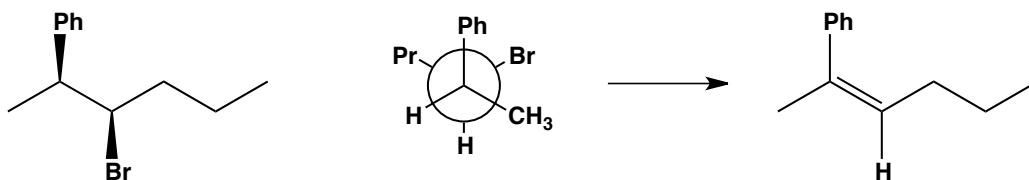
Grade this one

5. (10 points) Draw the E2 elimination product that would form from each of the alkyl halides given below. *Be sure to draw the correct isomer, including stereochemistry where appropriate.*

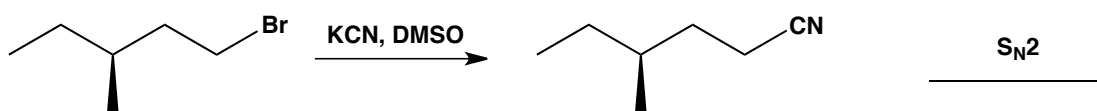
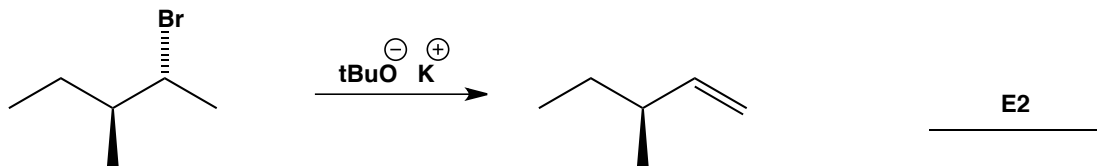
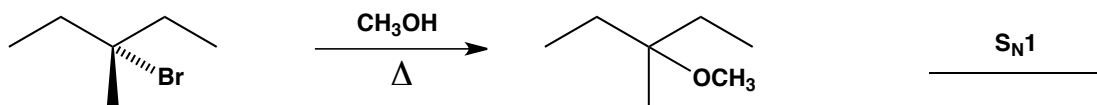
a)



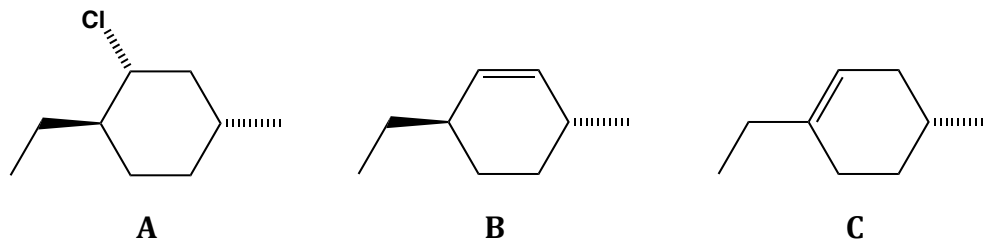
b)



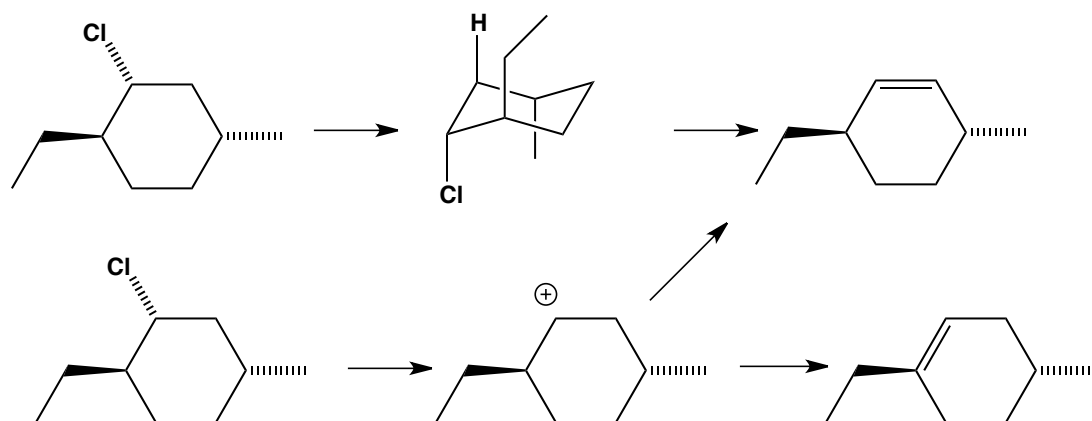
6. (15 points) Predict the mechanism (S_N1 , S_N2 , E1, E2) for each of the following reactions.



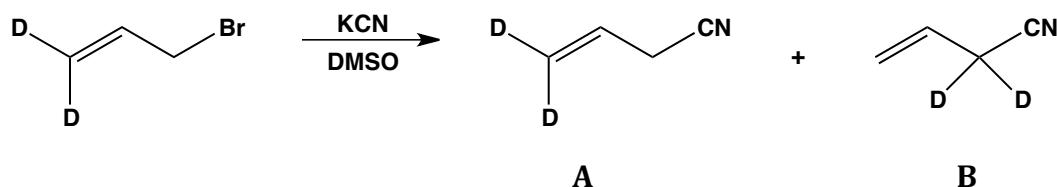
7. (12 points) Explain the following observation: Treatment of alkyl chloride **A** with $\text{NaOCH}_2\text{CH}_3$ yields only one product (**B**), whereas treatment of **A** with very dilute base in $\text{CH}_3\text{CH}_2\text{OH}$ yields a mixture of alkenes **B** and **C**, with **C** predominating. Drawings may be helpful. DO NOT EXCEED THE SPACE PROVIDED.



Treatment of **A** with NaOEt results in E2 elimination to give **B** and not **C** because of the location of the only anti-periplanar H. Under neutral conditions with a poor nucleophile, E1 dominates and produces the mixture of alkenes **B** and **C**. **C** is more stable than **B**.

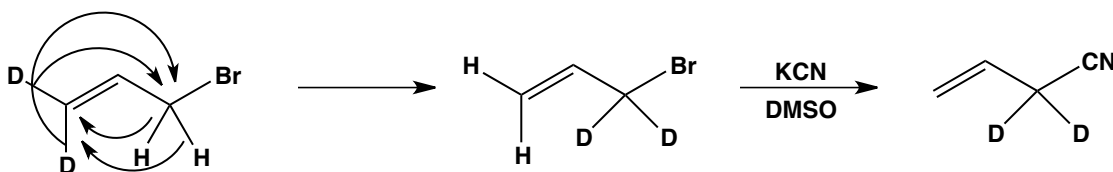


8. (8 points) The allylic bromide below is a stable, well-behaved reagent. The substitution reaction shown below exhibits bimolecular kinetics and produces a mixture of two products ('D' is, of course, deuterium. It's an isotope of H).

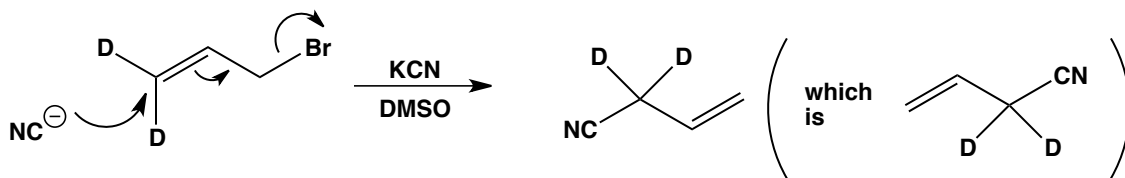


Of the following, which is the *best* (most reasonable) explanation for the formation of compound **B** is (circle one):

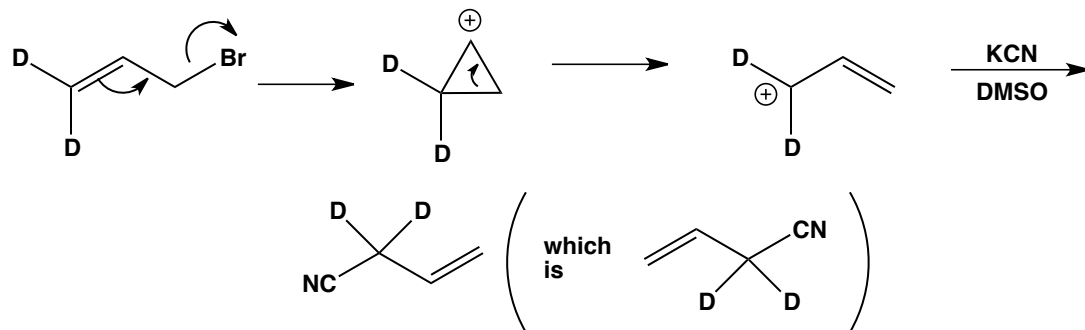
- a) The D's and the H's change places during the reaction:



- b) Cyanide attacks at the opposite end, displacing π -electrons and expelling the leaving group:



- c) A cyclopropane cation is formed, which then opens to place the positive charge next to the deuteriums.



END OF EXAM