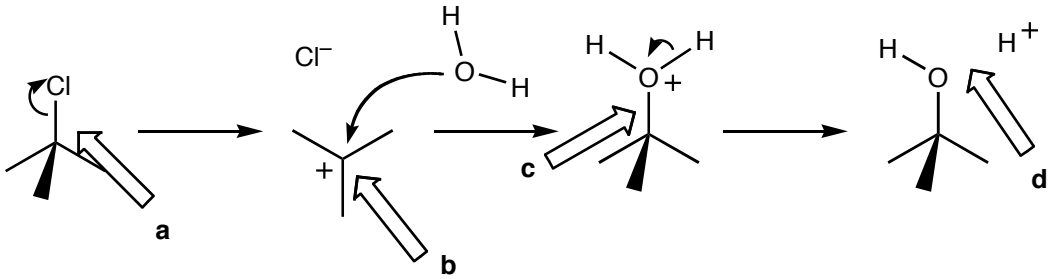
Name _____ Test 1 (2/13)
CHEM 0203 (Organic II) Spring 2009

1. A mechanism for a nucleophilic substitution is drawn below.



a. (6 pts.) Describe what is happening in the first step (be specific and detailed).

b. (6 pts.) Is this an accurate representation of the geometry of the carbocation? Explain/describe the orbitals on the C atom.

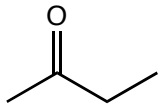
c. (3 pts.) Where did the electrons come from to make this bond?

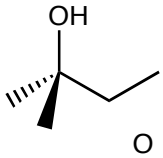
d. (3 pts.) Where did the electrons that used to be in this missing bond go?

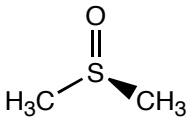
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

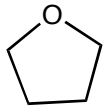
2. a. (6 pts.) When performing substitution reactions polar solvents are required. Nevertheless, some encourage carbocation formation better than others. Indicate whether the following solvents would encourage carbocation formation.

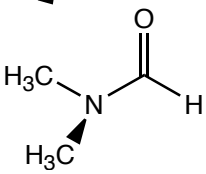
b. (4 pts.) Encouraging carbocation formation encourages which mechanism S_N2 or S_N1?

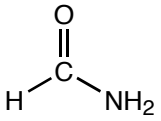
i. 

ii. 

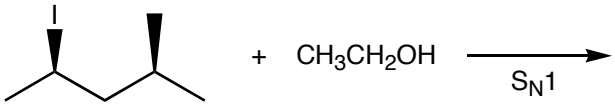
iii. 

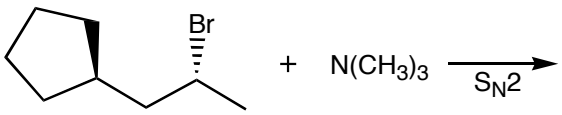
iv. 

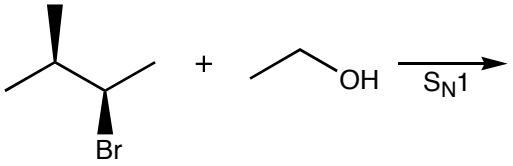
v. 

vi. 

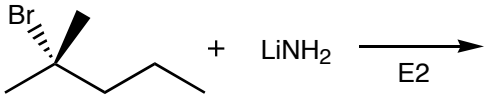
3. (4 pts each) Predict the products of the following reactions. Remember to indicate the stereochemistry (use ◀ and ····ıı bonds) of the product(s) where appropriate. The mechanism of the reaction is indicated under the reaction arrow.

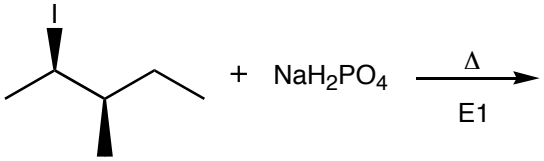
a. 

b. 

c. 

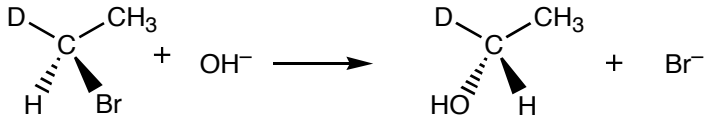
4. (4 pts. each) Predict the product(s) for the following elimination reactions and identify which would be the major product.

a. 

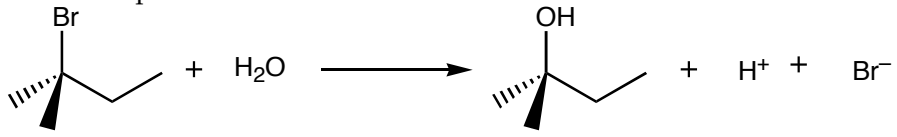
b. 

5. a. (4 pts.) Draw a mechanism for the following reaction and

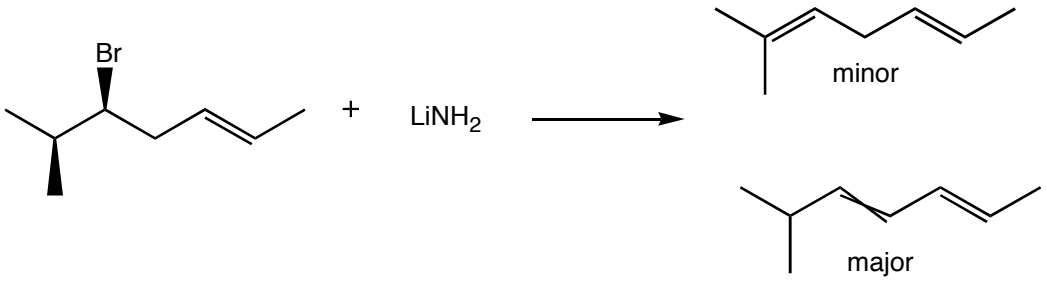
b. (6 pts.) Explain the stereochemical outcome of the reaction.



6. (8 pts.) Will increasing the concentration of the nucleophile in the following reaction increase the rate of the reaction? Explain.



7. (10 pts) Typically the alkenes with the most carbon substituents (the minor product in this reaction) are the major products of elimination reactions; however, that is not always the case.
   a. Explain the product distribution in the following reaction, and
   b. explain why the alkene with the most carbon substituents is often the major product.



8. Typically, an S_N1 reaction produces a mixture of *R* and *S* enantiomers when a chiral reactant is converted to a chiral product. Nevertheless, some S_N1 reactions will not produce a 50/50 mixture, and one enantiomer will be produced in excess.

   a. (8 pts.) Explain why a 50/50 mixture of *R* and *S* products would be expected from an S_N1 reaction using *R*-2-iodobutane as the reactant.

   b. (8 pts.) Explain why an excess of one enantiomer is often produced.