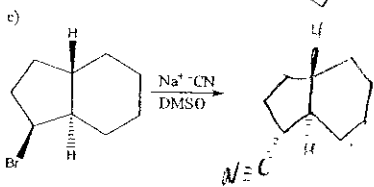
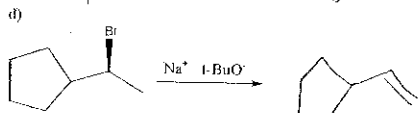
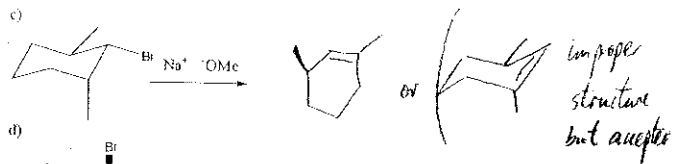
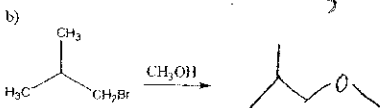
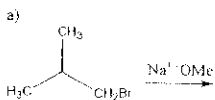
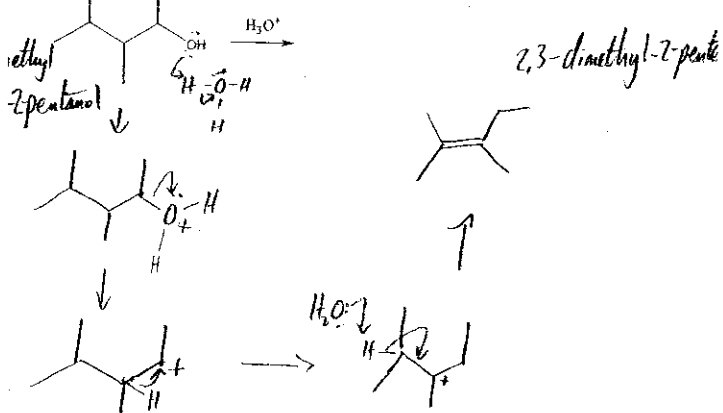


1. Predict the major product of the following reactions. Include stereochemistry where appropriate. Circle the structure you wish to be graded. (3 points/answer)

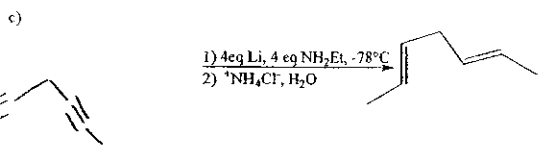
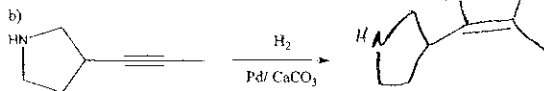
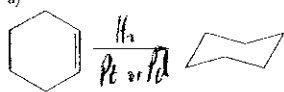


2.a) Draw an arrow-push mechanism for each of the steps of the following reaction. (6 points)

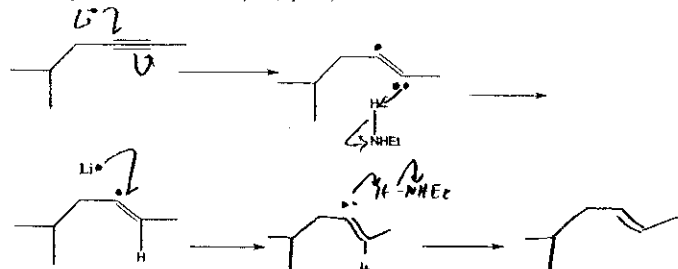
b) Name the starting material and the product. (2 points)



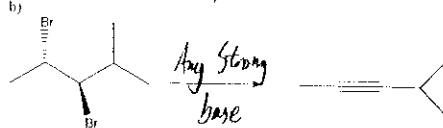
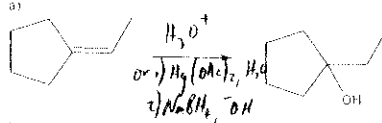
3. Provide either the missing reagents for (a), the product for (b) or the starting material for (c). (2 points/answer)



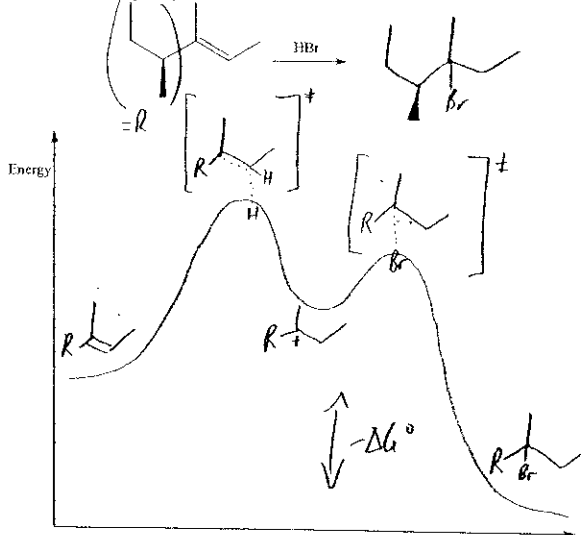
4. Arrow push the following steps and complete the reagents required to complete this dissolving metal reduction of the alkyne. (6 points)



5. Provide reagents for the following reactions (2 points/answer)



6. Draw an appropriate graph to illustrate the free-energy diagram of the following reaction. Provide the structures of the intermediates and the transition states of the key transformations. (6 points)



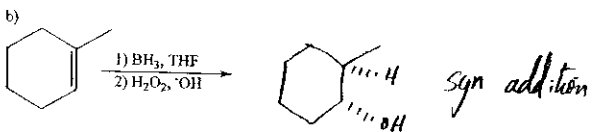
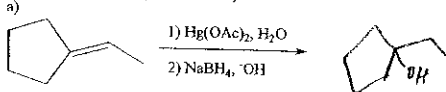
7. Write a couple of sentences to explain the Markovnikov rule. (3 points)

During addition reactions to a double bond the hydrogen ion (or a positive equivalent) will be added to the carbon bearing the most hydrogens already. This generates the more stabilized carbocation.

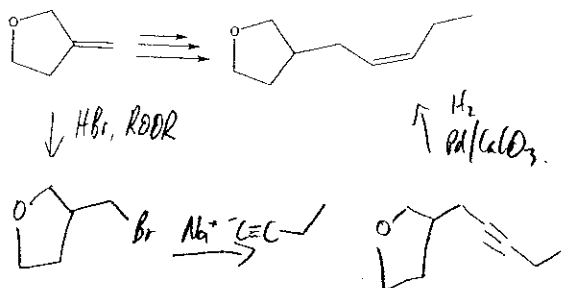
8. Why is it important to consider Zaitsev's rule when predicting the possible products of an acid catalyzed dehydration of an alcohol? Write your response in a couple of succinct sentences. Think about a secondary alcohol!! (4 points)

Zaitsev's rule predicts the more substituted alkene will be favored. Often a 2° carbocation will rearrange to a 3° carbocation leading to a more substituted alkene product.

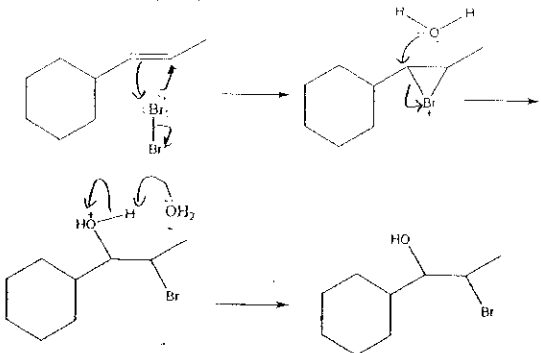
9. Predict the major product of each of the following reactions. Circle the structure you wish to be graded. (3 points/answer)



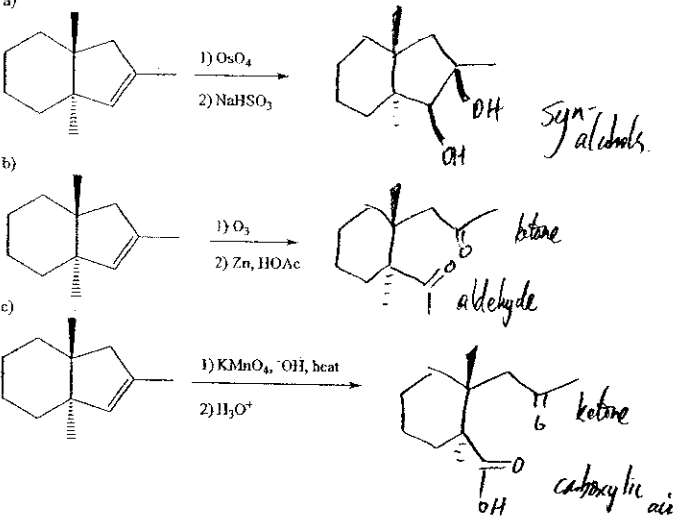
10) Provide all the steps required to convert the starting material on the left to the product on the right. Draw the synthetic strategy out so as to include the intermediate products. (6 points)



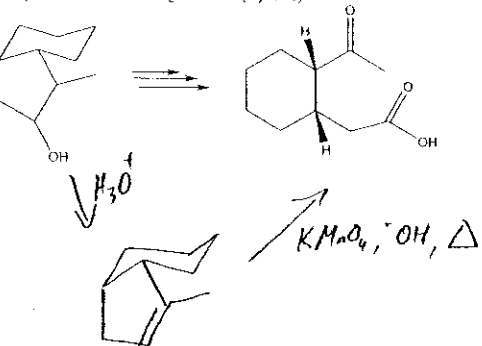
11) Fill in arrows to accurately represent the mechanism involved in the following halohydrin reaction (6 points)



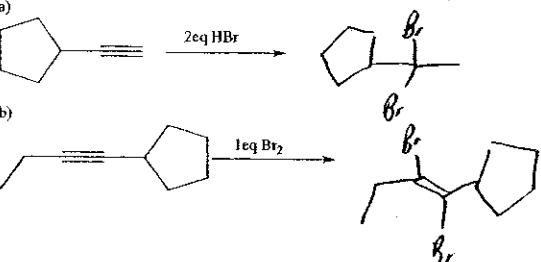
12) Draw the products of the following reactions. (3 points/answer)



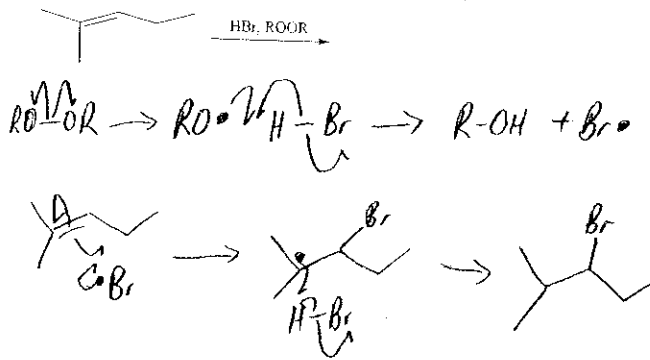
13) Develop and illustrate a full synthetic strategy for the synthesis of the following compound from the starting material. (4 points)



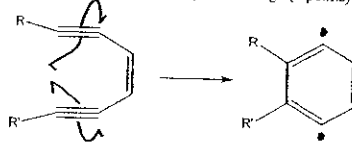
14) Provide the products for the following reactions. (3 points/ answer)



15) Provide a full mechanism for the following reaction. (7 points)



16) At the beginning of chapter 10 there is a little story about a drug called calicheamicin. This drug is an anti-tumor agent as it generates a diradical which attacks DNA and causes cell death. The molecule is very complex but the key step is the formation of a diradical by a Bergman cycloaromatization step. Please add arrows to push the electrons appropriately to generate the radicals and complete the ring. (4 points)



17) List the order of stability for the halide radicals. (4 points)

