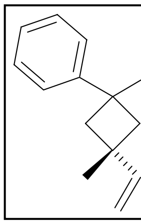
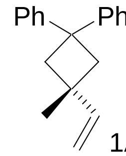
1. Predict the products. The double bonds in the benzene rings of 1A do not react under these conditions.



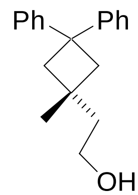
You can draw this structure as:



1A

a. (10 pts.)

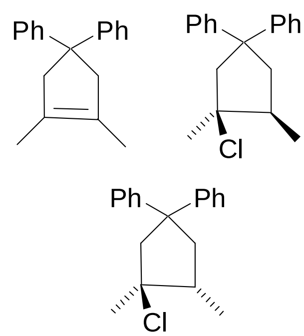
1A $\xrightarrow[\text{2) } H_2O_2\text{, NaOH, } H_2O]{\text{1) } BH_3\text{, ether, 25 °C}}$



my answer for prob.1a

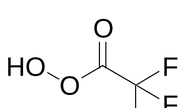
b. (10 pts.)

1A $\xrightarrow{\text{1) HCl, solvent}}$



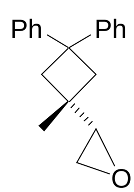
any of these for full credit

c. (10 pts.)

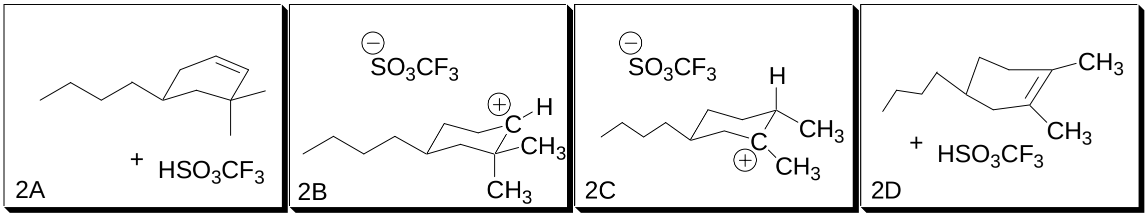


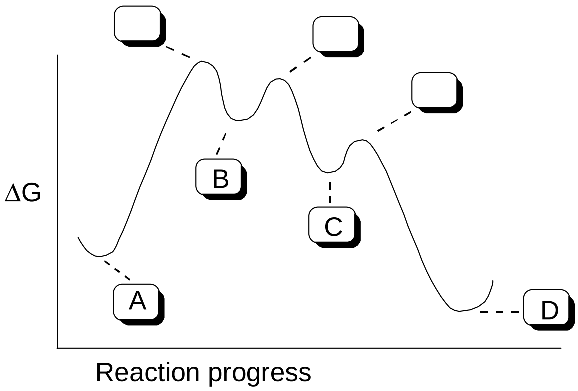
1) solvent

1A $\longrightarrow$



my answer for prob.1c





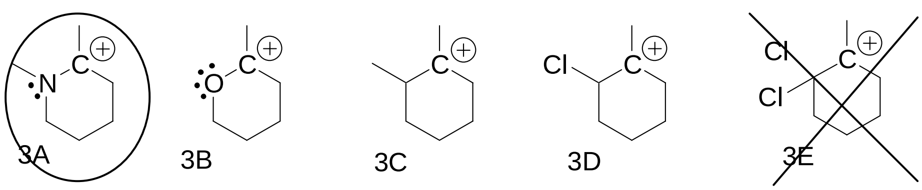
2. Consider the molecules in 2A-2D and the energy diagram above.

a. (16 pts.) Put the letters in the label boxes on the diagram. There are more labels than there are molecules. You should NOT fill in ALL the boxes with numbers!

b. (4 pts) HSO_3CF_3 is a (**circle one!**) initiator, transition state, conformer, catalyst, intermediate, diastereomer, proton acceptor, a piece of poop, tautomer, base.

3. (10 pts.) Circle the most stable cation. Draw an X over the least stable cation.

a. (5 pts.) Briefly explain your choice of the most stable carbocation.

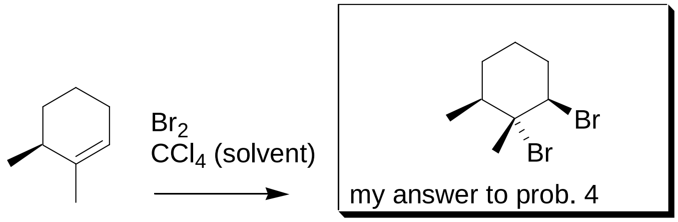


____lone pair conjugates with p orbital of the carbocation. N is less ________

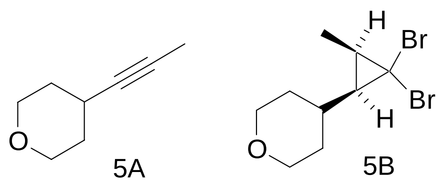
_____electronegative than O.____

____

4. (10 pts.) Predict the major product of the following reaction. Be careful. Show stereochemistry.

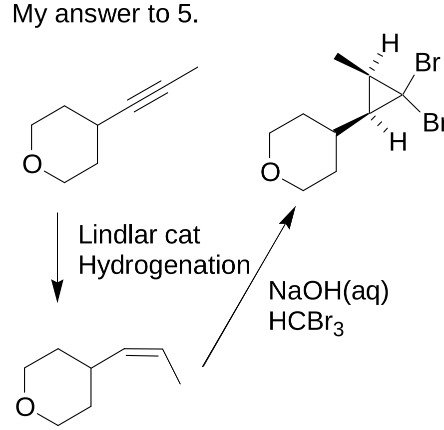


5. (10 pts.) Devise a synthesis of 5B from alkyne 5A. Pay attention to stereochemistry. Draw chemical reactions in the box below at right.



5A 5B

My answer to 5.



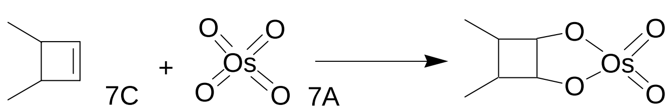
6. (10 pts) Why does the <u>alkene</u> react with acid, whereas the <u>alkane</u> does not? Be as brief as possible. You might want to draw a molecular orbital energy diagram in the margin at left if you can't put this into words.

___pi bond is higher in energy than sigma_

____due to less efficient overlap of p orbitals.__

____

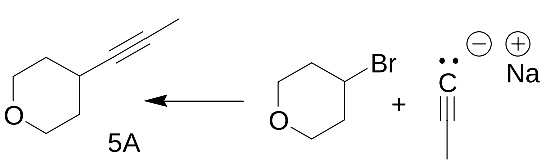
7. (10 pts.) What is the oxidation of Os in 7A? _8_ What is the oxidation of Os in 7B? __6_



8. (5 pts.) How would you make 5A with starting materials possessing no more than 5 carbon atoms? Draw a chemical reaction below at left.

9. (5 pts.) Think about the reaction of 7C with ozone followed by oxidizing conditions. Draw the product below at right.

8



5A

9