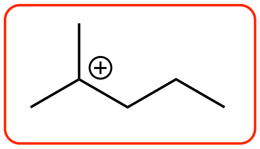
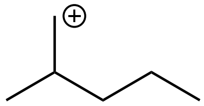
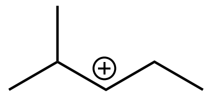
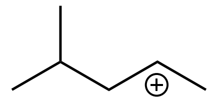
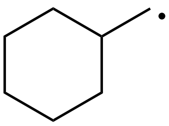
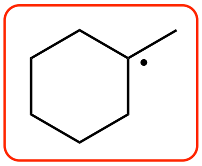
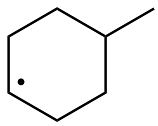
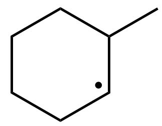
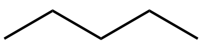
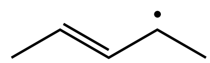
7. (4 pts) For the following series of carbocations, **circle the most stable carbocation.**

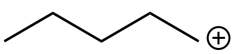
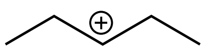
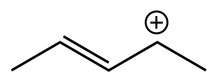
8. (4 pts) For the following series of radicals, **circle the most stable radical.**

9A. (4 pts) **Rank the following from 1-4** with respect to radical stability, with the **1 under the least stable radical** and the **4 under the most stable radical.**

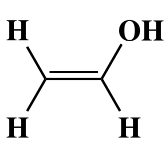
		• CH_3	
2	3	1	4

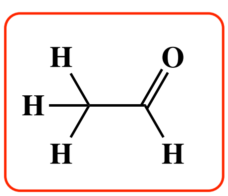
9B. (4 pts) **Rank the following from 1-4** with respect to carbocation stability, with the **1 under the least stable carbocation** and the **4 under the most stable carbocation.**

		⊕ CH_3	
2	3	1	4

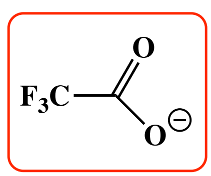
10. (8 pts) For each pair of molecules, **circle the one that is more stable** (lower in energy)

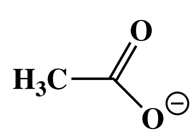
A)



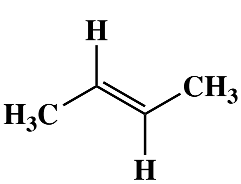


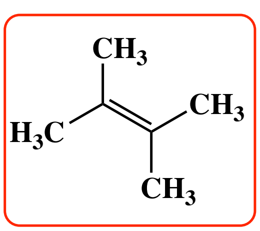
B)



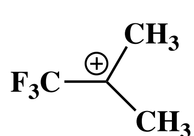


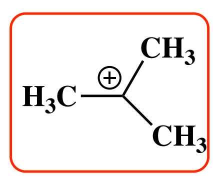
C)





D)

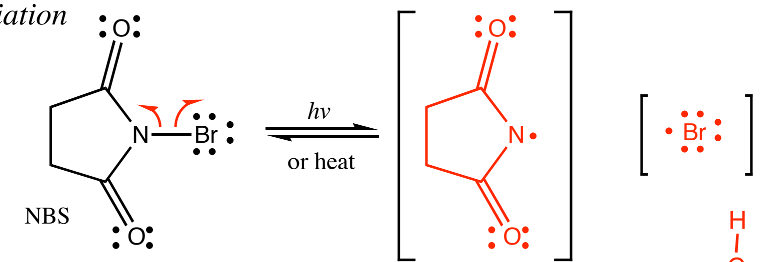




Signature___________________________ Pg 7__________(20)

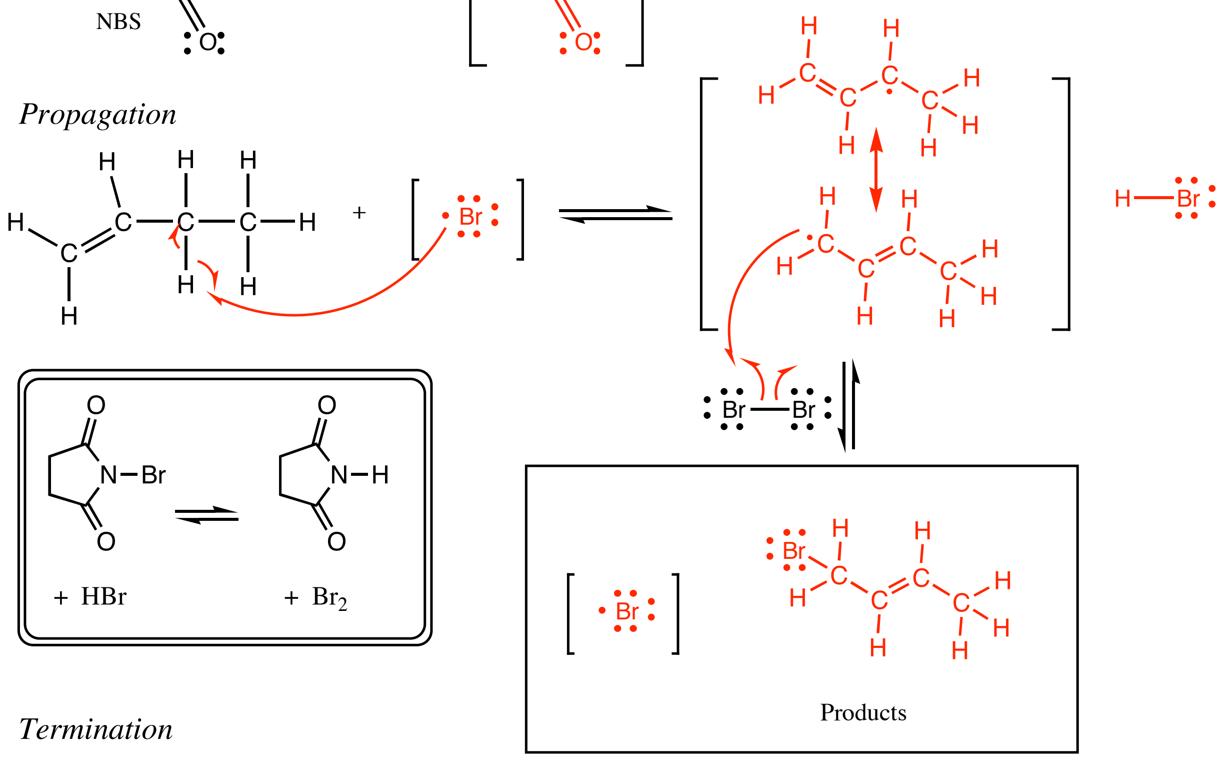
11. (20 pts.) Read these directions carefully. Read these directions carefully. (It was worth repeating) **For the reaction of 1-butene with NBS and light shown below, fill in the details of the mechanism. Draw the appropriate chemical structures and use an arrow to show how pairs of electrons are moved to** make and break bonds during the reaction. Use fishhook arrows when moving single electrons. Note that at the end you only have to list one of the three possible termination reactions.

Initiation



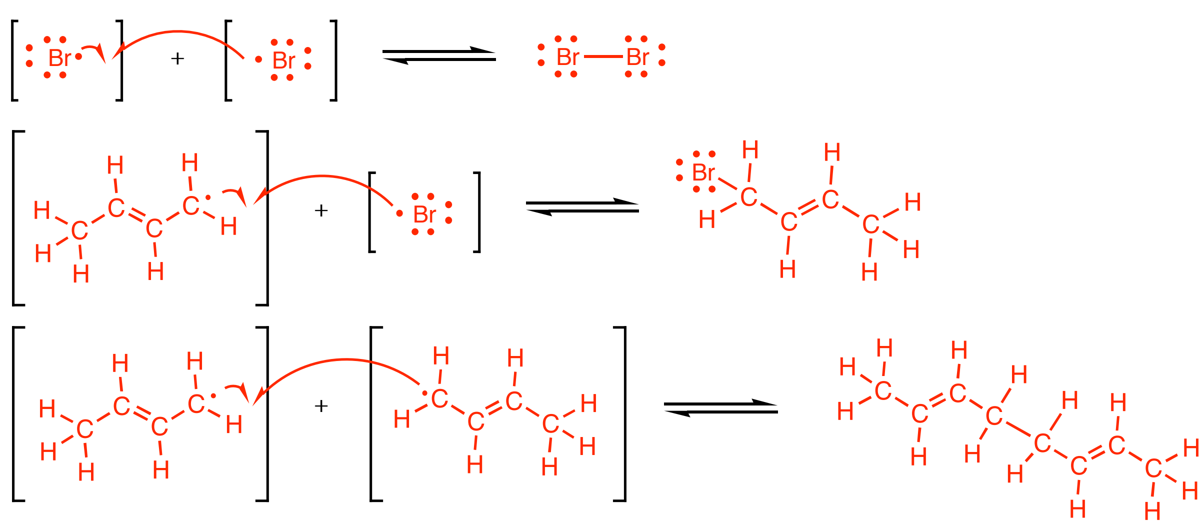
You do not have to draw both contributing structures, we did to help make this more clear.

Propagation

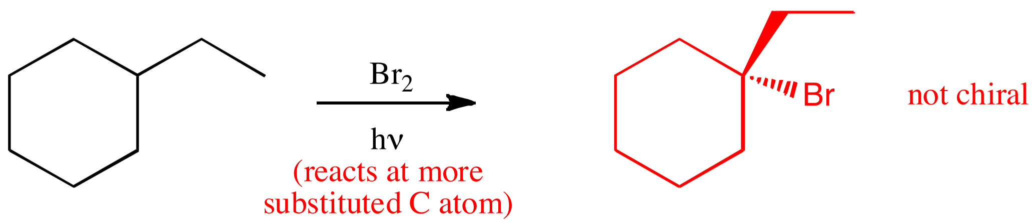


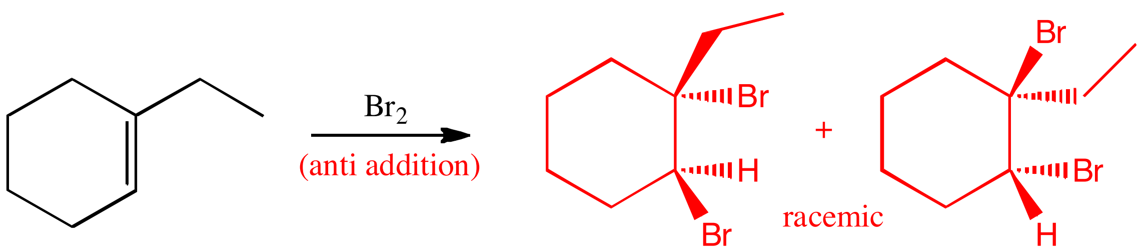
Termination

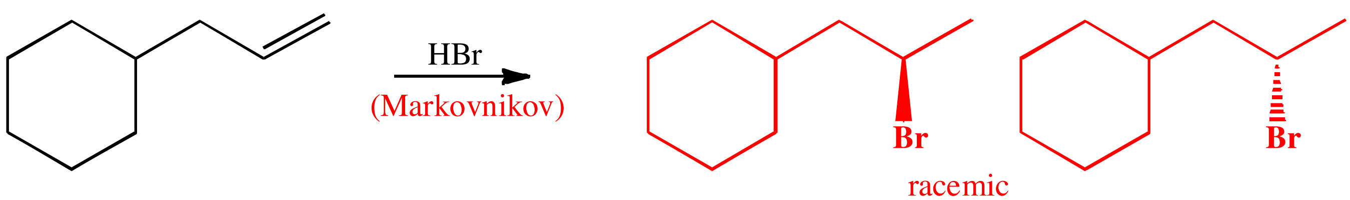
You only have to list one of the three possible termination reactions:

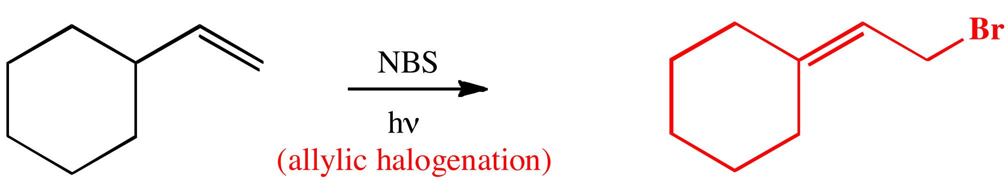


14. (3 or 5 pts each) For the following reactions, all of which involve reagents containing bromine atoms, complete the reactions with the predominant product or products. You must indicate stereochemistry with wedges and dashes. You must draw all stereoisomers produced as predominant products and write "racemic" under the structures when appropriate. Assume no rearrangments take place.



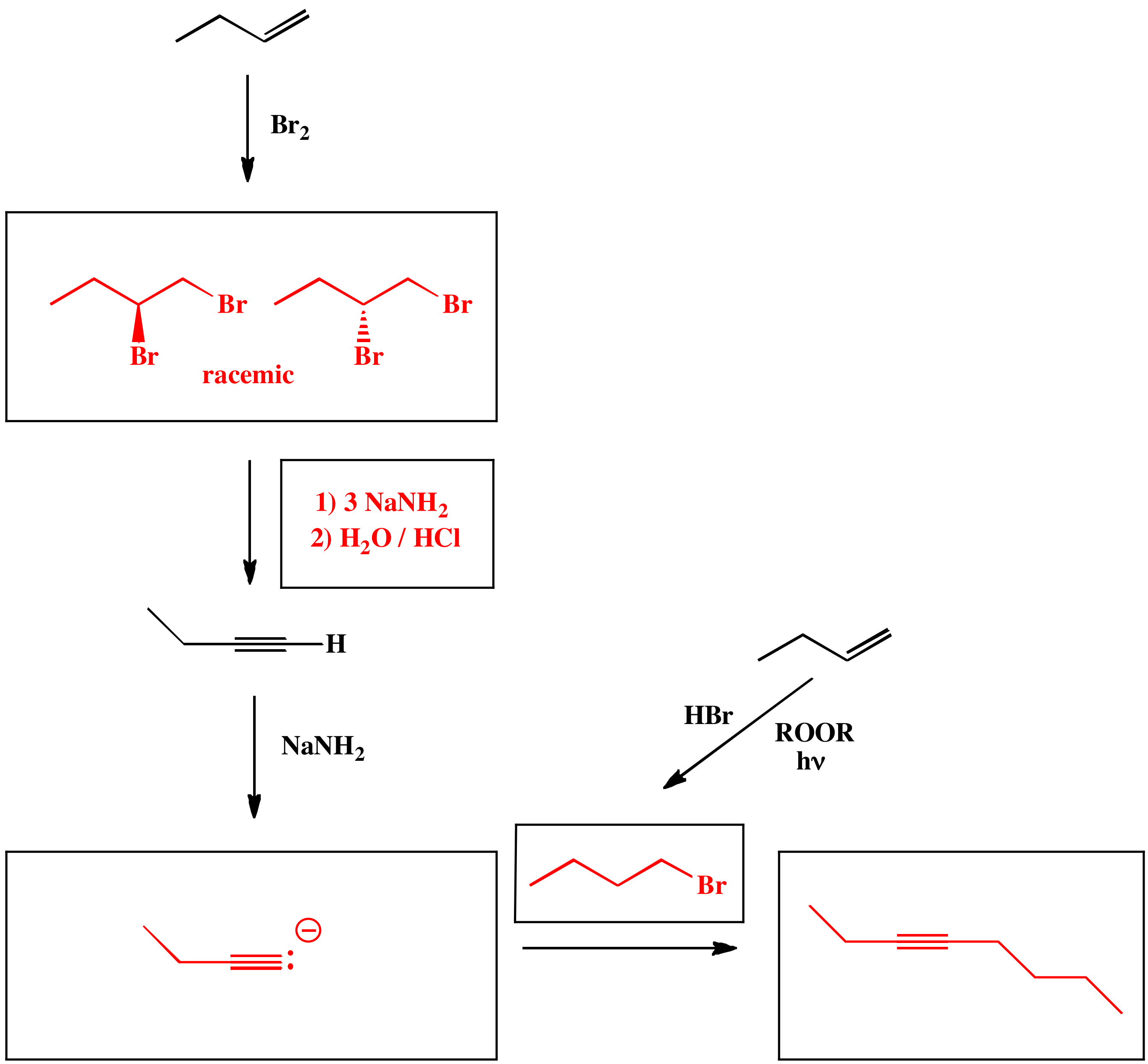




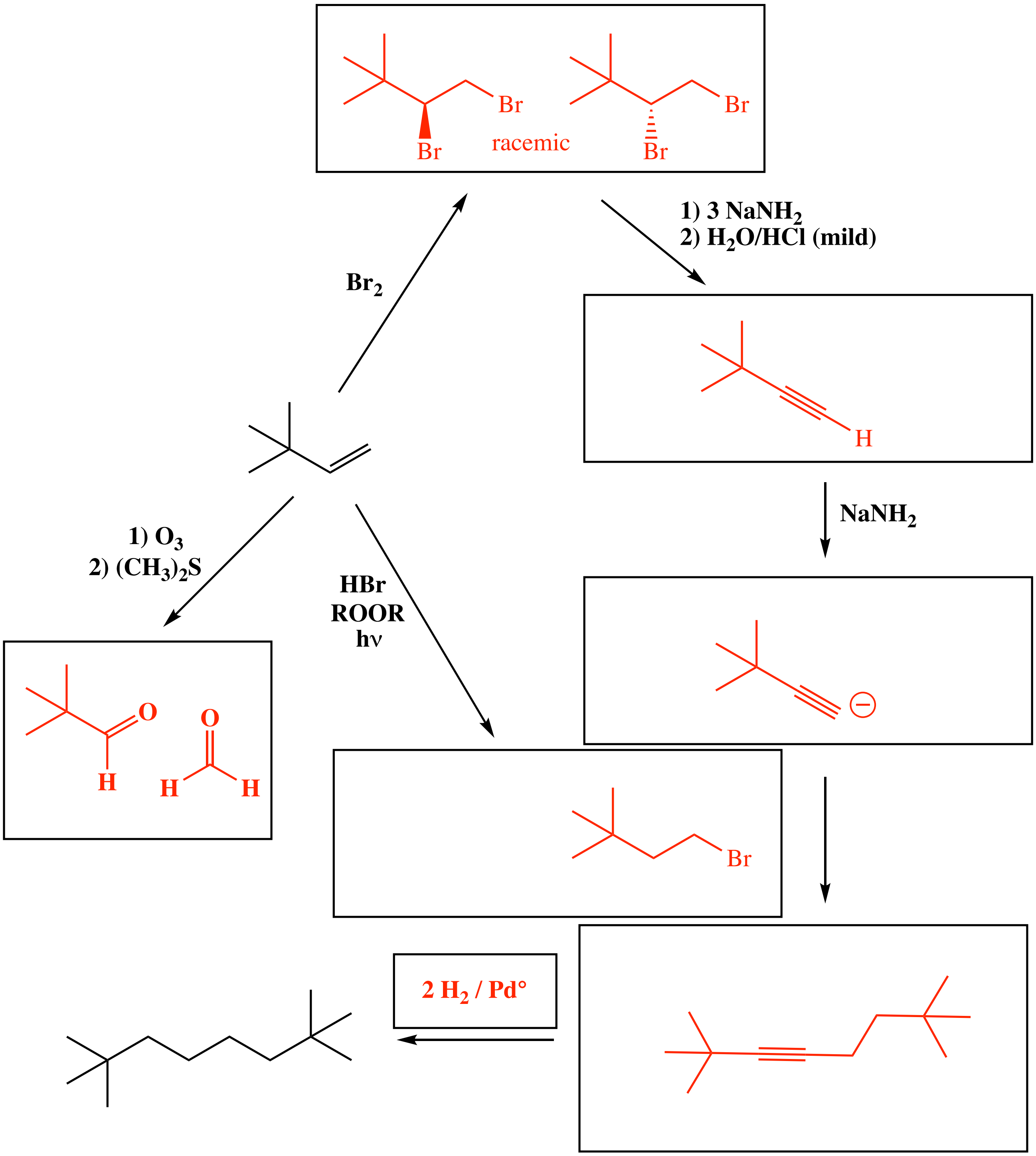


Signature_________________________

17. (3 or 5 pts each) For the following reactions, fill in the box with the predominant products or reagents ncessary to complete the following syntheses. You must indicate stereochemistry with wedges and dashes. You must draw all stereoisomers produced as predominant products and write "racemic" under the structures when appropriate. Assume no rearrangments take place.

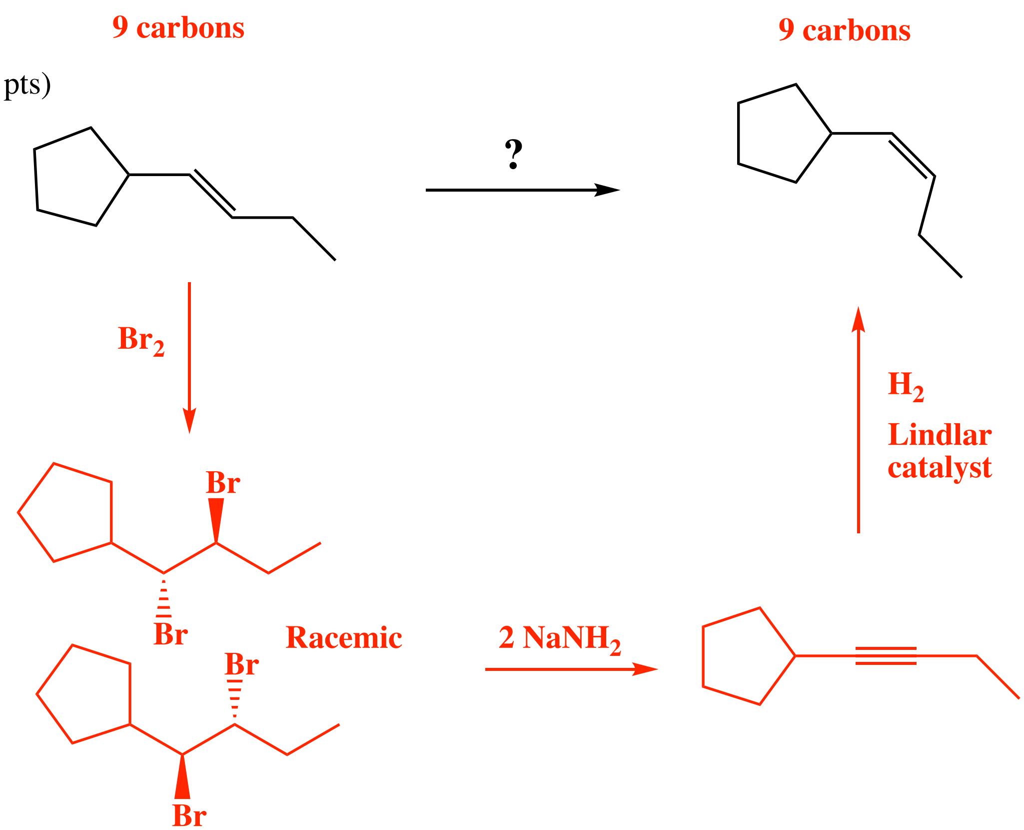


18. (3, 4 or 5 pts each) For the following reactions, fill in the box with the predominant **products** or **reagents** necessary to complete the following syntheses. **You must indicate stereochemistry with wedges and dashes. You must draw all stereoisomers** produced as predominant products and **write "racemic"** under the structures when appropriate. Assume no rearrangments take place.



23. These are synthesis questions. You need to show how the starting material can be converted into the product(s) shown. You may use any reactions we have learned provided that the product(s) you draw for each step is/are the predominant one(s). Show all the reagents you need. Show each molecule synthesized along the way and be sure to pay attention to the regiochemistry and stereochemistry preferences for each reaction. You must draw all stereoisomers formed, and use wedges and dashes to indicate chirality at each chiral center. Write racemic when appropriate. **All the carbons of the product must come from carbons of the starting material.**

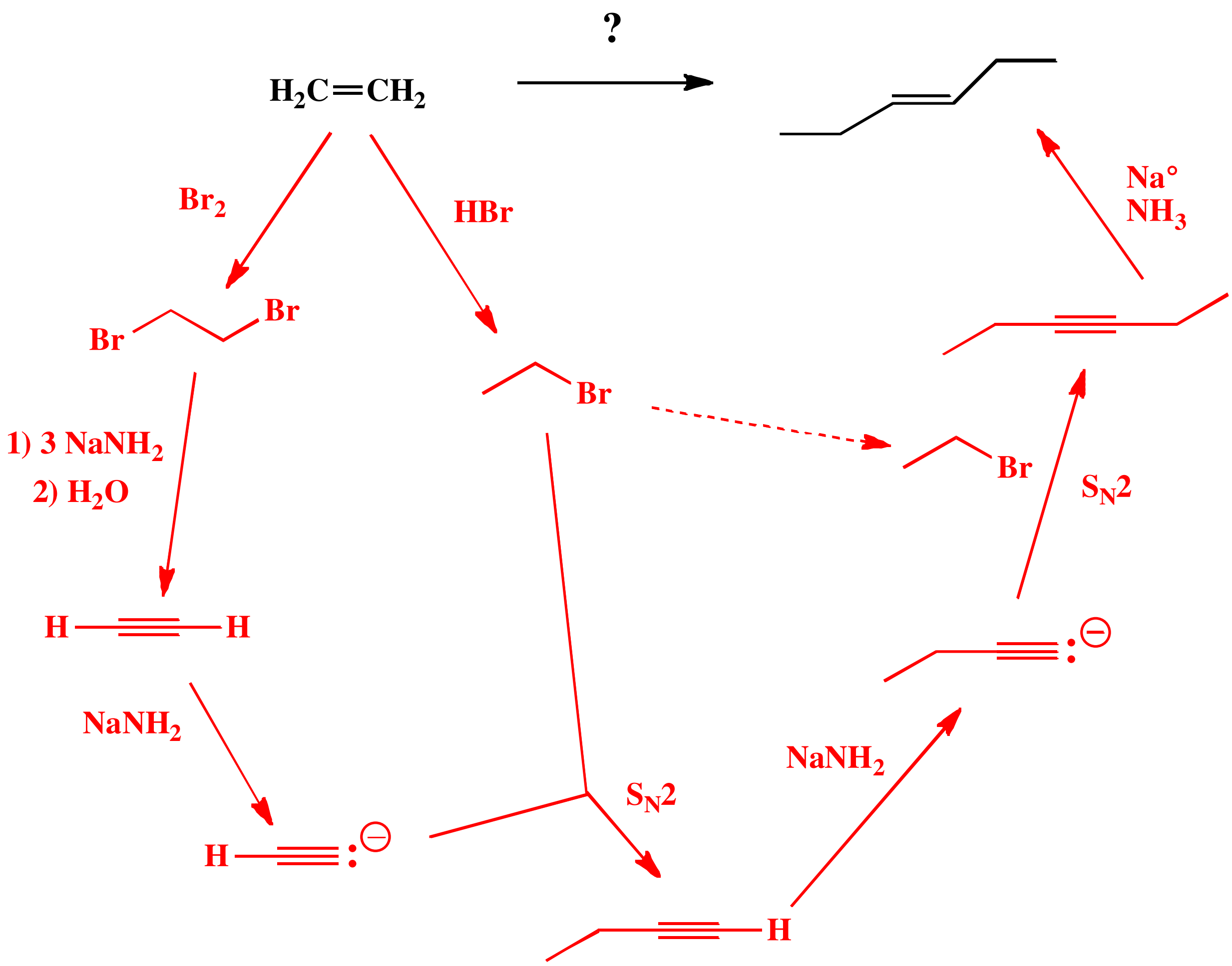
C) (7 pts)



Recognize that the product is a *Z* alkene, and the only way to make these involves using H_2 and Lindlar's catalyst. Therefore the last step must be reaction of the corresponding alkyne with those reagents. Recognize that it is then a matter of converting the starting *E* alkene into an alkyne using the standard "I-35" reactions.

24 (cont.) These are synthesis questions. You need to show how the starting material can be converted into the product(s) shown. You may use any reactions we have learned provided that the product(s) you draw for each step is/are the predominant one(s). Show all the reagents you need. Show each molecule synthesized along the way and be sure to pay attention to the regiochemistry and stereochemistry preferences for each reaction. You must draw all stereoisomers formed, and use wedges and dashes to indicate chirality at each chiral center. Write racemic when appropriate. **All the carbons of the product must come from carbons of the starting material.**

C) (21 pts)



Recognize that this molecule can be assembled from three different 2-carbon pieces, using the alkyne alkylation strategy each time. Therefore, an alkyne is required, so **recognize** that the last step must be the reduction of the alkyne group using Na° and NH_3 to give the *E*-alkene product. The rest is standard chemistry at this point.

18. (15 pts) Save this until the end, because it may take you a while to find all the answers. One of the interesting aspects of organic synthesis is that sometimes you can make the same molecule several different routes. Propose five different syntheses of the following alkyl halide. To be considered a different route, at least one of your reactants must be different, although you can use the same reagent more than once. IN each case, the molecule shown is the only predominant product expected. Only the last reaction can involve a rearrangement, and in that case, you can presume that the major product is rearranged as long as your rearrangement corresponds to one we have seen in the course.