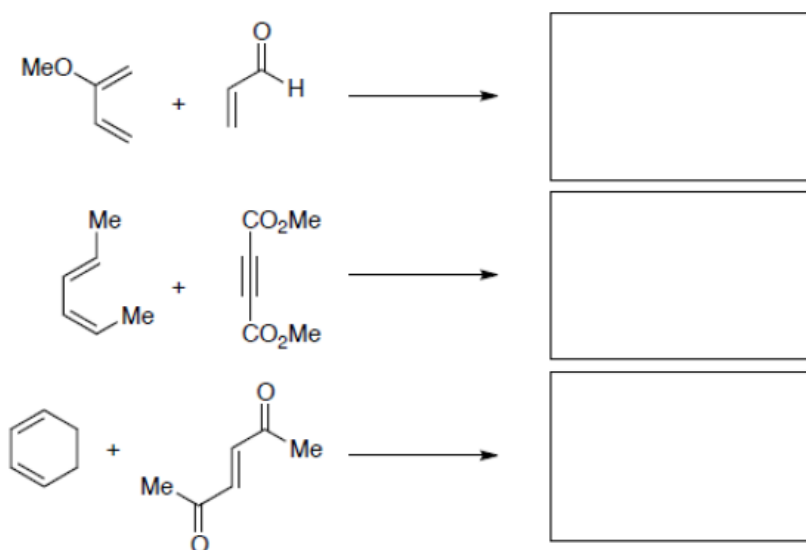


Last Name

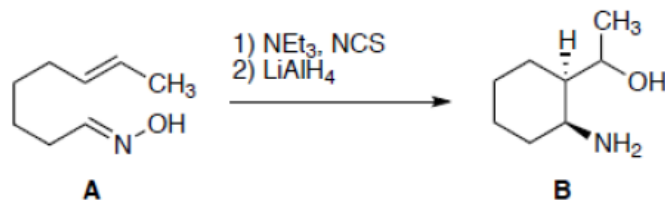
First Name

ID Number

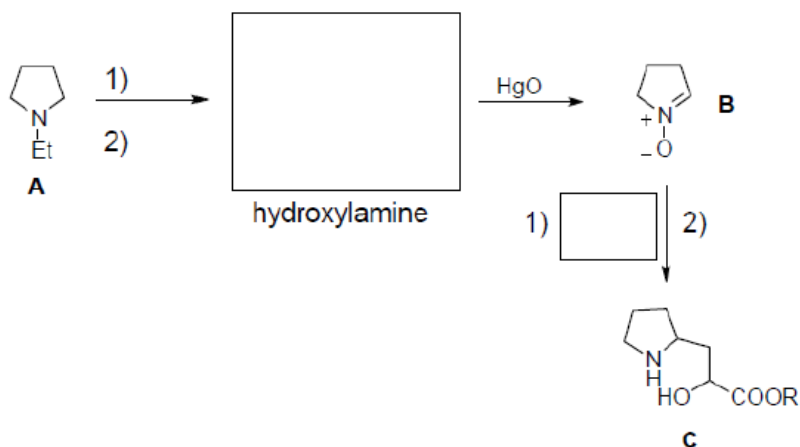
1. Fill in the missing products (no mechanism)



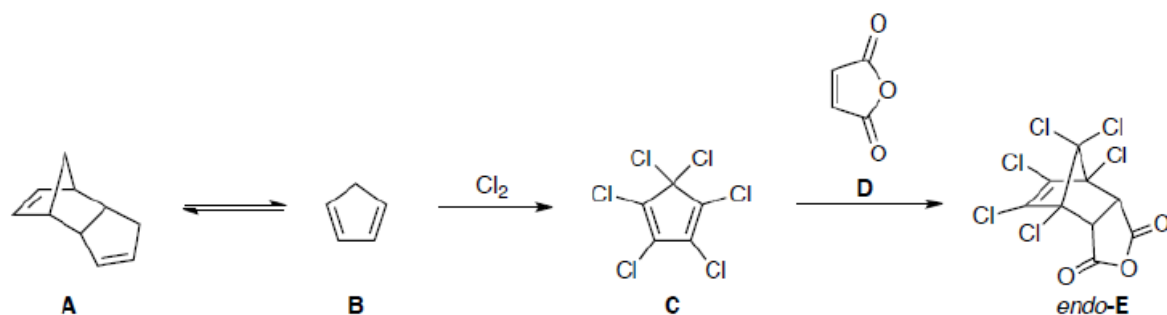
2. a) Treatment of oxime **A** with base and N-chlorosuccinimide followed by LiAlH_4 -reduction leads to the formation of γ -amino alcohol **B**. Provide the full mechanism for this transformation. b) how would you make the oxime from octa-6-enal?



3. Another way to synthesize 1,3 amino-alcohol is to prepare nitron with a cope elimination and subsequent oxidation. a) Fill the missing part (reagents products). b) Give an alternative way to synthesize **B**.

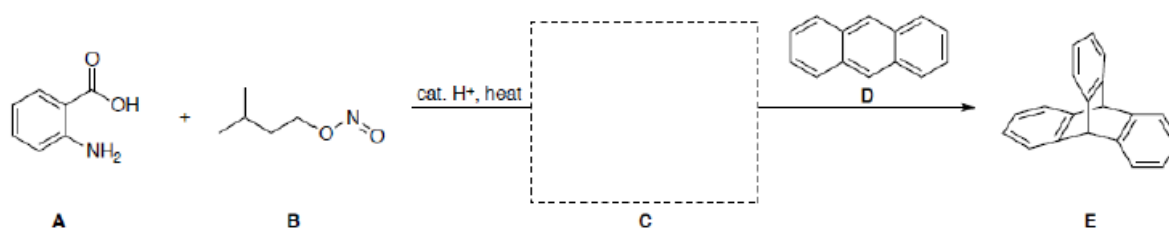


4. Cyclopentadiene **B** and its derivatives are useful building blocks for Diels-Alder reactions.

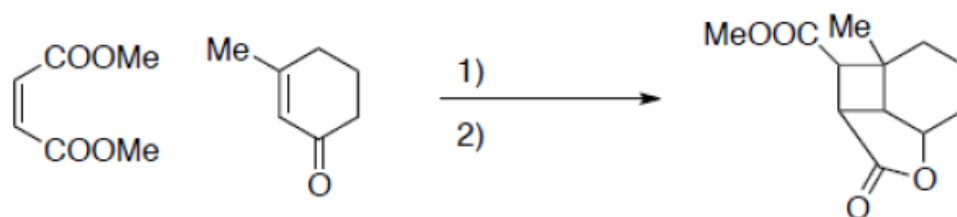


a) At room temperature Cyclopentadiene **B** exists as its dimer **A**, but can be dissociated into the monomeric form on heating. Provide a mechanism for this transformation. What kind of reaction is that? b) Cyclopentadiene **B** can be chlorinated to give hexachlorocyclopentadiene **C**. The reaction of the chloro-derivative **C** with maleic anhydride **D** only provides the *endo*-product **E** (not the *exo*). Use orbital diagrams/interactions to explain this observation.

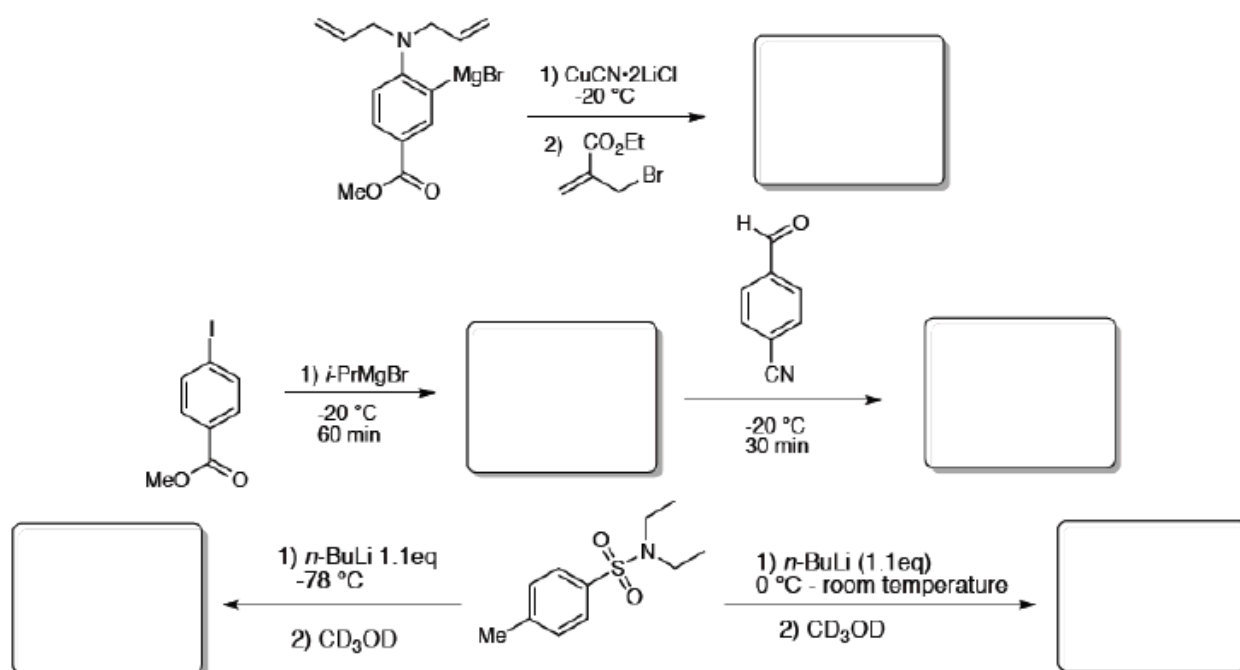
5. The reaction of anthranilic acid **A** with a nitrite **B** (e.g. amyl nitrite) leads to the formation of a highly reactive intermediate **C**. Provide the full mechanism for this transformation. What is the name of the reactive intermediate **C**? (*hint* (!): the reactive intermediate **C** can be trapped by anthracene **D** to give product **E**)



6. Provide the missing conditions for the transformation and give a possible stereochemical configuration of the product.



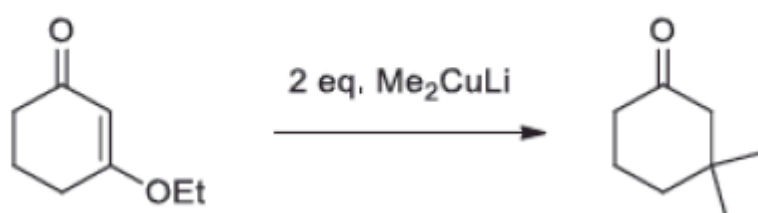
7. Give the products for the following reactions



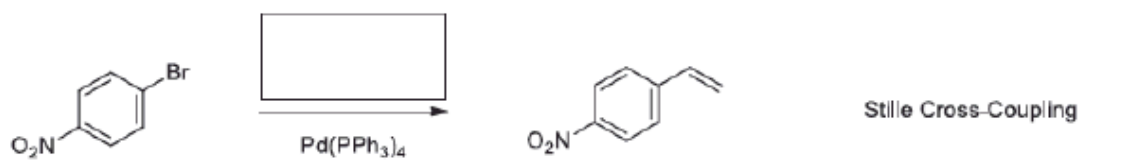
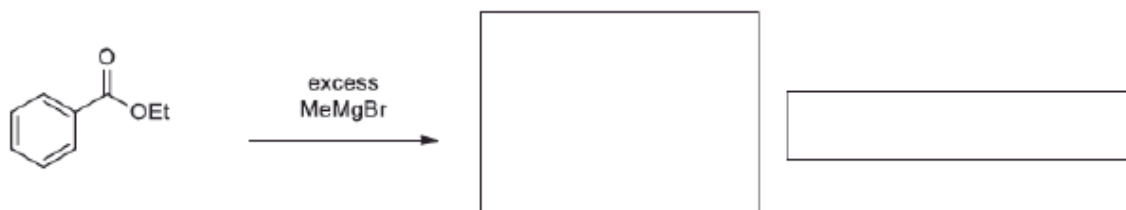
8. Provide a one-step synthesis for each of the two compounds below. Use starting materials containing not more than four carbon atoms.



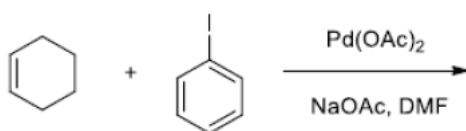
9. Draw the mechanism of the following reaction:



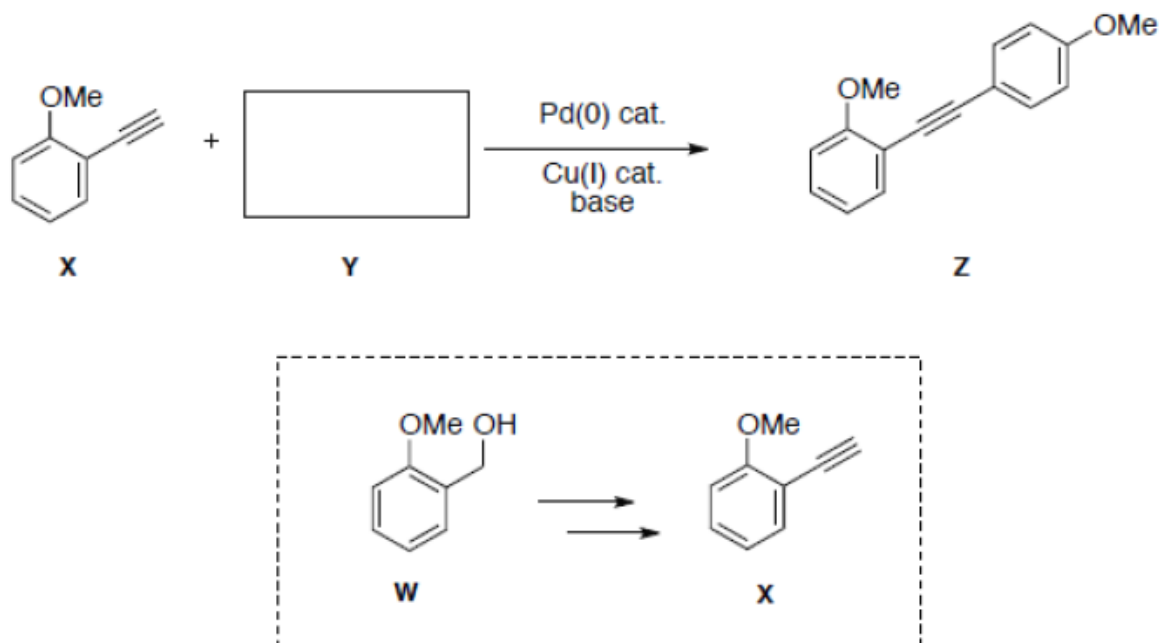
10. The following reactions involve organometallic compounds. Fill in the missing reagents, products and or reaction names.



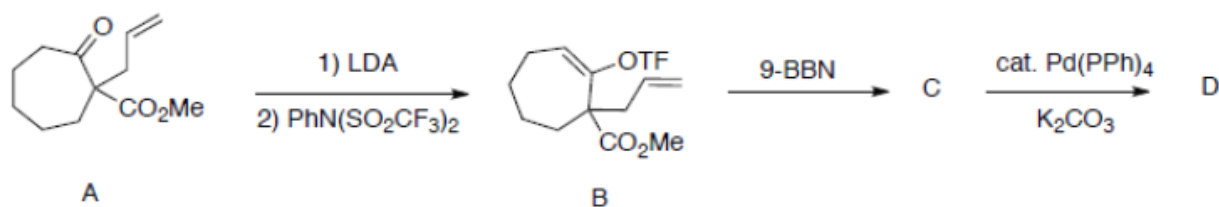
11. For cyclic alkenes, C-C bond rotation is not possible. Give the full mechanism and product of the following Heck reaction.



12. Provide reagent **Y** for the Pd-catalyzed reaction to form product **Z**. What is the name of this reaction? How would you prepare reagent **X** from alcohol **W**?



13. Substituted cycloheptanone **A** is converted to bicyclic compound **D** via the following reaction sequence:



- Provide the structure of intermediate **C** and the final product (**D**). What is the name of the last reaction?
- Provide a synthesis of **A** starting from cycloheptanone.