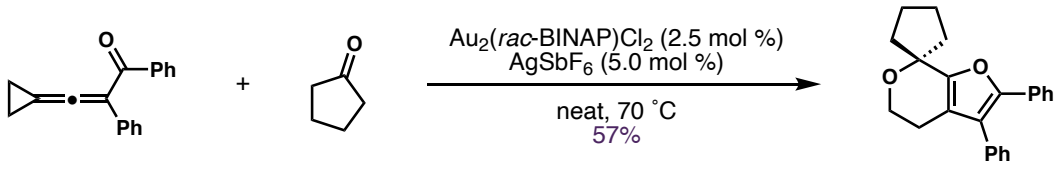
N. Falcone
06-16-2022

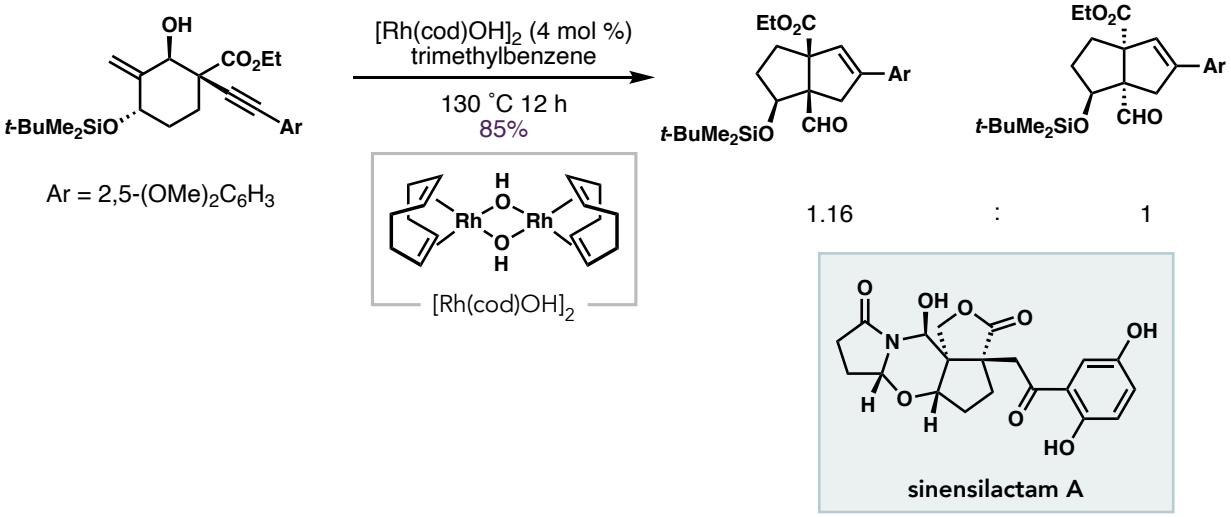
1. Propose a mechanism for the following transformation.



Ren, H. & co-workers. *Org. Lett.* **2018**, *20*, 3096.

2. Yang and co-workers used this rhodium-catalyzed transformation to access the substituted hexahydropentalene scaffold of sinsensilactam A with modest diastereocontrol. There are three possible mechanisms that could account for this unusual transformation, one of which later received computational support. How many can you propose?

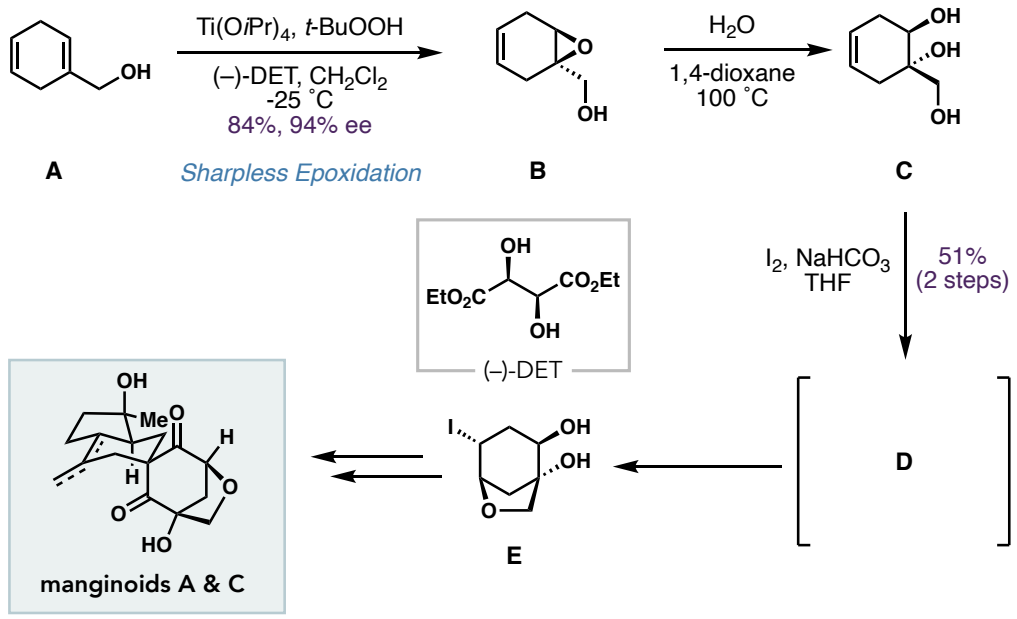
Hint: The mechanisms vary at the beginning, but converge on a common intermediate.



Gong, J.; Yang, Z. & co-workers. *Org. Lett.* **2018**, *20*, 1857.
Gong, J.; Yang, Z.; Bai, R.; Lan, Yu. & co-workers. *Chem. Commun.* **2018**, *54*, 13551.

3. Undergraduate Problem: Your Nosy Neighbor

Some background: Below is a sequence from a recent synthesis of some bioactive metabolites. The synthesis begins with the synthesis of 2,3-epoxyacohol **B** from diene **A** using the Sharpless asymmetric epoxidation (SAE) reaction, which enables the enantioselective synthesis of 2,3-epoxyalcohols from allylic alcohols. This reaction was developed in the laboratory of K. Barry Sharpless (one of Erik's former colleagues!) and was part of the 2001 Nobel Prize in Chemistry.



Xu, Z.-J.; Lou, H.-X. & co-workers. *Angew. Chem. Int. Ed.* **2021**, *60*, 15286.

a. Propose a mechanism to account for the conversion of compound **B** to triol **C** that accounts for the observed stereochemistry.

b. Triol **C** can be converted to bicyclic compound **E** by treatment with iodine under basic conditions. Provide the structure of intermediate **D** with the correct stereochemistry.

c. Bonus (if time): Propose a synthesis of compound **A** starting from butadiene.