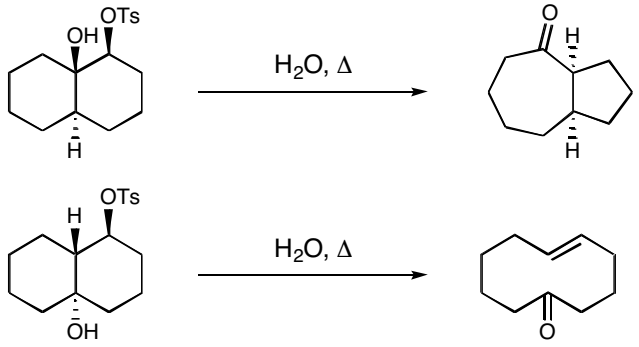
Massachusetts Institute of Technology

5.13: Organic Chemistry II *Fall 2003, S. Tabacco*

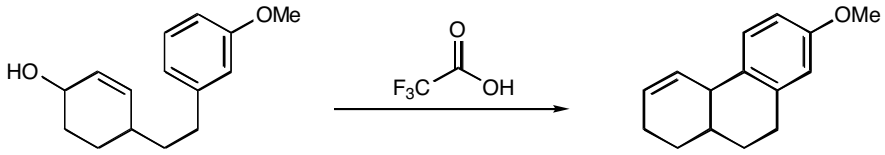
Optional Problem Set 7

If you would like feedback from your TA, please turn your problem set in by **4PM** on **Tuesday, December 2nd.**

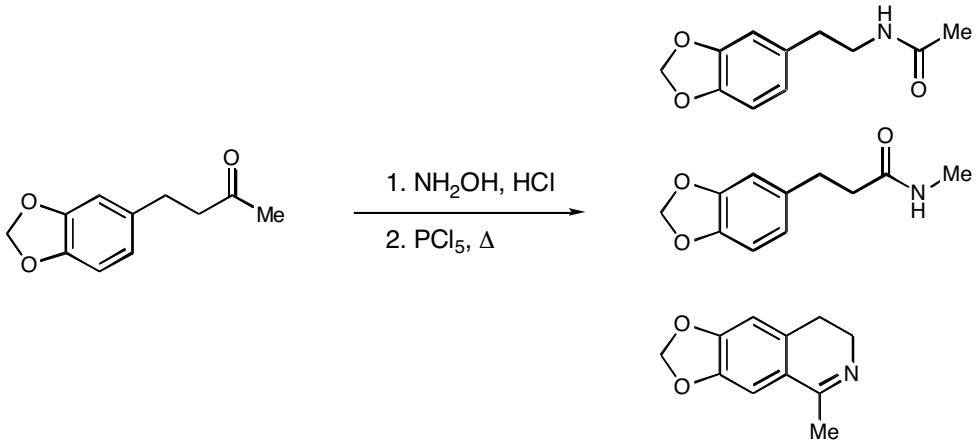
1. With the aid of three-dimensional drawings, provide a clear rationale for the products that are observed in the following transformations. Your rationale must include the mechanism for each transformation. Hint: Think cyclohexane chair!



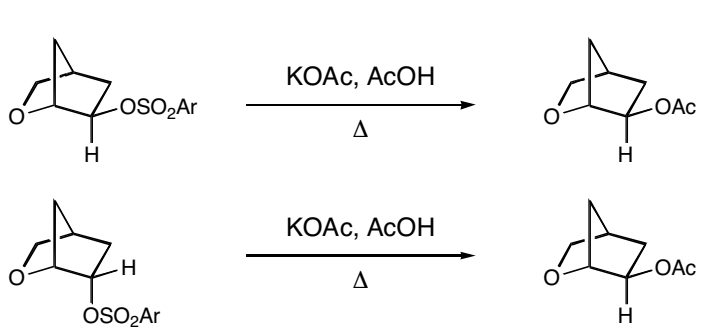
2. Please provide a detailed mechanism for the illustrated transformation.



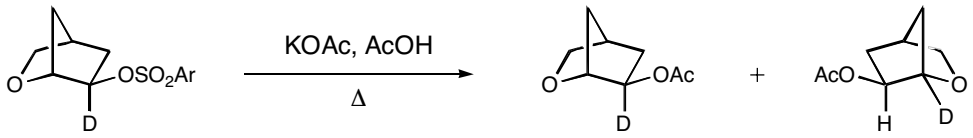
3. Please provide a detailed mechanism that accounts for the formation of all three of the observed products. Hint: Think Beckmann rearrangement.



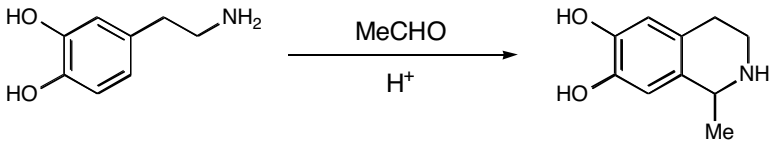
4. a) Please provide a rationale for the illustrated rate data.



b) Please provide a mechanism to account for the formation of the products illustrated below. In addition, explain why no other stereoisomers are generated in the reaction.



5. Please provide a detailed mechanism for the illustrated transformation.



6. In the reaction illustrated below, the desired product from a simple Friedel–Crafts acylation (**A**) was not observed. Instead, and isomeric product (**B**) was generated through a more complex route that also involves Friedel–Crafts chemistry. Please provide a detailed mechanism for this unexpected process.