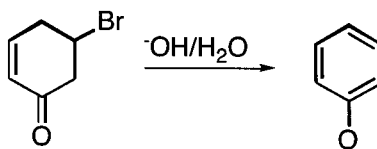
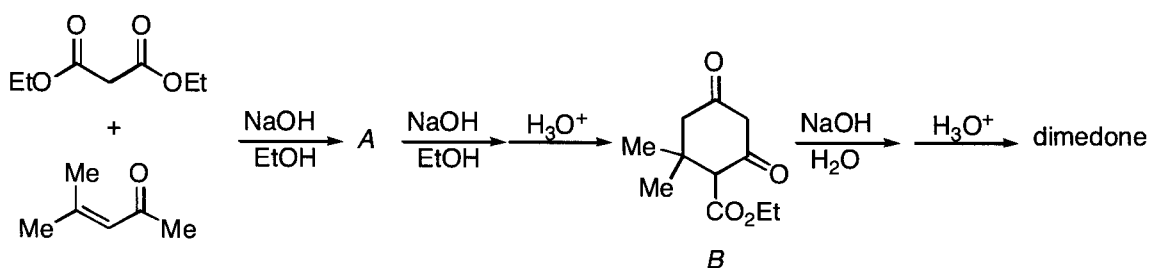


EXAM 4 EXTRA PROBLEMS

1. Provide the best mechanism for the following reaction.



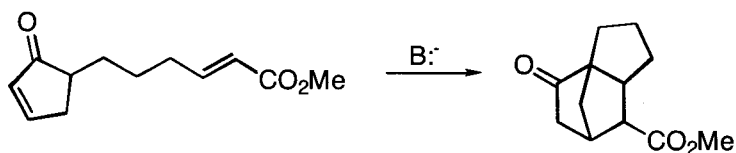
2. A useful diketone, dimedone, can be prepared in high yield by the synthesis below. Provide structures for the intermediate *A* and for dimedone, and show a mechanism for each step up to *B*.



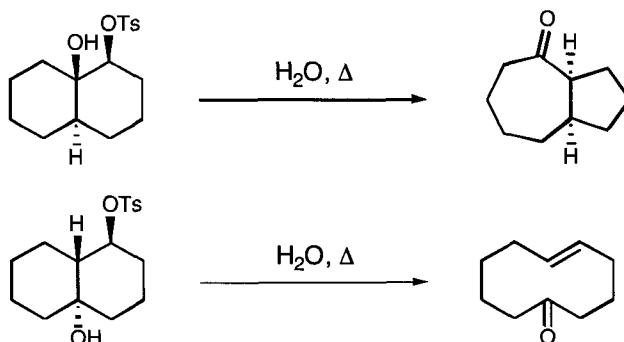
3. A biochemist, Sal Monella, has come to you to ask your assistance in testing a promising biosynthetic hypothesis. She wishes to have two samples of methylsuccinic acid specifically labeled with ^{14}C as shown below. The source of the isotope, for financial reasons, is the salt Na^{14}CN . Outline a synthesis that will accomplish this objective.



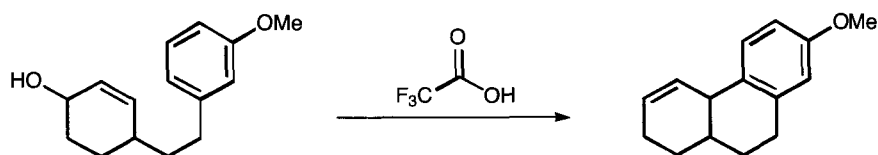
4. In early 1999, chemists from Tohoku University in Japan reported that they had achieved the transformation shown below. In this equation, B^- is a base strong enough to form enolate ions. Propose a reasonable mechanism for this transformation. (L 22.87)



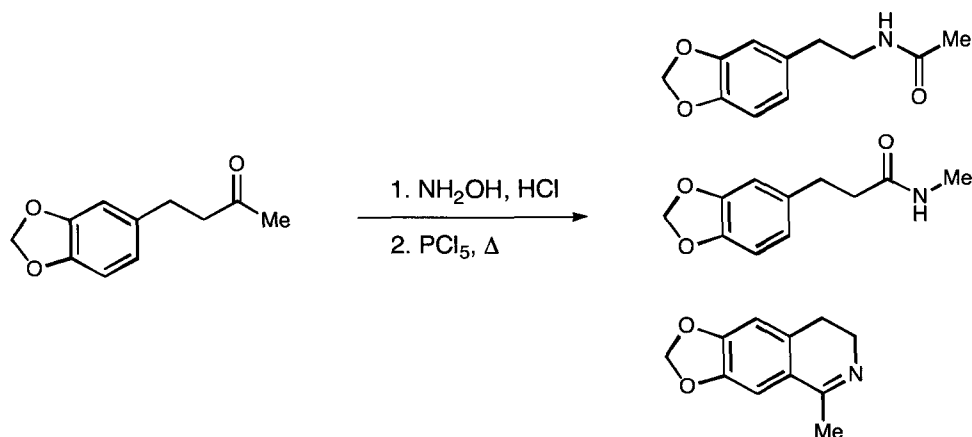
5. With the aid of three-dimensional drawings, provide a clear rationale for the products that are observed in the following transformations. Your rationale must include the mechanism for each transformation.



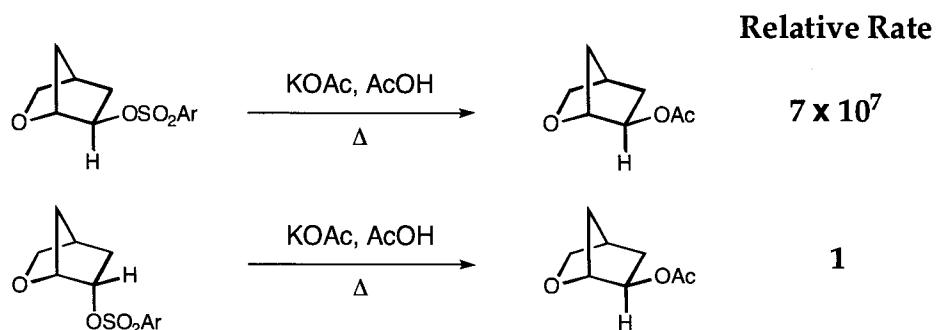
6. Please provide a detailed mechanism for the illustrated transformation.



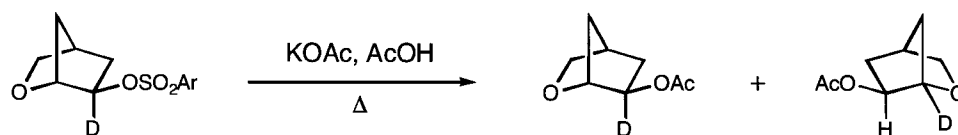
7. Please provide a detailed mechanism that accounts for the formation of all three of the observed products.



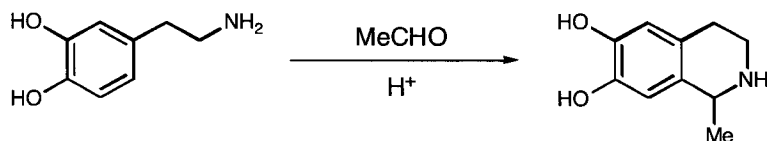
8. a) Please provide a rationale for the illustrated rate data.



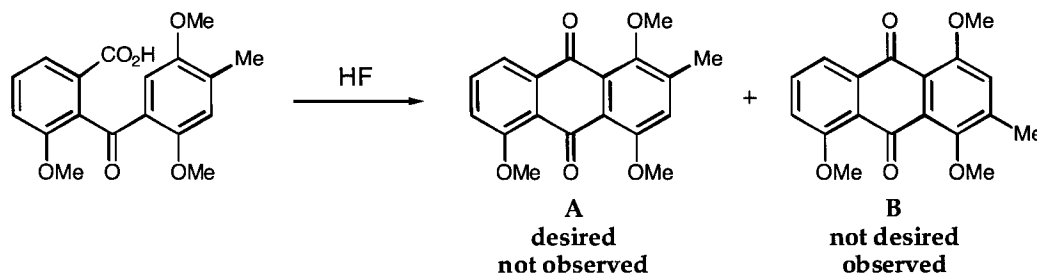
b) Please provide a mechanism to account for the formation of the products illustrated below. In addition, explain why no other stereoisomers are generated in the reaction.



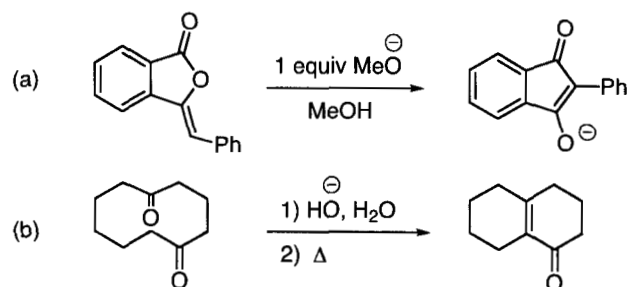
9. Please provide a detailed mechanism for the illustrated transformation.



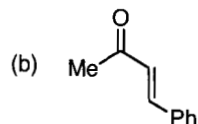
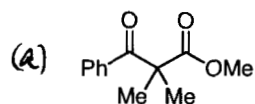
10. In the reaction illustrated below, the desired product from a simple Friedel–Crafts acylation (**A**) was not observed. Instead, an isomeric product (**B**) was generated through a more complex route that also involves Friedel–Crafts chemistry. Please provide a detailed mechanism for this unexpected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



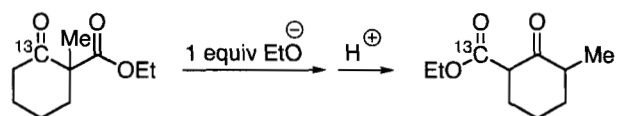
11. Provide the best mechanism. Please show all arrow-pushing.



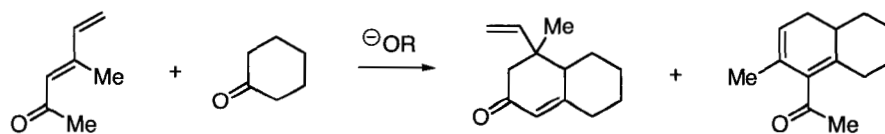
12. Propose a synthesis for each of the following compounds, starting with benzyl alcohol (PhCH₂OH) and with alcohols that contain three or fewer carbons.



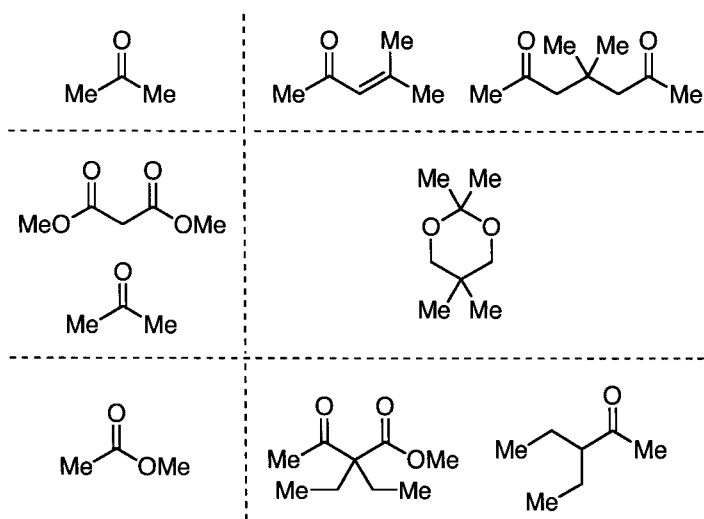
13. Provide a mechanism for the illustrated transformation that is consistent with the carbon-13 labeling result. Please show arrow pushing.



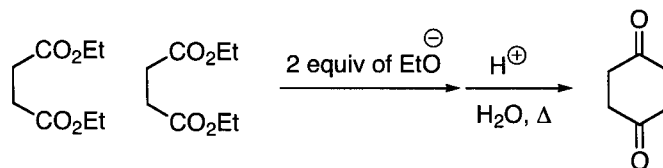
14. Provide a mechanism. Please show arrow-pushing.



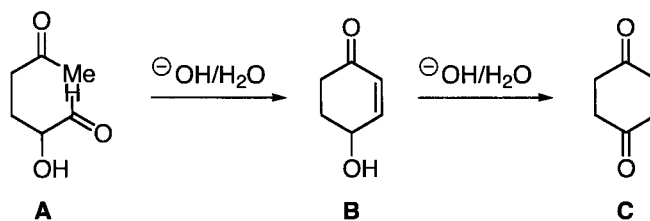
- 15) Propose a synthesis for the molecules on the right using the starting materials on the left and any one-carbon organic molecules.



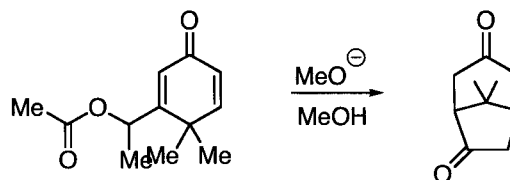
16. Provide a mechanism for the illustrated reaction. Please show arrow pushing.



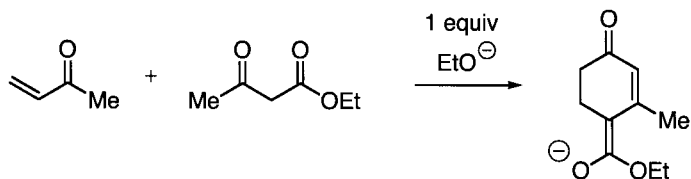
17. Provide a mechanism for the conversion of **A** to **B** and of **B** to **C**. Please show arrow pushing.



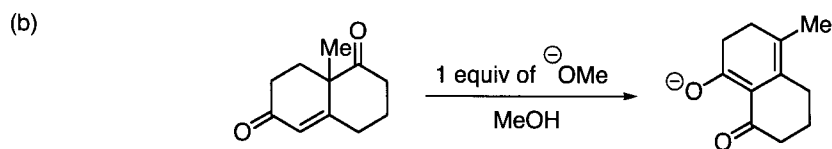
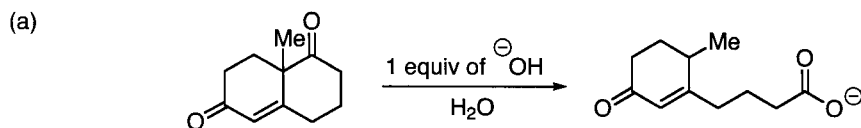
18. Provide a mechanism for the illustrated reaction. Please show arrow pushing.



19. Provide the best mechanism. Please show all arrow pushing.

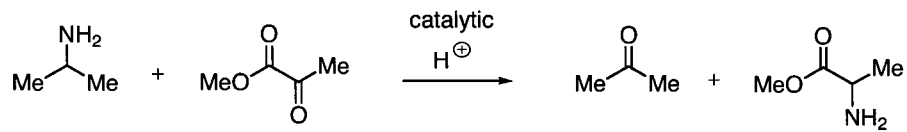


20. Provide the best mechanism for each of the reactions illustrated below. Hint: The mechanism for part (a) only requires three or four steps. Please show all arrow pushing.

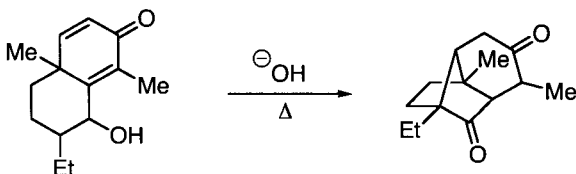


(c) Succinctly explain why different pathways are observed under the different reaction conditions.

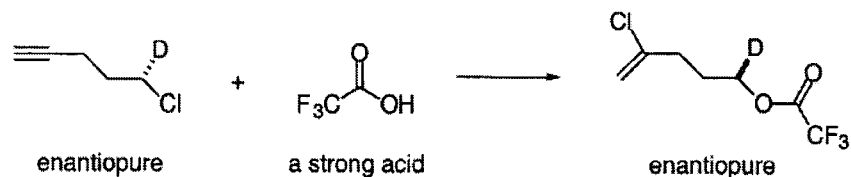
21. Provide the best mechanism. Please show all arrow pushing.



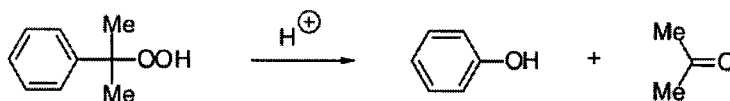
22. Provide the best mechanism. Please show all arrow pushing. **Hint:** The last step is a Michael addition reaction.



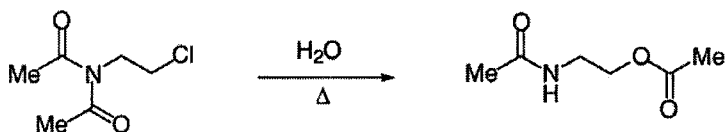
23. Provide a mechanism for the illustrated reaction that relies upon Cl serving as a neighboring group. Please show all arrow pushing.



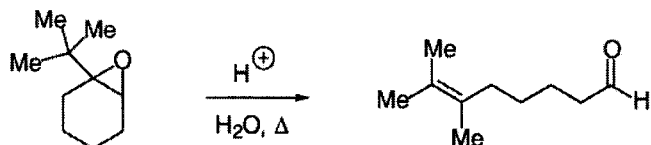
24. Provide the best mechanism for the illustrated transformation. Please show all arrow pushing.



25. Provide the best mechanism for the illustrated transformation. Please show all arrow pushing.



26. Provide the best mechanism for the illustrated transformation. Please show all arrow pushing.



27. Diastereomers **A** and **B** provide different products upon diazotization. Please explain why only one product is generated selectively in each reaction. Your explanation should include three-dimensional structures (e.g., chair representations of cyclohexane rings) of the starting materials, intermediates, and products.

