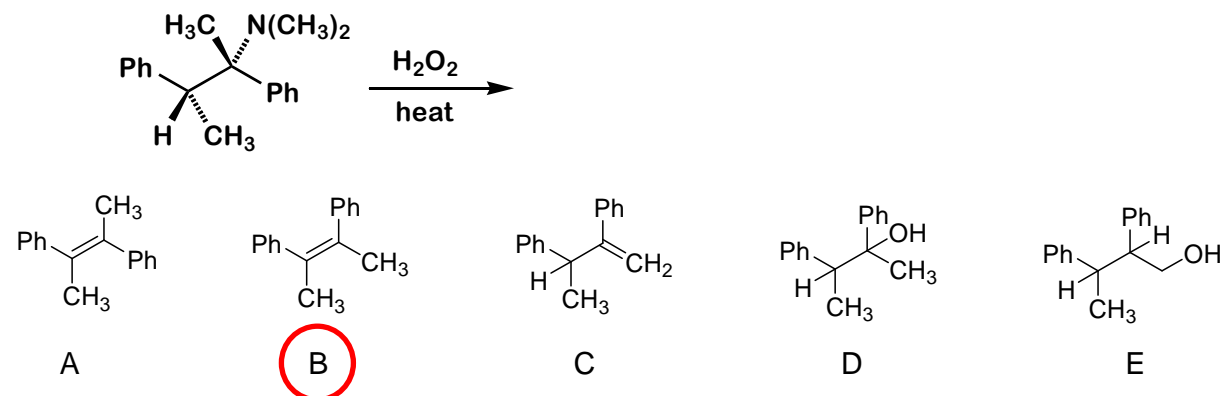
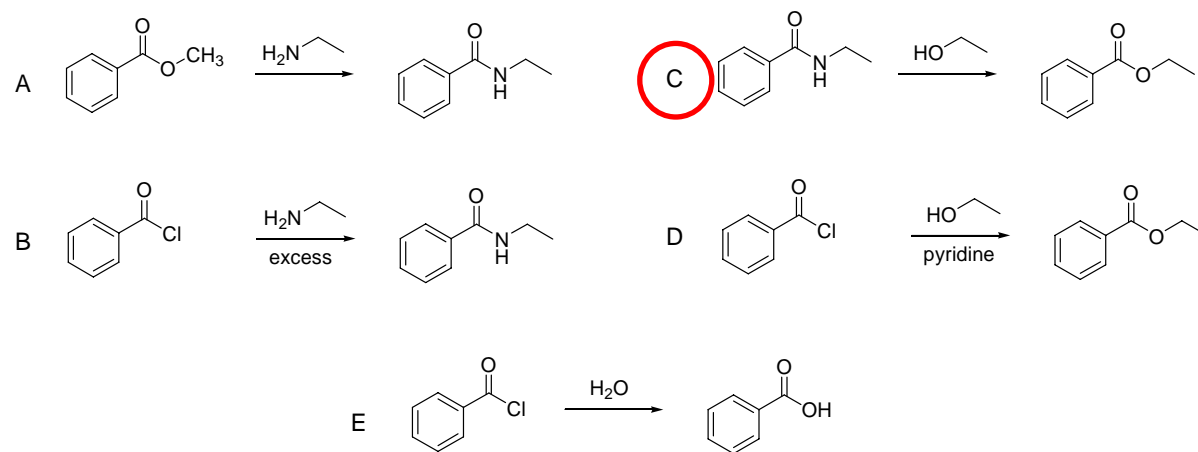


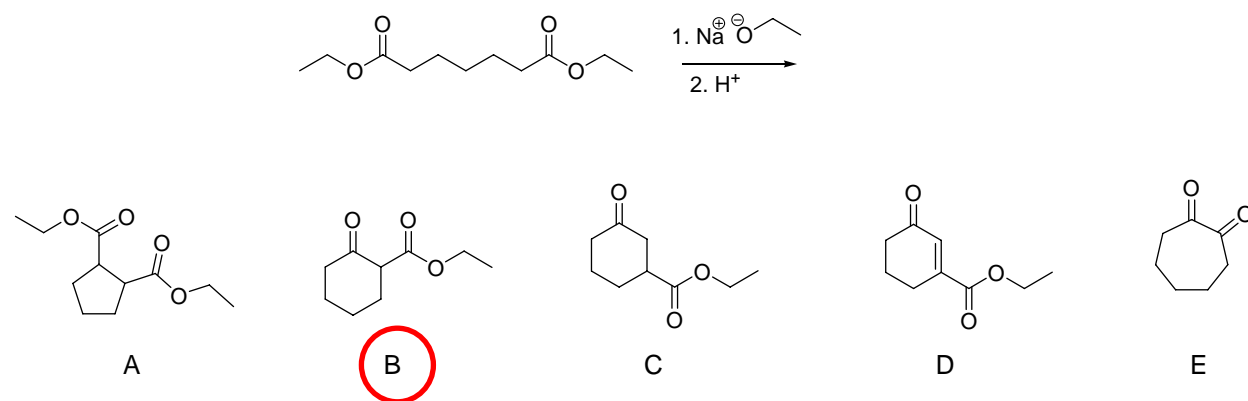
1. Predict the product of the following reaction.



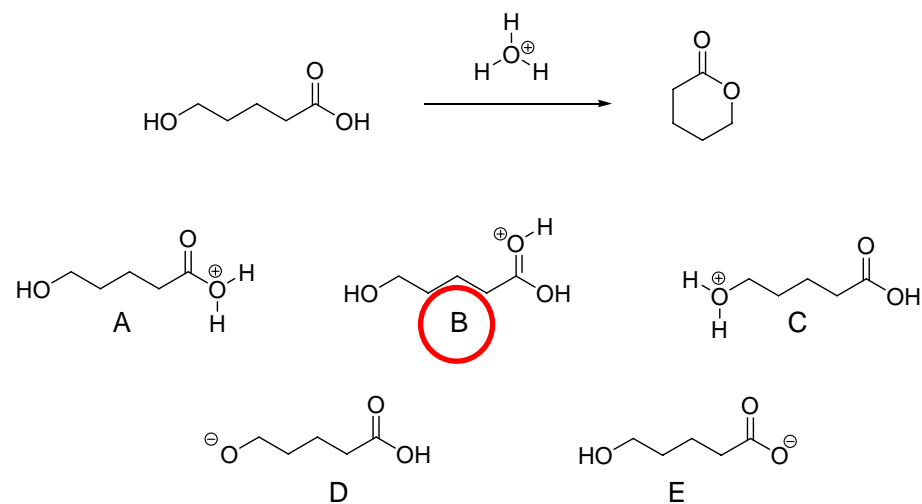
2. Which one of the following reactions would be the most likely to fail?



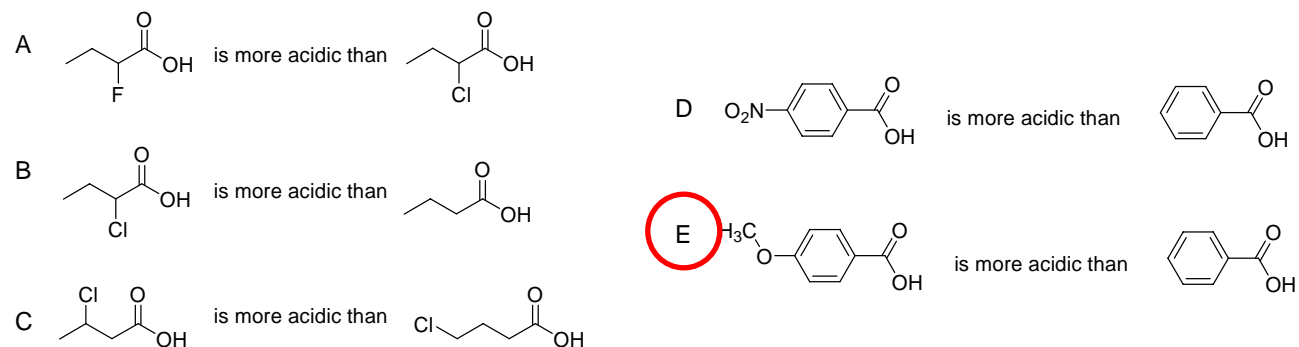
3. Predict the product of the following reaction.



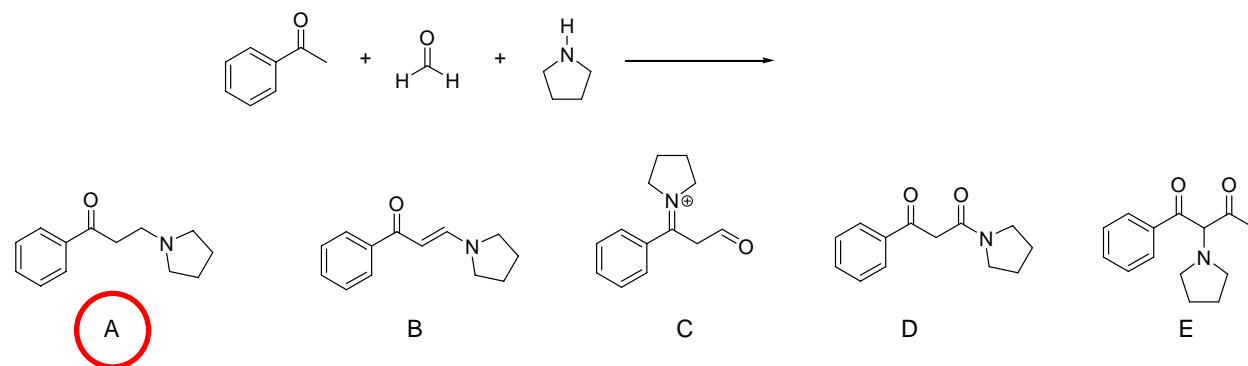
4. A student was asked to draw a mechanism for the following reaction. Choose the most appropriate first intermediate.



5. Which of the following comparisons of acidity is incorrect?



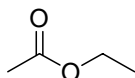
6. Predict the product of the following Mannich reaction.



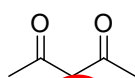
7. Which of the following compounds would be the most acidic? (Which would have the lowest  $pK_a$  value?)



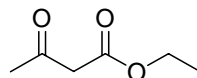
A



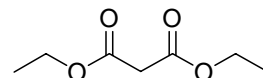
B



C

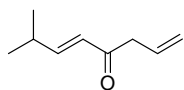
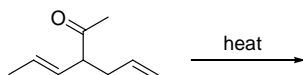


D

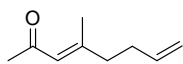


E

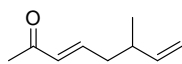
8. Predict the product of the following rearrangement.



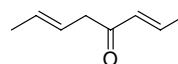
A



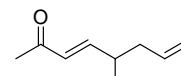
B



C

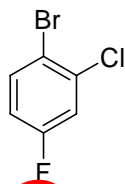
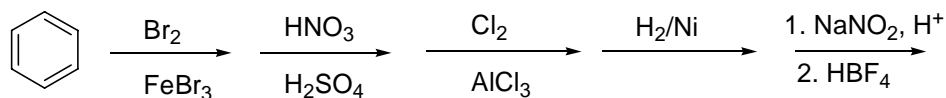


D

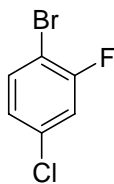


E

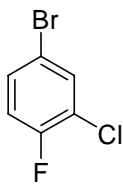
9. Predict the product of the following reaction sequence.



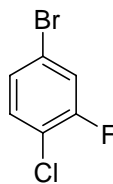
A



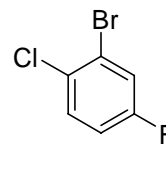
B



C

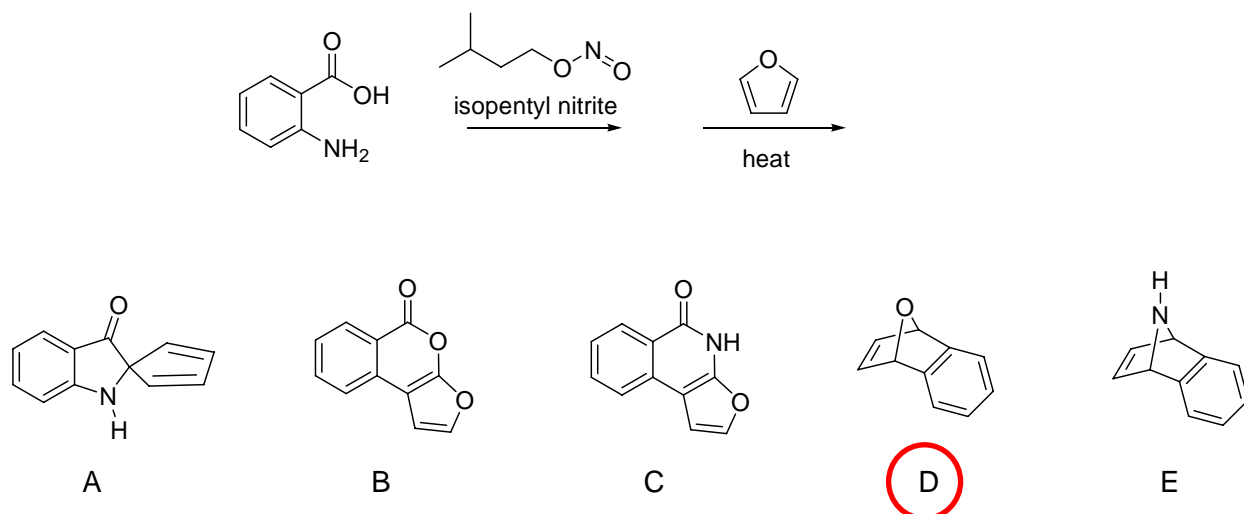


D

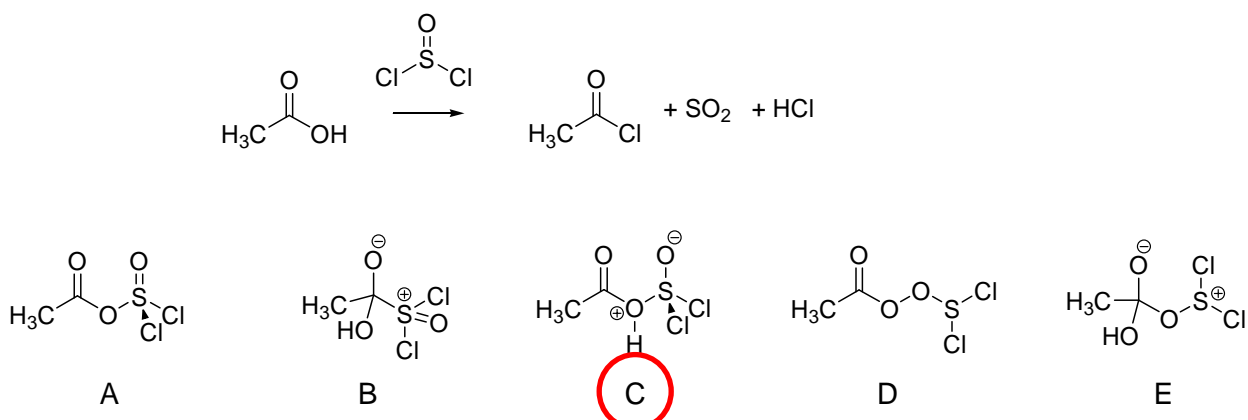


E

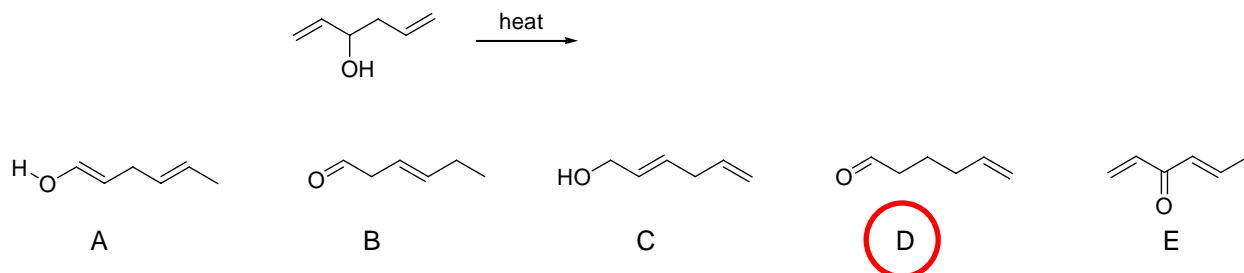
10. The compound isopentyl nitrite is a source of  $\text{NO}^+$  ions and will react with an amine to generate a diazonium cation. Predict the product of the following reaction sequence.



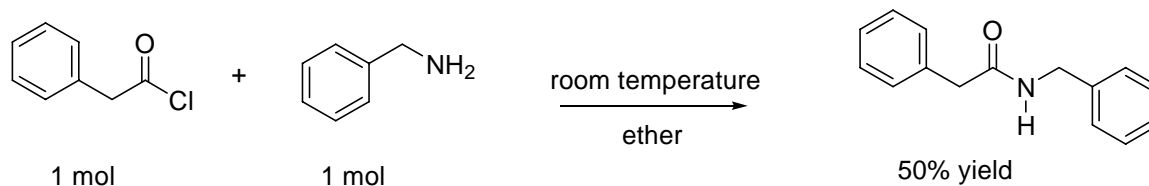
11. A student was asked to write a mechanism for the synthesis of an acid chloride. Choose an appropriate first intermediate.



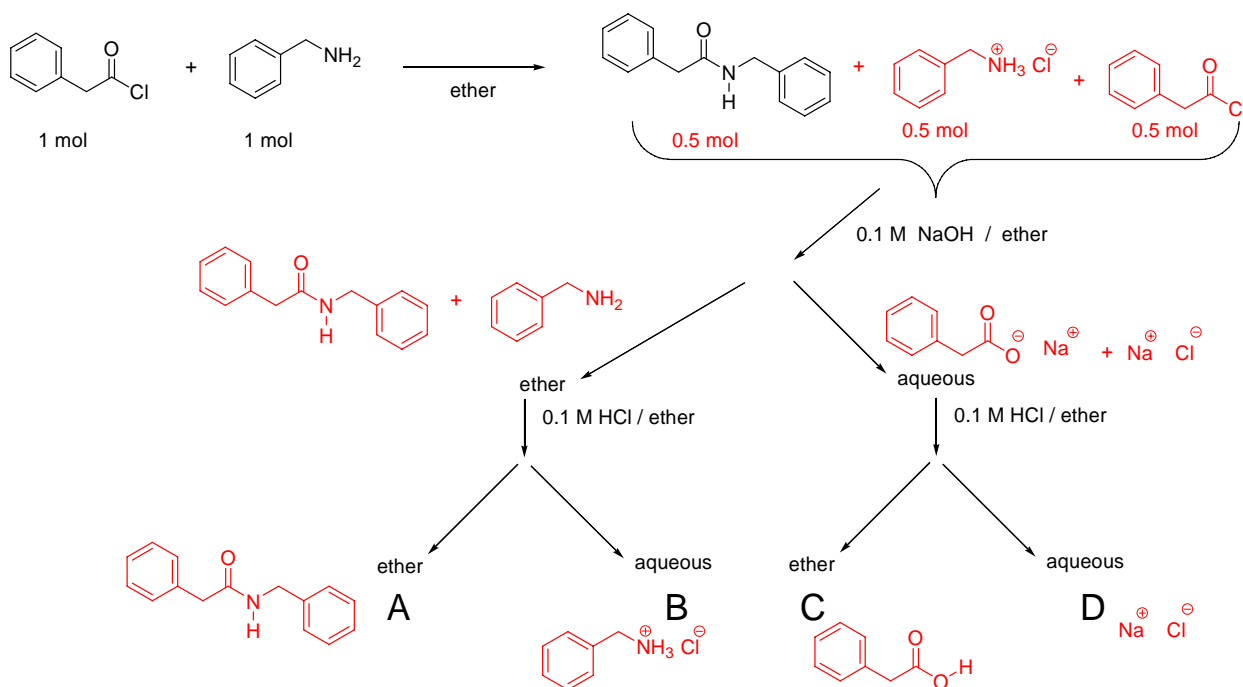
12. Predict the product of the following rearrangement.



13. A student in the lab attempted the following amide synthesis.

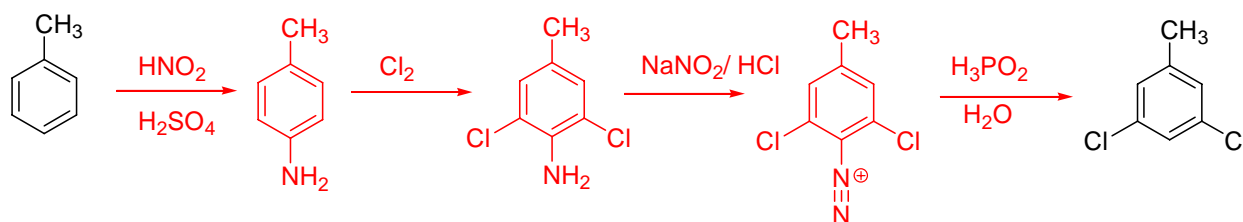


Unfortunately the yield was only 50 percent. At the end the reaction mixture was subjected to an extraction (separation) scheme as shown. The scheme yielded four flasks labeled, A, B, C, and D. Identify the contents of each flask. Draw structures as needed. **Hint:** The yield was only 50%, so consider what happens to the left over starting reagents.

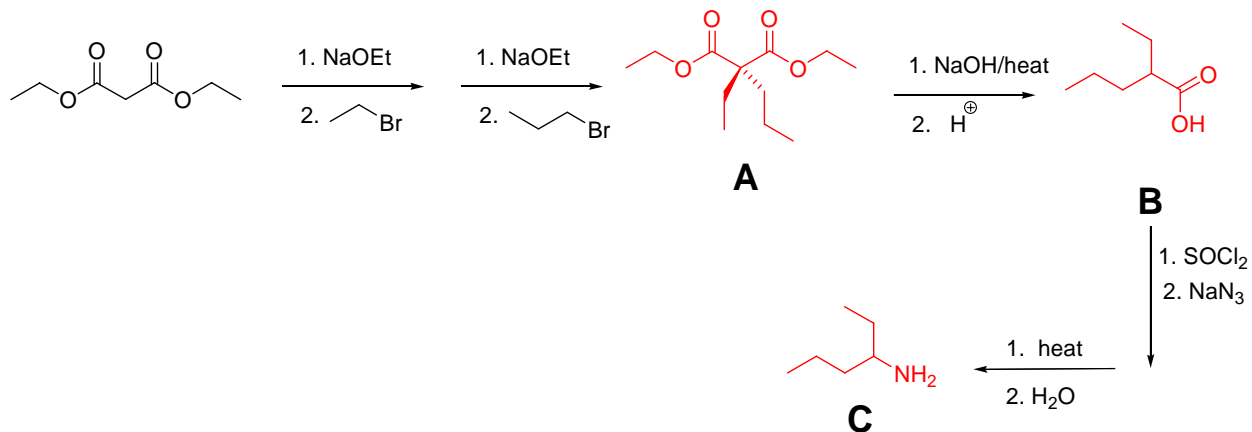


Identify the contents of each flask. Draw structures as needed.

14. Give a synthesis of 3,5-dichlorotoluene from toluene.



15. Identify compounds **A**, **B** and **C** in the following reaction sequence.



16. **Pregabalin** is an anticonvulsant drug used for neuropathic pain.

Propose a synthesis of pregabalin. Your carbon containing starting materials must have **five** carbons or less.

