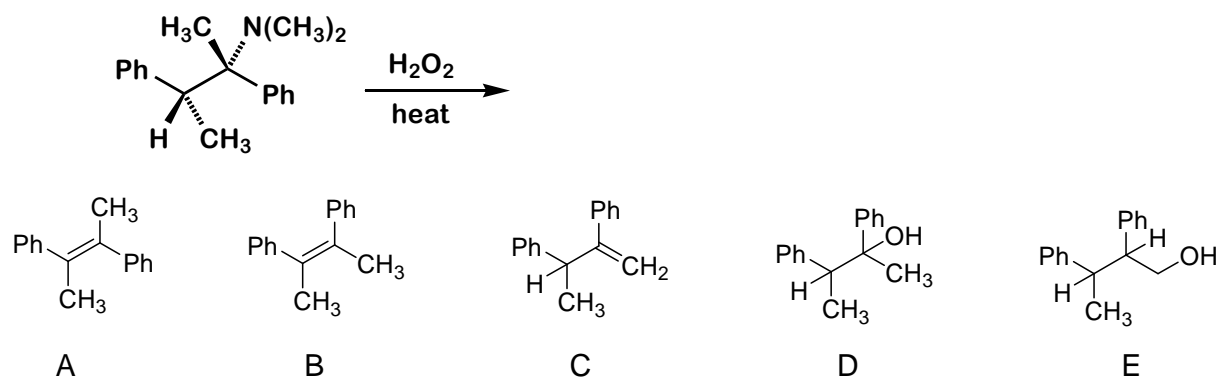
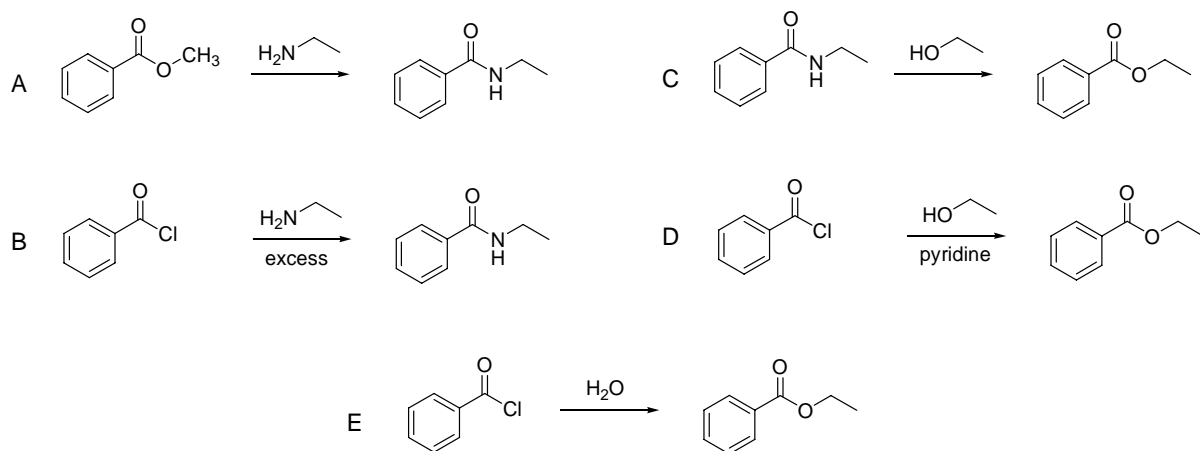


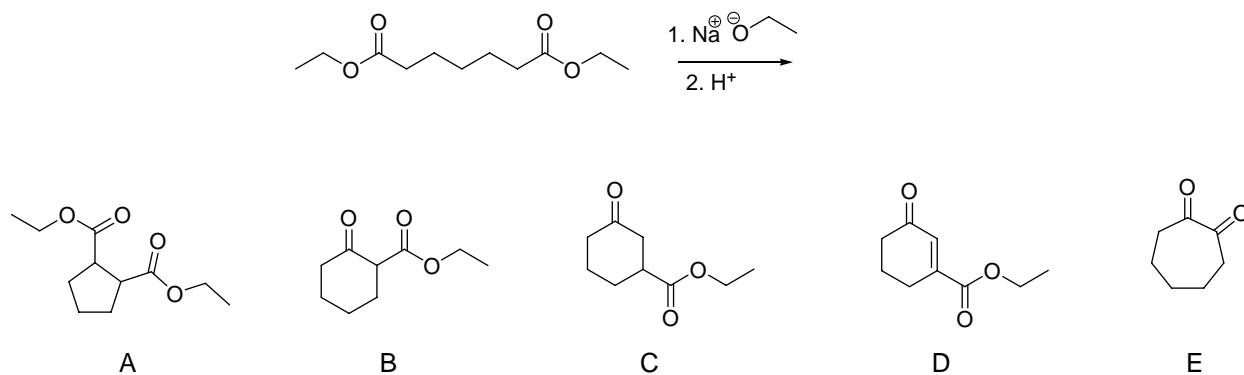
1. Predict the product of the following reaction.



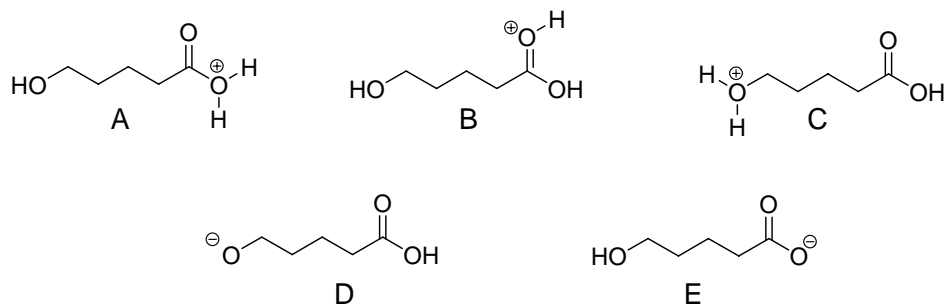
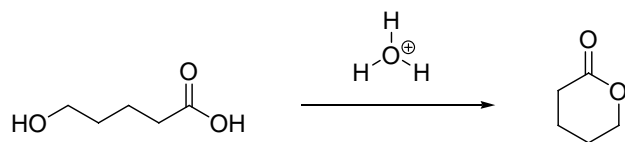
2. Which one of the following reactions would be the most likely to fail?



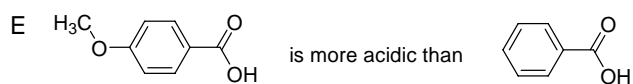
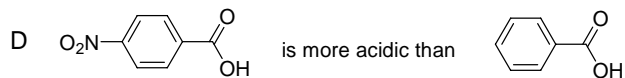
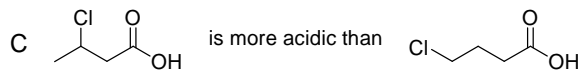
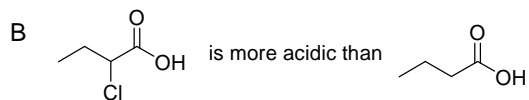
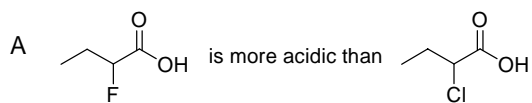
3. Predict the product of the following reaction.



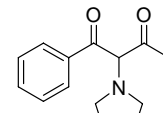
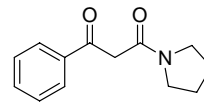
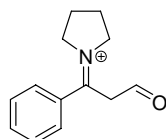
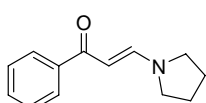
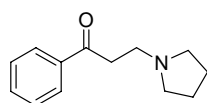
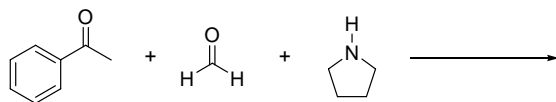
4. A student was asked to draw a mechanism for the following reaction. Choose the most appropriate first intermediate.



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



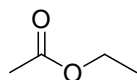
6. Predict the product of the following Mannich reaction.



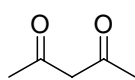
7. Which of the following compounds would be the most acidic? (Which would have the lowest  $pK_a$  value?)



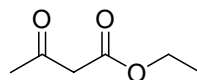
A



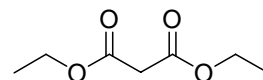
B



C

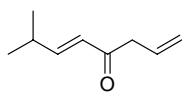
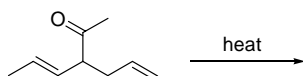


D

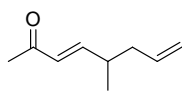


E

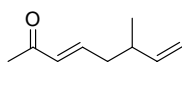
8. Predict the product of the following rearrangement.



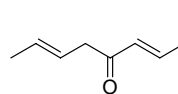
A



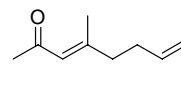
B



C

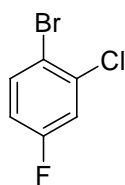
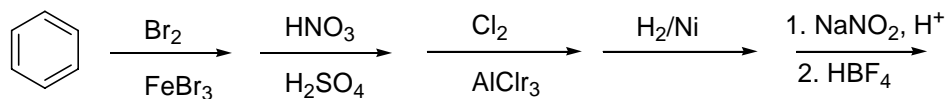


D

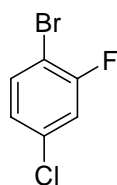


E

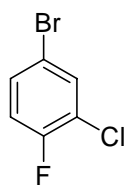
9. Predict the product of the following reaction sequence.



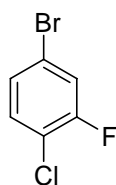
A



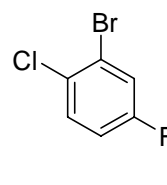
B



C

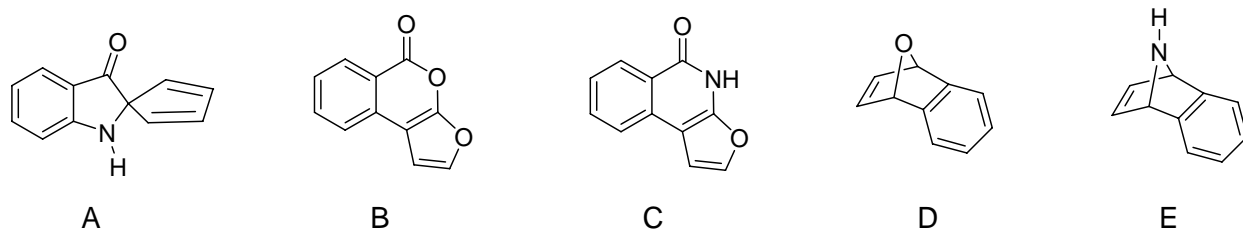
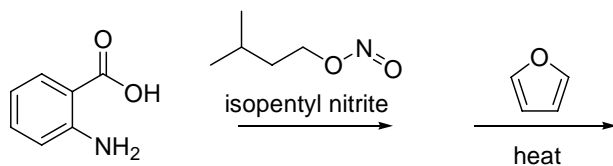


D



E

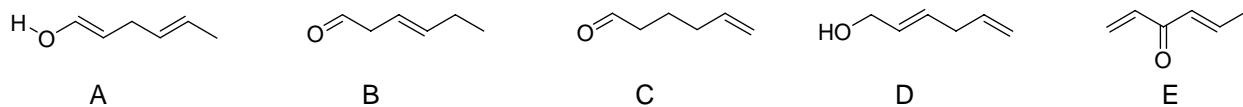
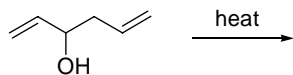
10. The compound isopentyl nitrite is a source of  $\text{NO}^+$  ions and will react with an amine to generate a diazonium cation. Predict the product of the following reaction sequence.



11. Which of the following reactions should not be considered a pericyclic reaction?

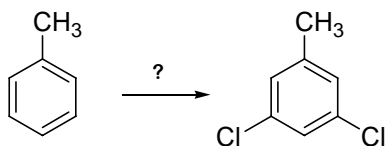
- The Diels Alder reaction
- The Claisen rearrangement
- Grignard reaction with a ketone
- The Cope rearrangement
- Decarboxylation of a  $\beta$ -ketoacid

12. Predict the product of the following rearrangement.



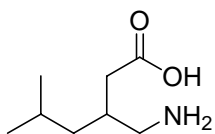


15. Give a synthesis of 3,5-dichlorotoluene from toluene.



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

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



**Pregabalin**