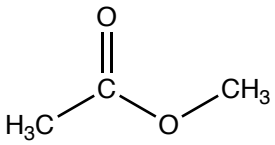
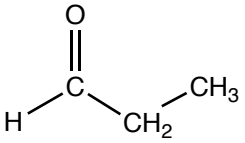
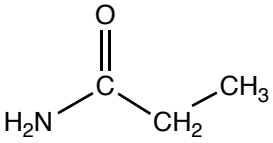
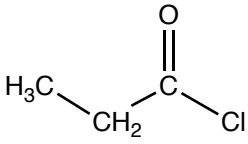
Name _____ Test 3 (4/25)
CHEM 0203 (Organic) Spring 2025

1. (12 pts.) Identify the functional groups in the following molecules (be more specific than "carbonyl").





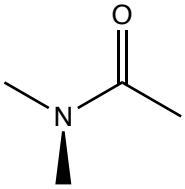




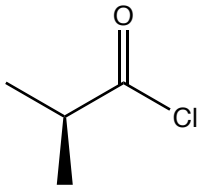
_____ _____ _____ _____

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

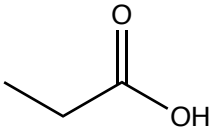
2. a. (5 pts.) Which of the following is more reactive toward nucleophilic acyl substitution?
b. (5 pts.) Explain your choice.



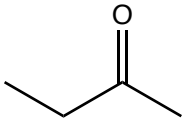
or



3. (12 pts.) Carboxylic acids undergo nucleophilic substitution reactions when they react with nucleophiles, whereas ketones undergo nucleophilic addition reactions. Explain why carboxylic acids do substitution reactions whereas ketones do addition reactions.

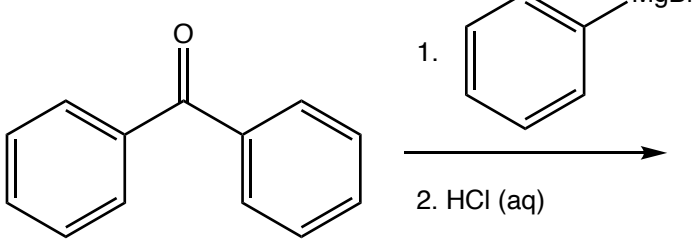


propanoic acid

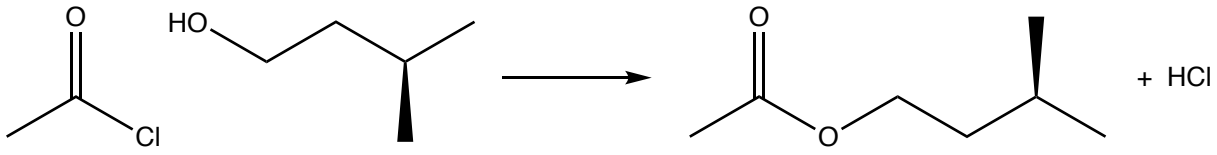


methyl ethyl ketone

4. (6 pts.) Predict the products for the following two step reaction sequence (list organic and inorganic/ionic products).

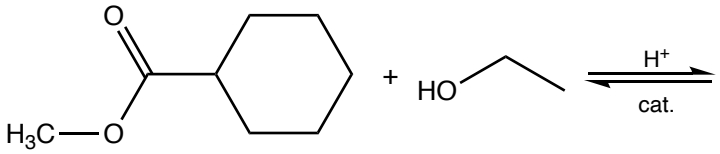


5. (10 pts.) The following reaction occurs rapidly without a catalyst. Draw a mechanism that shows the how the product is formed. Remember to draw the intermediate(s) and electron movement arrows that show bonds breaking and forming.

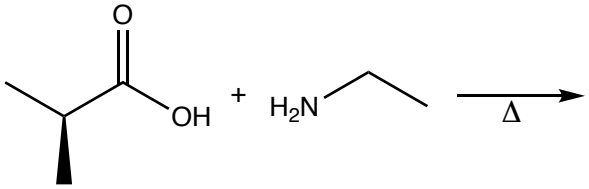


(6 pts. ea.) Predict the products of the following nucleophilic acyl substitution reactions.

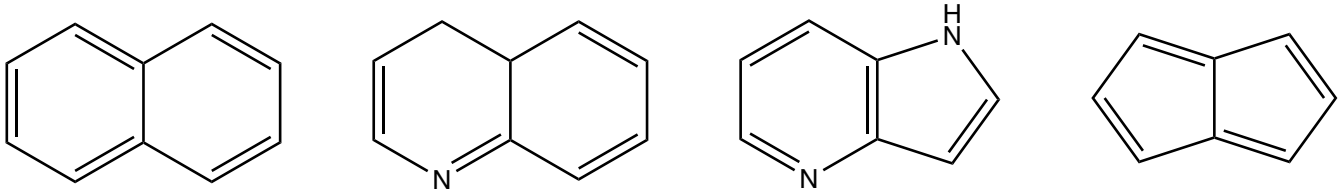
6.



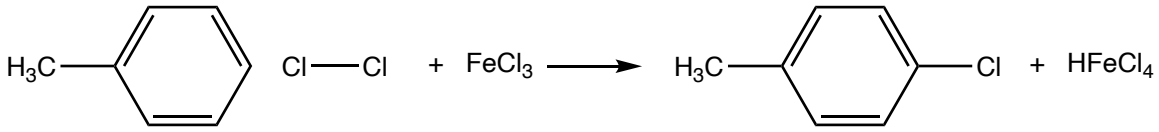
7.



8. (12 pts.) Identify the following molecules as aromatic, antiaromatic, or neither.

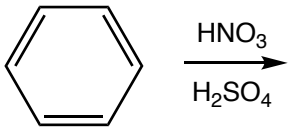


9. (10 pts.) Draw a mechanism that shows the how the product is formed in the following reaction. Remember to draw the intermediate(s) and electron movement arrows that show bonds breaking and forming.

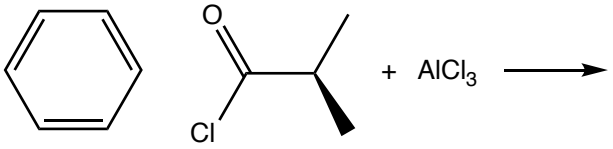


(6 pts. ea.) Predict the organic products of the following reactions.

10.



11.



12. (8 pts.) Carbonyl groups deactivate benzine rings toward electrophilic aromatic substitution. Draw **one** resonance contributor that demonstrates how the carbonyl group deactivates the benzene ring.