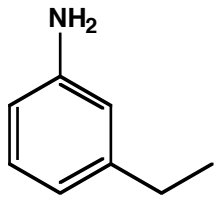
JASPERSE CHEM 350 TEST 4 VERSION 3
Conjugation, Aromaticity, Electrophilic Aromatic Substitution

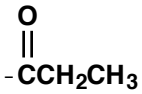
1. Provide Either the Name or the Structure for the Following Chemicals. (6 points) (3 minutes)

a. Furan

b. p-nitrobenzoic acid

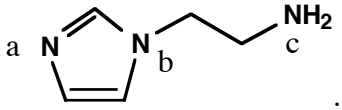
c. 

2. For the following substituents, classify each as 1) electron-donating or electron-withdrawing ["D" or "W"], 2) as activating or deactivating ["Act" or "Deact"], and as 3) ortho-para directing or meta directing ["o/p" or "m"]. (6 points) (2 minutes)

$-OCH_3$  $-CH_3$ -Cl

1. D or W
2. Act or Deact
3. o/p or m

3. The molecule below has 3 different nitrogens. For each of the nitrogens, classify the hybridization of the nitrogen atom, the hybridization of the nitrogen's lone pair, and whether the basicity of the nitrogen is "normal" or "low". (6 points, 2 min)



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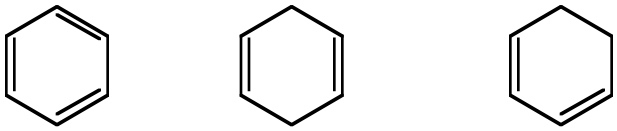
	Lone-Pair Hybridization
N^a	
N^b	
N^c	

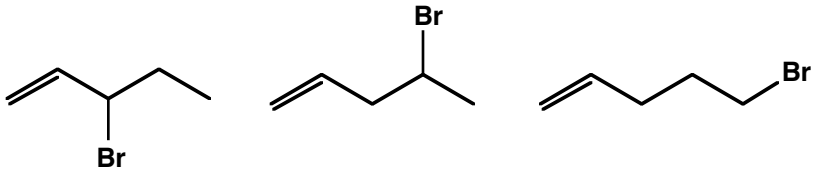
4. Rank the reactivity (rates!) of the following sets of molecules toward the reagents shown, 1 being most reactive, 2 being middle, and 3 being least reactive. (10 points) (6 minutes)

Reagent	Molecules Being Compared

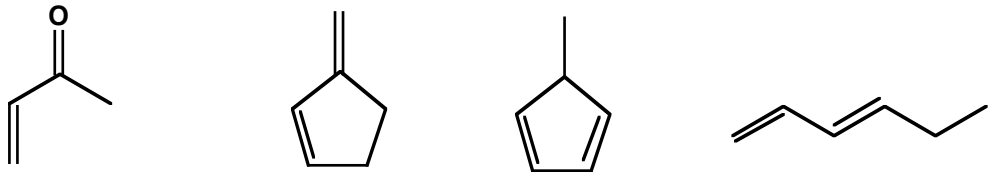
a. H_2, Pt



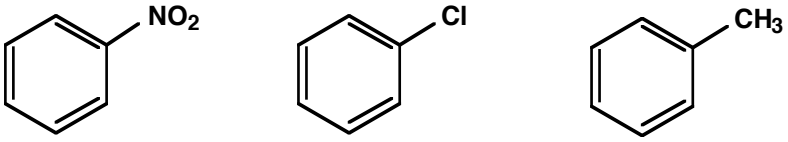
b. H^+, H_2O (S_N1/E1)



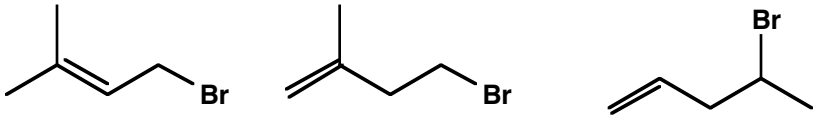
c.



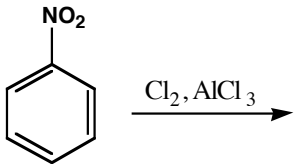
d. HNO_3, H_2SO_4

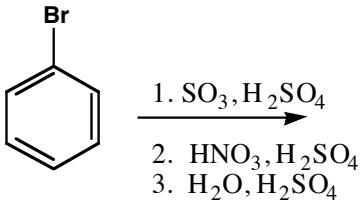


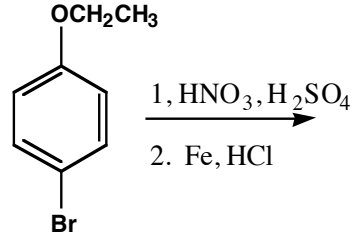
f. NaOMe
(S_N2 reactivity)

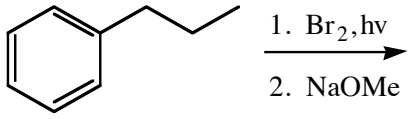


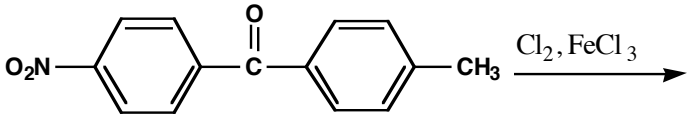
5. Draw the major product for each of the following reactions. (3 points each, 21 total, 7 minutes)

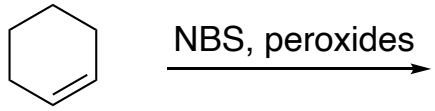
a. 

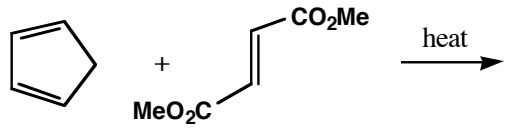
b. 

c. 

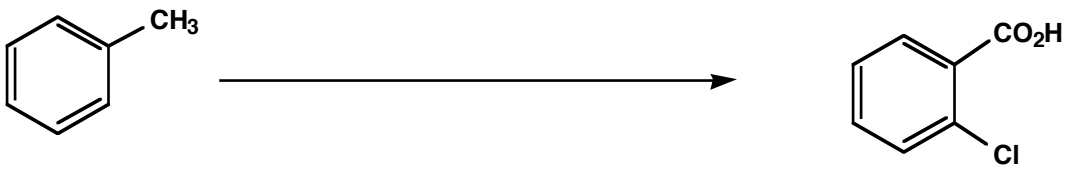
d. 

e. 

f. 

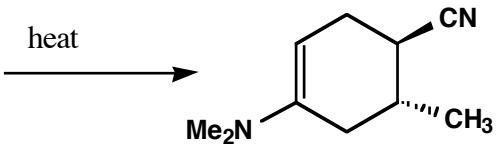
g. 

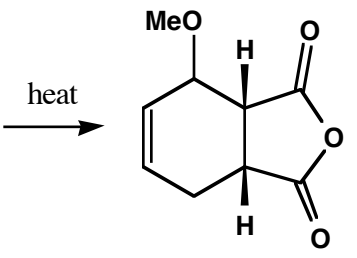
6. Provide reagents for the following transformations. (5 points each, 10 total, 6 minutes)

a. 

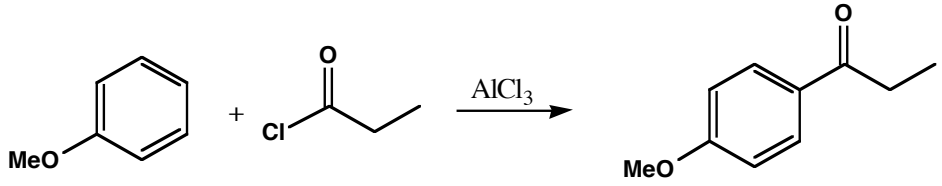
b. 

7. Daw the diene and dienophile from which the following Diels-Alder products would have come. (3 points each, 6 total, 2 minutes)

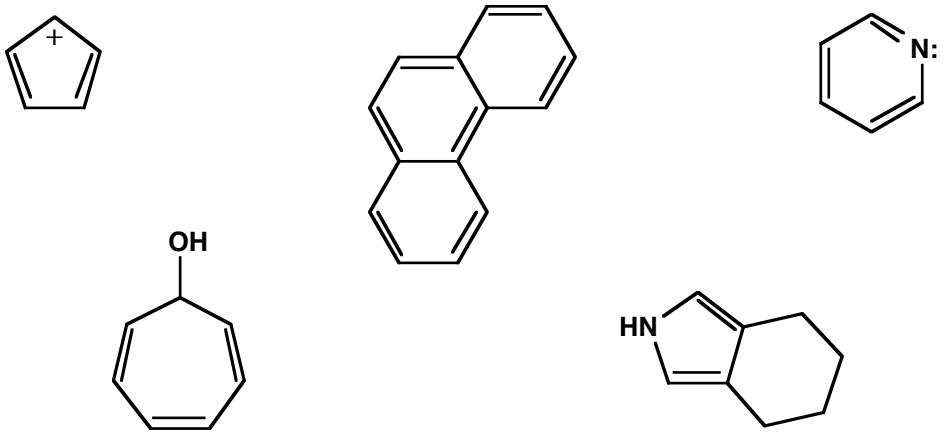
a. 

b. 

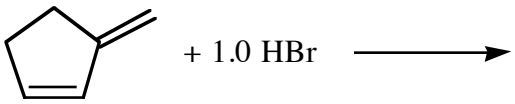
8. a. Draw the mechanism for the formation of the major product shown, and identify the "**slow**" step in the reaction. (6 points, 5 minutes).
b. Also draw all 4 resonance structures for the cation intermediate in the reaction. (4 points)



10. Circle the aromatic molecules: (6 points) (3 minutes)



9. Draw the major product or products that would result from the following reaction, and write either "**chiral**" or "**achiral**" and "**optically active**" or "**racemic**" by each product. Draw a mechanism for the reaction, and identify the "**slow**" step in the reaction. (8 points, 5 min)



9. Provide a synthesis for the following molecule, starting from benzene and anything else you like. (7 points, 5 min)