Organic Chemistry c3444y

1st Hour Exam

Wednesday, Feb. 13, 2002
Prof. Leighton

Name:_____ **ID#**_____

Signature:_____

- Write your name on every page.
- The exam is 5 pages long (*not* including this one). Please make sure you have all of the pages.
- Write complete ***but succinct*** answers. **Good Luck!**

Question 1 (20 pts): _____

Question 2 (20 pts): _____

Question 3 (20 pts): _____

Question 4 (20 pts): _____

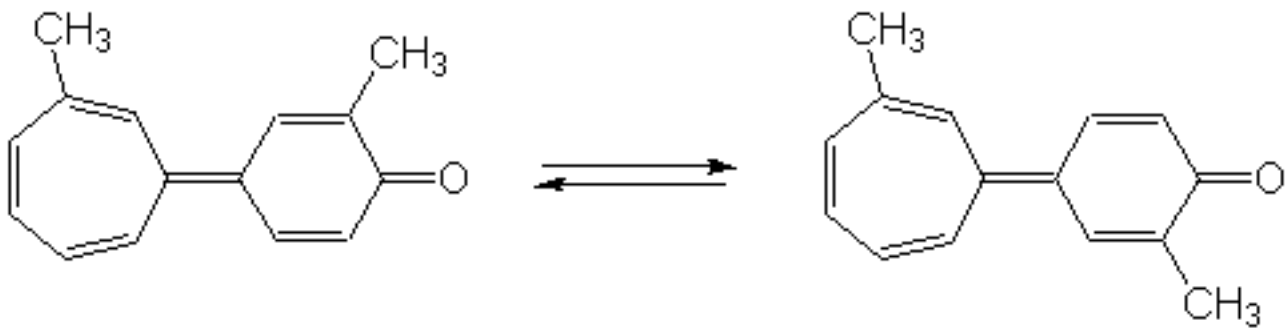
Question 5 (20 pts): _____

Total (100 pts):_____

Name: _____

1. a. (10 pts) Demonstrate the use of the Frost circle method to determine whether or not the illustrated compound is aromatic or antiaromatic.

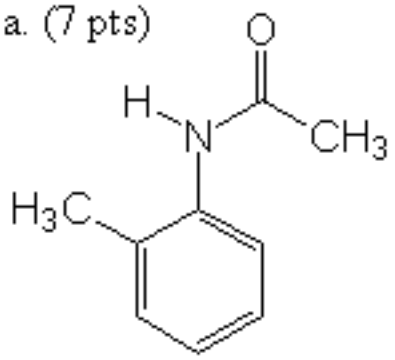
b. (10 pts) It has been observed that the following molecule undergoes unusually facile rotation about the central double bond, whereas "normal" double bonds will not rotate in such a manner. Using resonance structures, provide a simple explanation for this phenomenon.



Name: _____

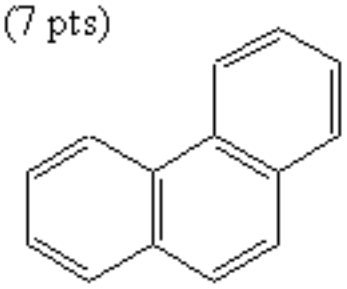
2. Predict the major product, if any, of the following reactions:

a. (7 pts)



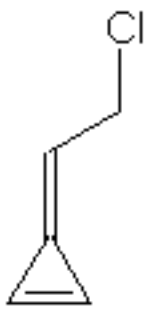
$\xrightarrow[2.\ KOH,\ H_2O]{1.\ Br_2,\ FeBr_3}$

b. (7 pts)



$\xrightarrow{Br_2}$

c. (6 pts)

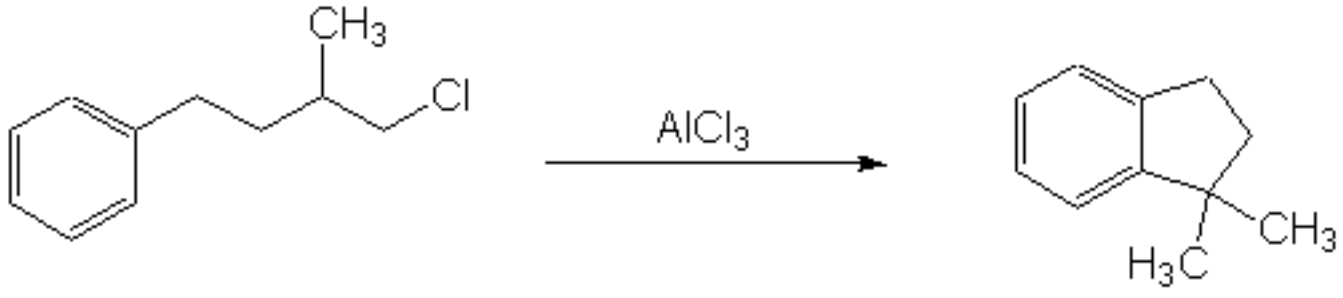


$\xrightarrow[(\text{Abstracts } Cl^-)]{SbCl_5}$

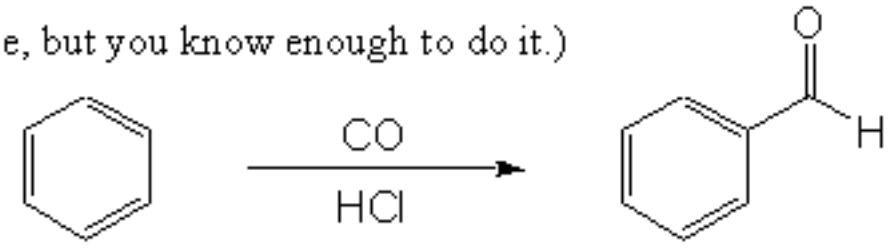
Name: _____

3. Provide detailed mechanisms for the following transformations:

a. (10 pts)

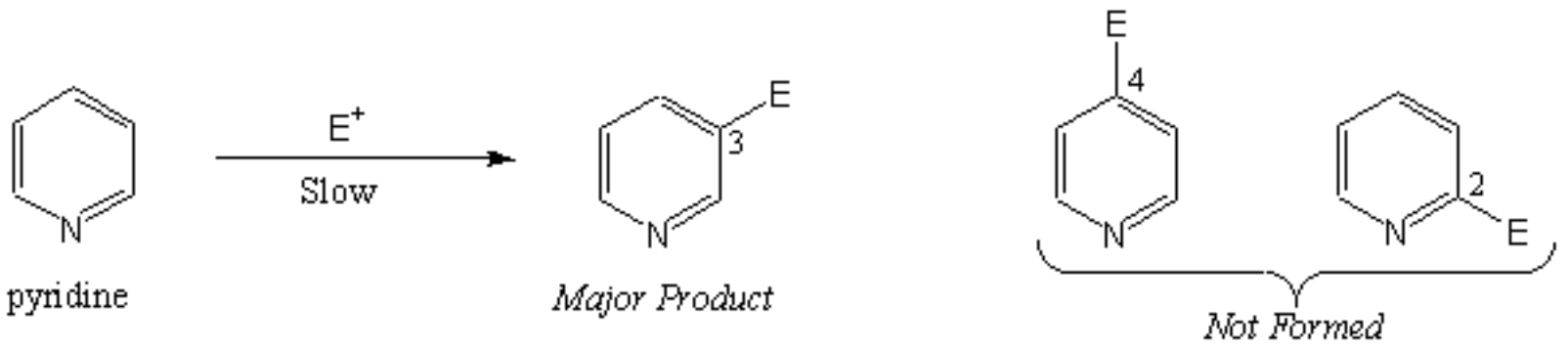


b. (10 pts) (You have not seen this one, but you know enough to do it.)



Name: _____

4. Pyridine can undergo electrophilic aromatic substitution. When it does, the reaction is slower than the corresponding reaction with benzene itself, and is quite selective for the 3 position rather than the 2 or 4 positions.



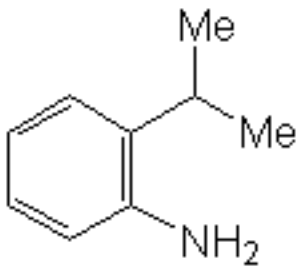
a. (7 pts) Draw the resonance structures for the intermediate arenium ion formed from attack at the 3 position:

b. (7 pts) Draw the resonance structures for the intermediate arenium ion formed from attack at the 2 (or 4) position:

c. (6 pts) What is it that makes attack at the 2 (or 4) position especially slow relative to attack at the 3 position?

Name: _____

5. a. (10 pts) Propose a synthesis of the following compound from benzene and any other reagents that you need.



b. (10 pts) For each of the following electrophilic aromatic substitution reactions draw the expected product in the big box, and indicate in the smaller box whether you would expect the reaction to be faster or slower than the corresponding reaction with benzene.