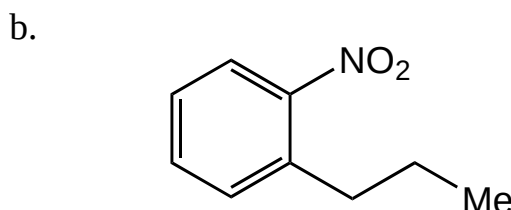
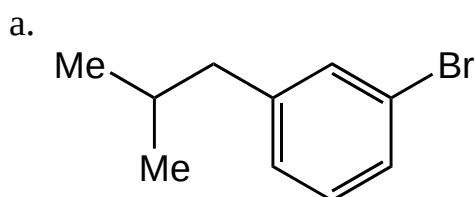


Problem Set 3 - Electrophilic Aromatic Substitution

Due in class Friday, February 12

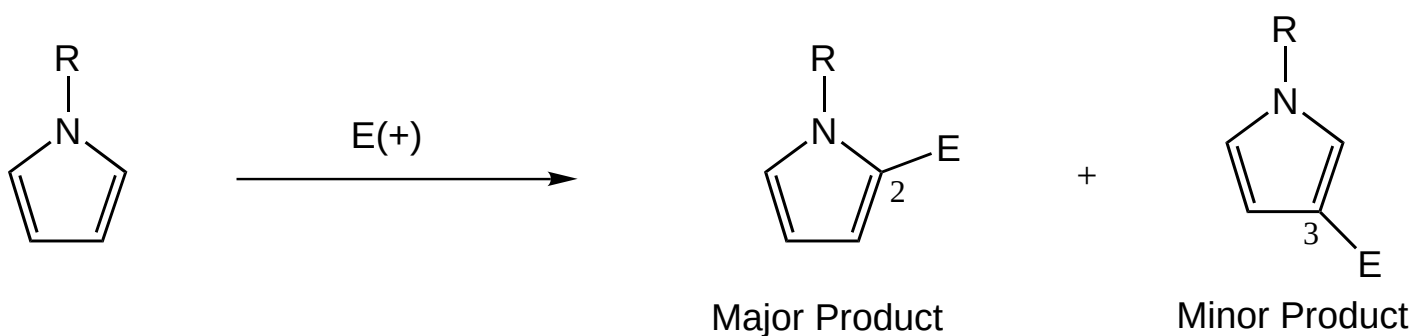
1. Propose syntheses of the following compounds starting from benzene and any other reagents you might need.



2. Here is a question from the final exam two years ago:

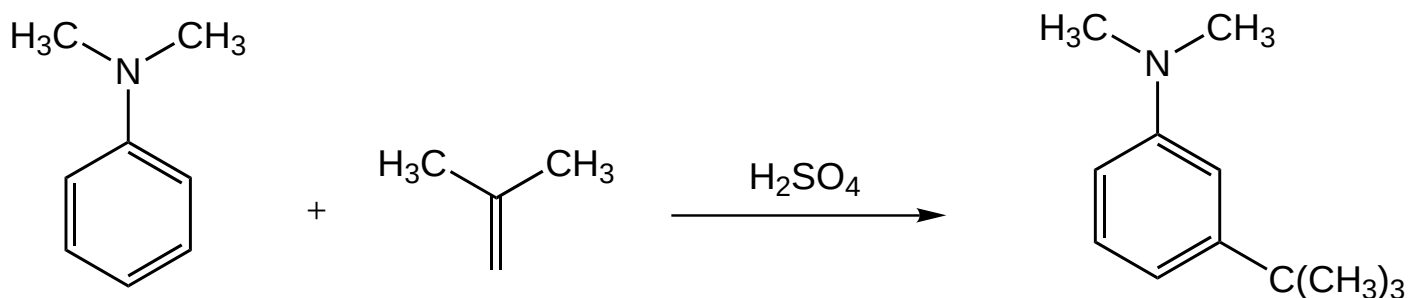
Electrophilic aromatic substitution is possible with aromatic systems other than benzene.

For example, pyrroles will undergo substitution to give the following products ($E(+) = \text{Electrophile}$):



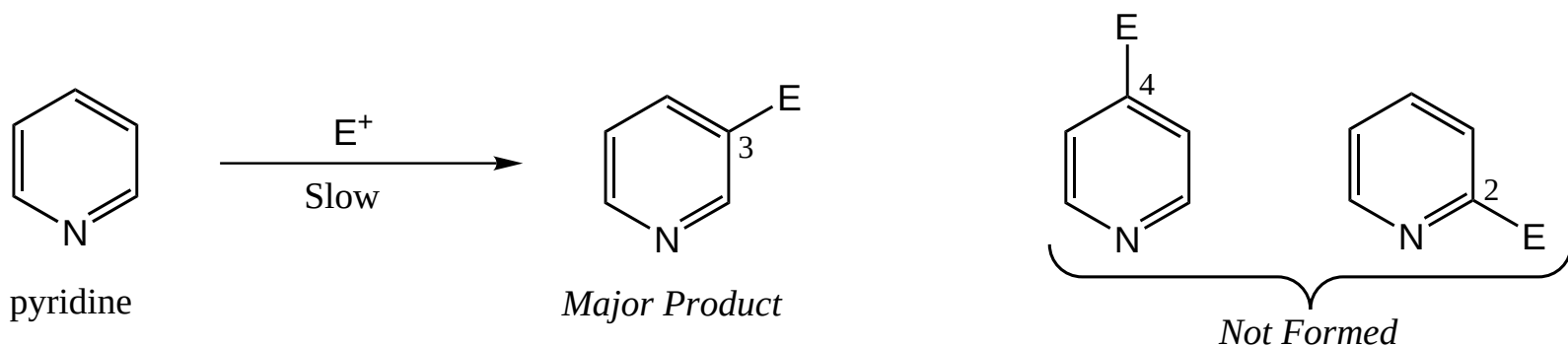
Given that the mechanism is exactly the same as for benzene, use resonance theory to explain the observed preference for substitution at the 2 position.

3. a. Draw a mechanism for the following alkylation reaction:



- b. Why does this reaction proceed to give the *meta* product?!?

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.



- Draw the resonance structures for the intermediate arenium ion formed from attack at the 3 position.
- Draw the resonance structures for the intermediate arenium ion formed from attack at the 2 (or 4) position.
- What is it that makes attack at the 2 (or 4) position especially slow relative to attack at the 3 position?