

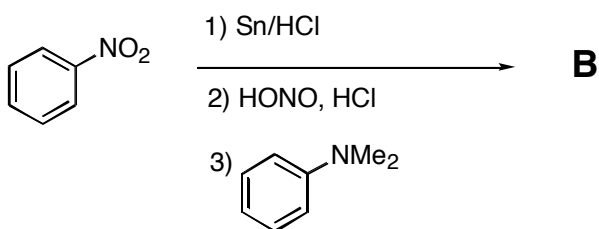
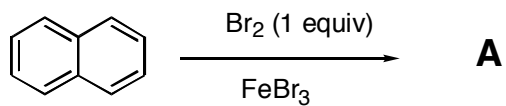
Chem 332
Exam 3
May 11, 2005
Prof Fox
50 minutes
100 points

Show your work in detail

Write your name on every page

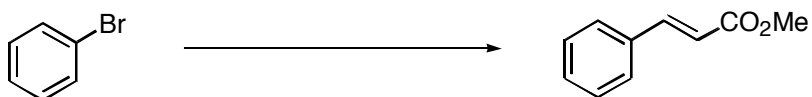
Name_____

1a. Provide structures of the products. Mechanisms are not needed. (4 points each)



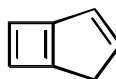
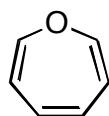
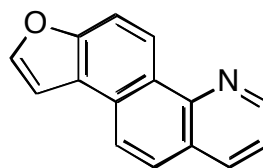
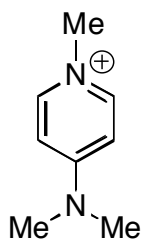
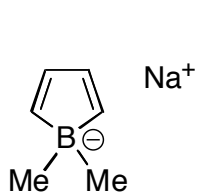
1b. Provide the reagents needed for the following transformations. Mechanisms are not needed.

(4 points each)

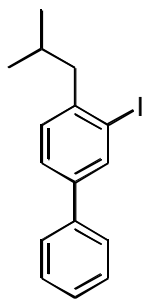


2. Circle the compounds that are aromatic.

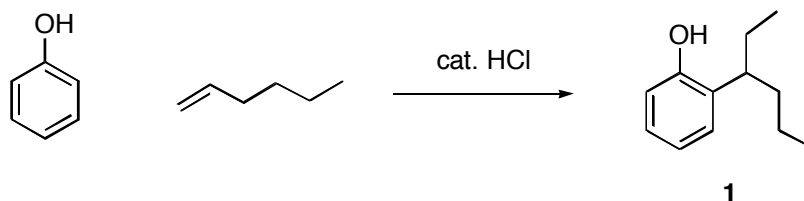
(3 points each)



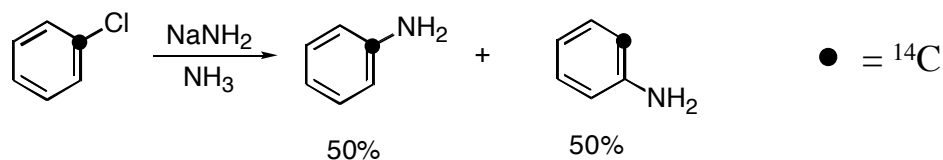
3. Suggest a multistep synthesis, using **benzene** and any other materials that contain **5 carbons or less**. Reagents that do not end up in the product (e.g. PPh₃) may contain more than 5 carbons. (23 points)



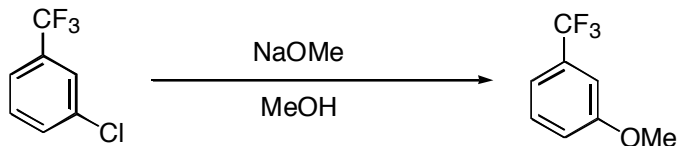
4. Provide a detailed arrow pushing mechanism for the formation of **1**. (note: other products are formed as well, but you only need to account for the formation of **1**) (23 points)



5. Recall the ^{14}C labeling experiment by Jack Roberts that provided evidence for the intermediate benzyne in the mechanism below:



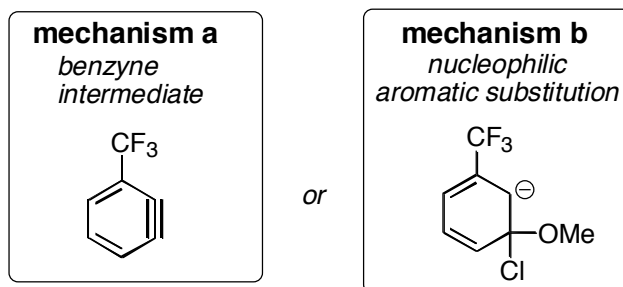
Now consider the reaction shown below.



For this reaction, mechanisms involving two different intermediates are plausible:

- (a) a benzyne mechanism or (b) a nucleophilic aromatic substitution mechanism.

The plausible intermediates are shown below



Suggest a way to distinguish the two mechanisms with a **deuterium labeling experiment** (that is, an experiment in which hydrogen is substituted by deuterium)

Note, *I am not asking you to tell me which mechanism is occurring. Rather, I want you to describe an experiment that could be used to tell the difference.* Explain in detail exactly what you would expect to observe for each mechanism. (23 points)

4. (continued)

Scratch paper

Scratch paper