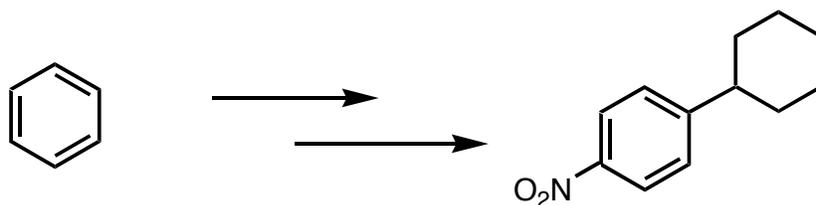
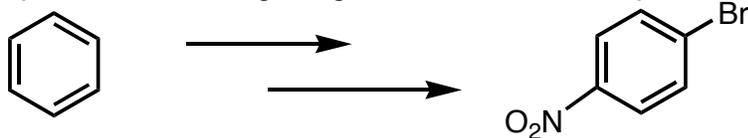


CHEM 5.12

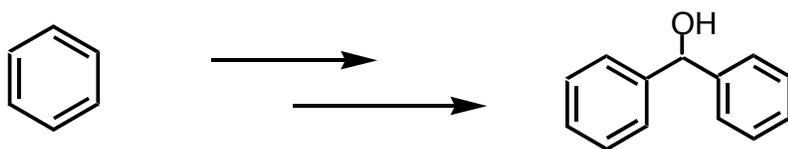
B. Imperiali

PROBLEM SET #9 - Due in Friday May 2, 2003

1. (9 points total) Show the steps necessary for the following transformations. Remember to pay attention to directing effects when you plan your synthesis. Note in some cases it may be impossible to avoid getting mixtures of isomeric products; if this is the case please indicate it.

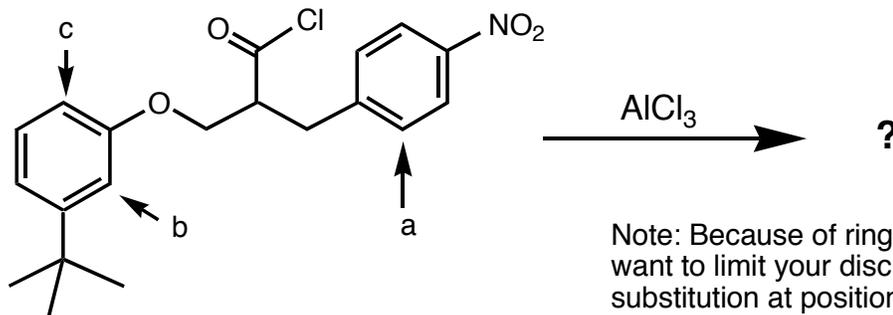


The only other carbon-containing starting material is chlorocyclohexane



The only other carbon-containing starting material is formaldehyde
 $\text{H}_2\text{C}=\text{O}$

2. (6 points). When the compound shown below is treated with aluminum trichloride it undergoes an intramolecular electrophilic aromatic substitution (EAS) reaction. Despite the fact that there are several sites for the EAS cyclization only a single MAJOR product is formed.



Note: Because of ring strain, you will want to limit your discussion to substitution at positions a. b. and c.

a. (4 pts) Deduce the **MAJOR** product of the reaction. In your answer, you must **EXPLAIN** why it is obtained by showing the mechanism of the reaction and the stability of the various intermediates that may be formed in the rate determining step. (You will want to consider both electronic and steric effects.)

b. (2 pts) Construct an energy diagram showing the course of the reaction and the relative stabilities of the starting material, the π complex and the product.

3. (2 points) Would you expect the Friedel-Crafts reaction of (R)-2-chlorobutane to yield an optically active or racemic product?
EXPLAIN your answer by detailing the mechanism of the reaction.

3. (3 points) Give the structures of the intermediates in the following reactions.

