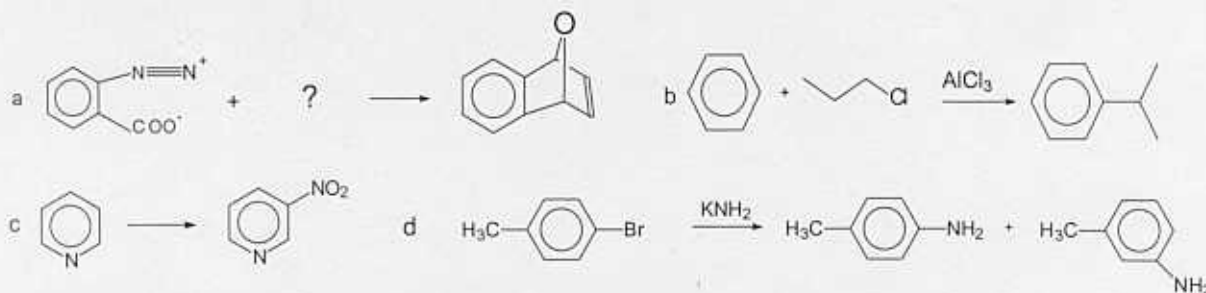


Problem Set Chapters 16, 17

1. The chlorination of n-butylbenzene with chlorine gas under irradiation with ultraviolet light generates $C_{10}H_{13}Cl$. Show a plausible product and a valid reaction mechanism for this reaction!

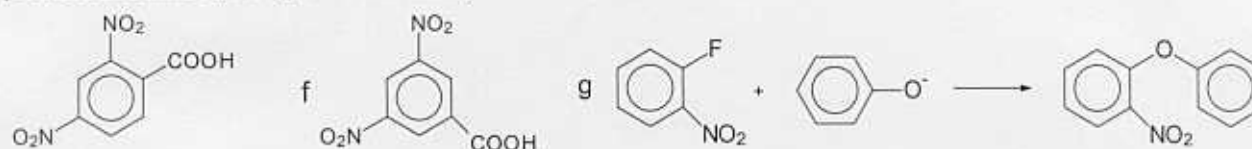
2. When benzenediazonium carboxylate is heated with a suitable diene, the product shown in eq. a is formed in addition to nitrogen and carbon dioxide. Explain!



3. Show a mechanism for the conversion in eq. b. What type of reaction is this?

4. Nitration of pyridine (eq. c) requires very drastic conditions and the nitro group ends up in meta position. Rationalize this!

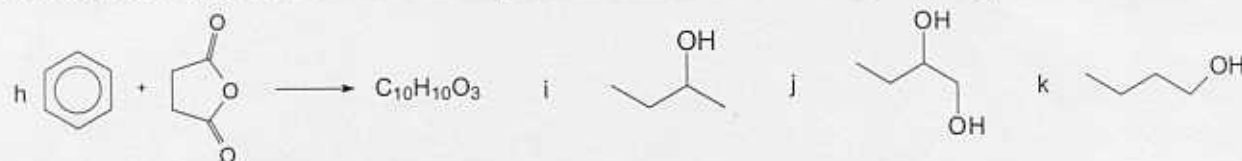
5. Show a plausible mechanism for reaction d, which is carried out in liquid ammonia! (KNH_2 , called potassium amide, is a powerful base)



6. The isomeric compounds e and f can both be prepared from toluene. Outline their synthesis and name the two compounds!

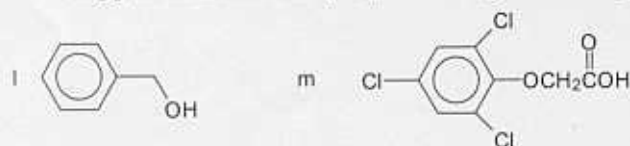
7. Reaction g is remarkable because the fluoride anion acts as a leaving group. Show a detailed mechanism for this reaction; suggest which step is rate-determining (slow) and rationalize why fluoride, in contrast to S_N1 and S_N2 substitutions, is an excellent leaving group in reactions such as g!

8. Suggest a structural formula for the product formed in reaction h. What type of reaction is this?

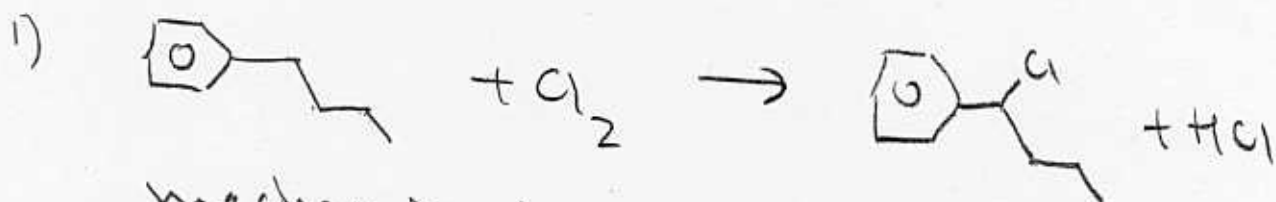


9. Suggest reagents/conditions to convert 1-butene to alcohols i, j, and k!

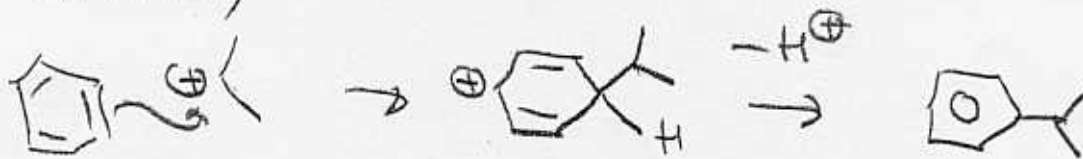
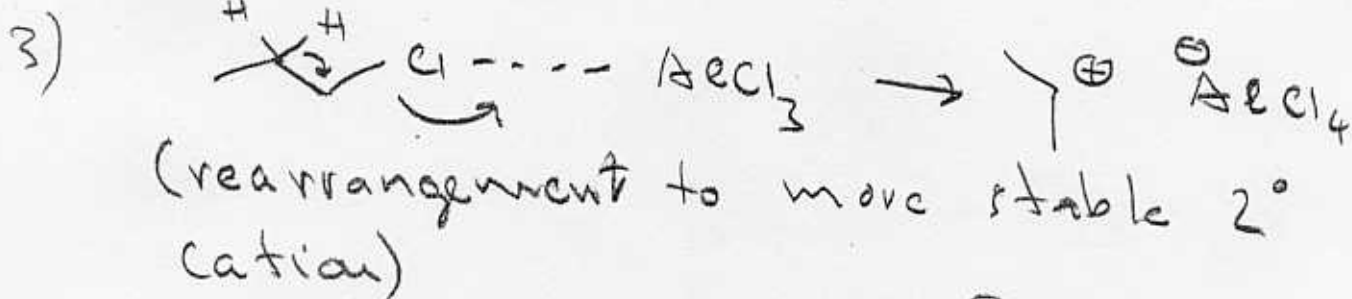
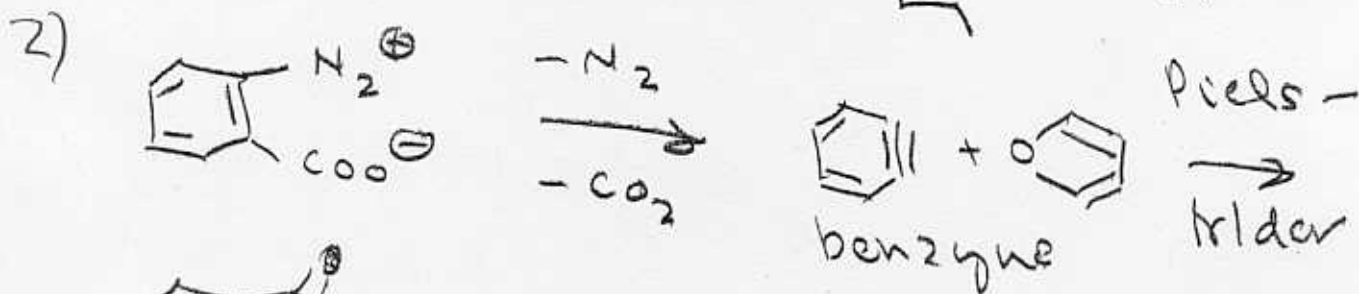
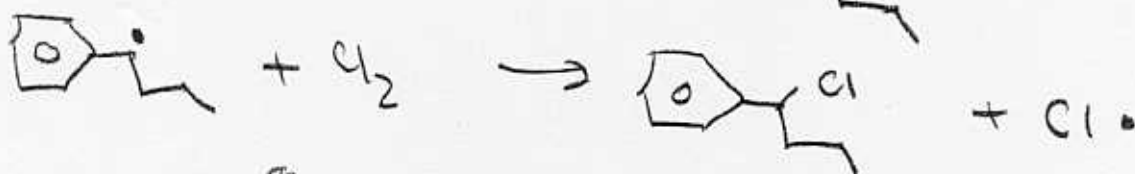
10. Suggest a method to prepare benzyl alcohol l from toluene!



11. Suggest a method for preparing the herbicide 2,4,6-trichlorophenoxyacetic acid m from phenol and chloroacetic acid!



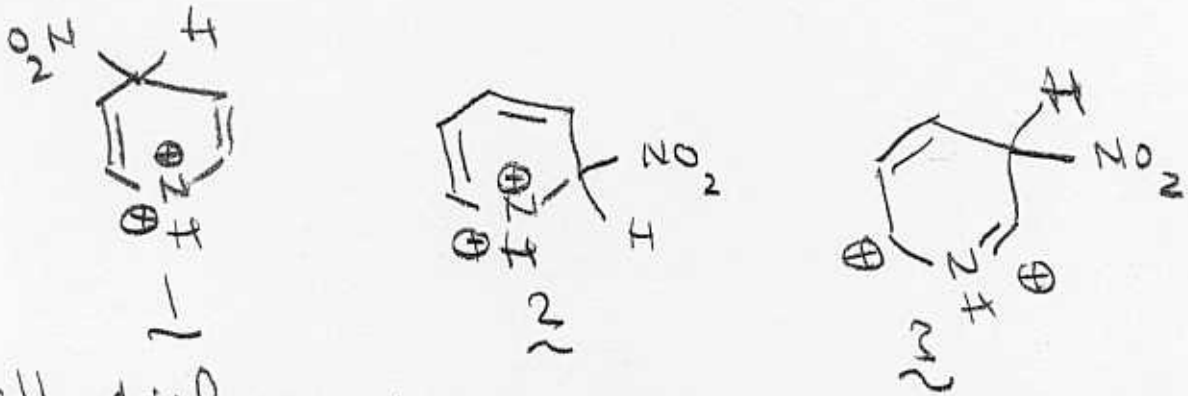
Mechanism:



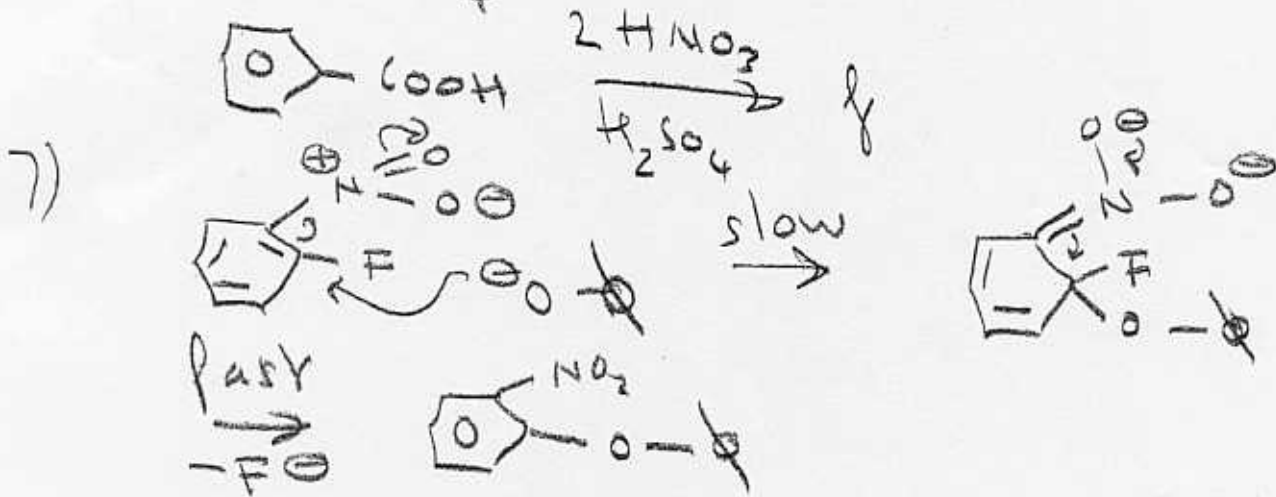
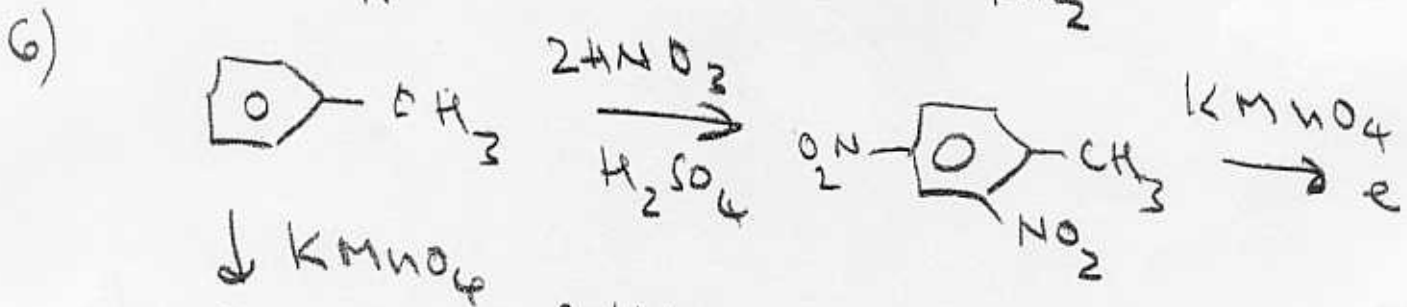
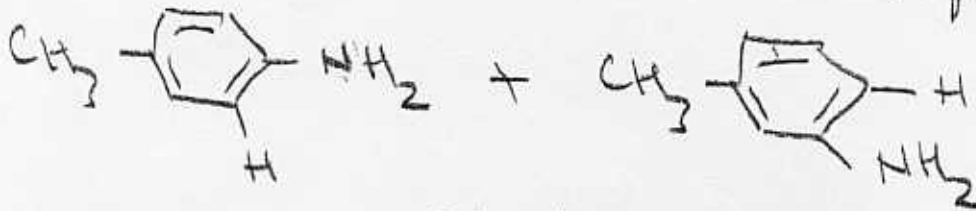
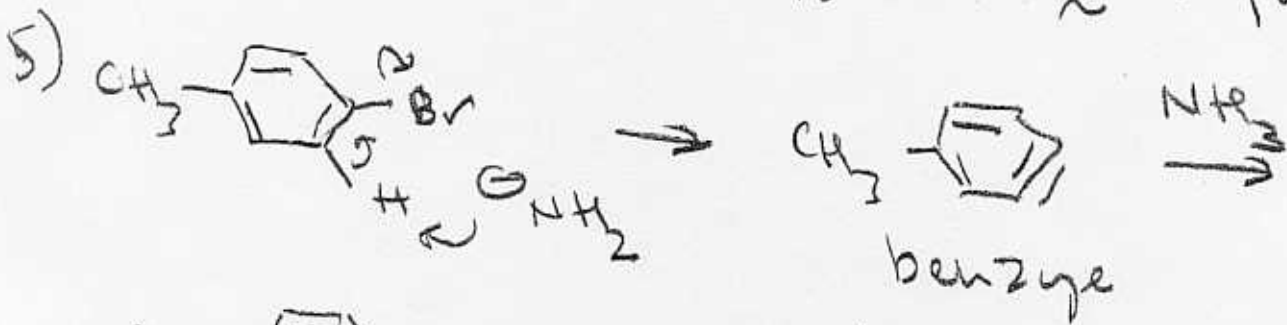
4) Nitrogen is more electronegative than carbon; also, pyridine becomes protonated:

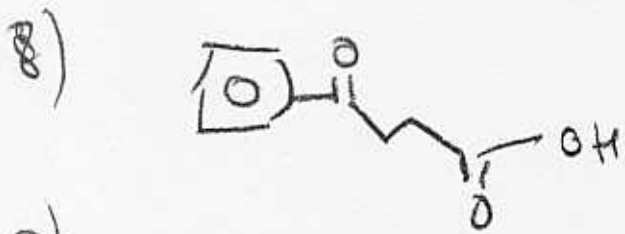


4) cont'd



all disfavored, but 1 and 2 impossible





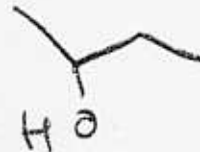
Friedel-Crafts acylation



hydroboration



oxymercuration



mercuration

KMnO4

H2O (cold)

