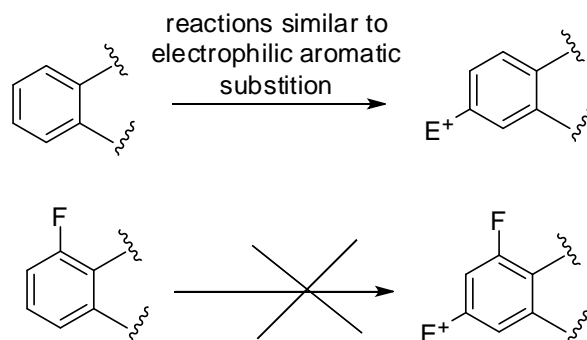


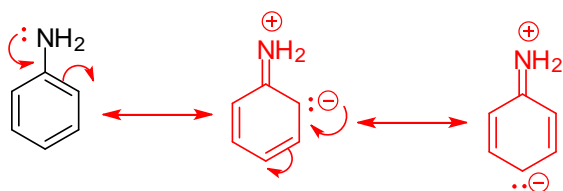
1. Reactivity of aromatic rings is a common problem with many drugs in development. In response to such a problem, medicinal chemists often replace a hydrogen on the aromatic ring with a fluorine atom. Based on our discussion of electronic effects in aromatic rings and your knowledge of fluorine properties, what affect does adding a fluorine have on the aromatic ring?



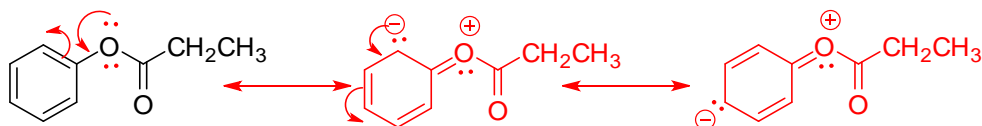
The fluorine atom is the most electronegative atom and consequently it will pull electron density from the ring due to its polar effect. The removal of electron density will make the aromatic ring much less nucleophilic.

2. Although we analyzed reaction intermediates in lecture to understand the regioselective preferences of substituted benzenes in electrophilic aromatic substitution reactions, another way to predict aromatic ring reactivity is to draw resonance forms of the aromatic molecule and predict the sites that will be most electron rich. Apply this practice on the aromatic structures drawn below by drawing resonance structures that show where the following molecules are likely to react.

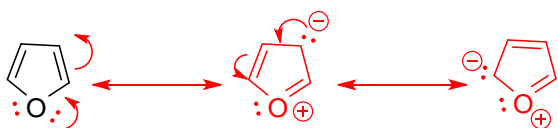
a)



b)

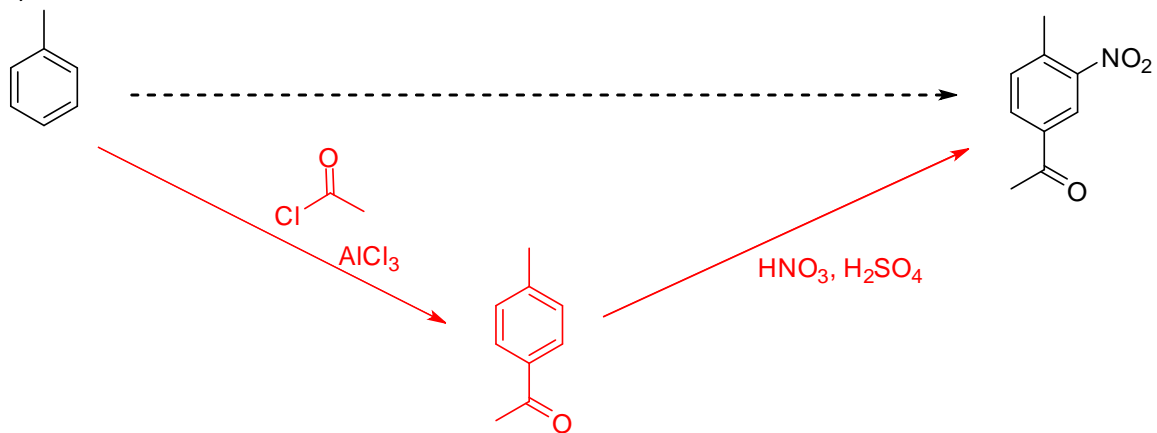


c)

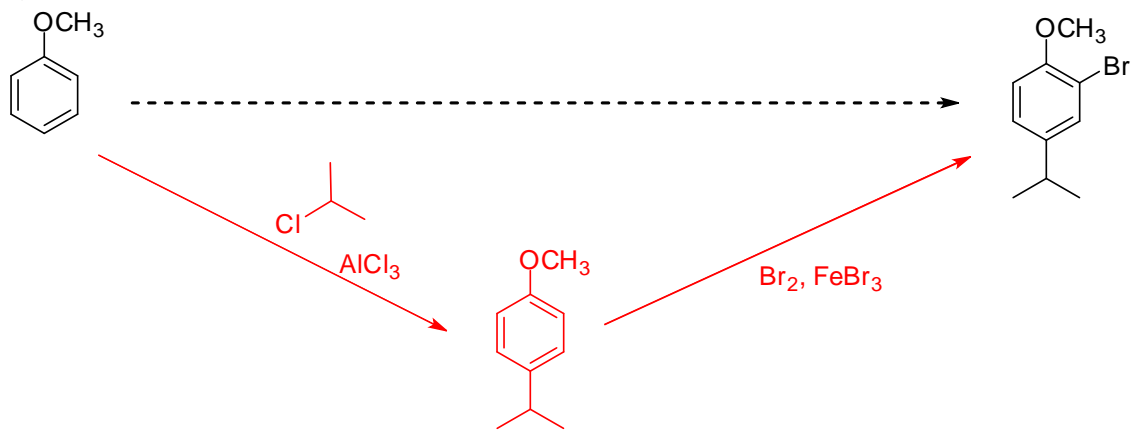


3. Provide a series of reactions to convert the starting material on the left to the product on the right.

a)



b)



c)

