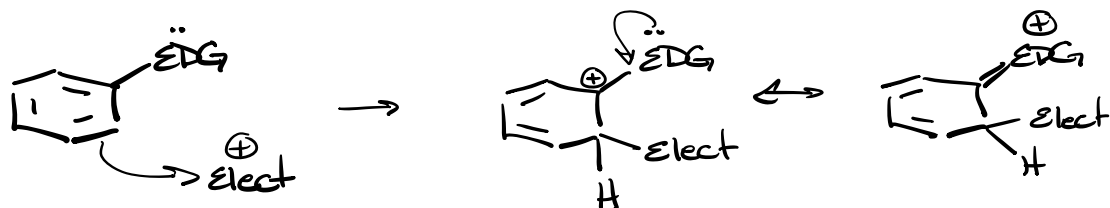
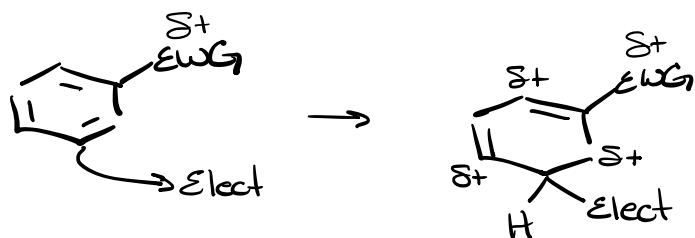


Electrophilic Aromatic Substitution



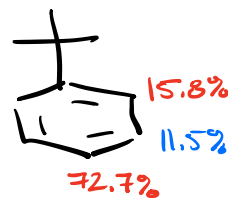
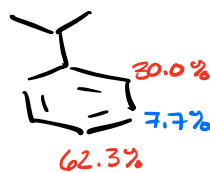
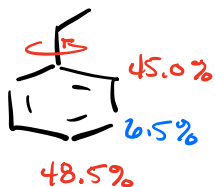
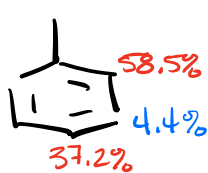
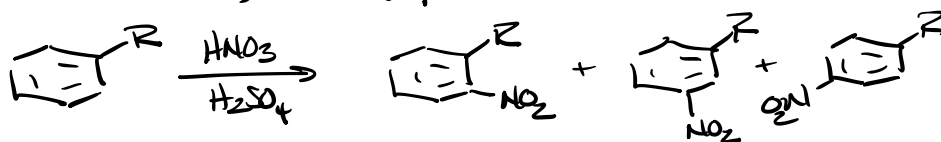
EDG Speed rxn up
& are ortho, para directors



EWG Slow Rxn down
meta directors

With EDG How much ortho vs para do we see?

% of ortho, meta, para of Nitration Rxn

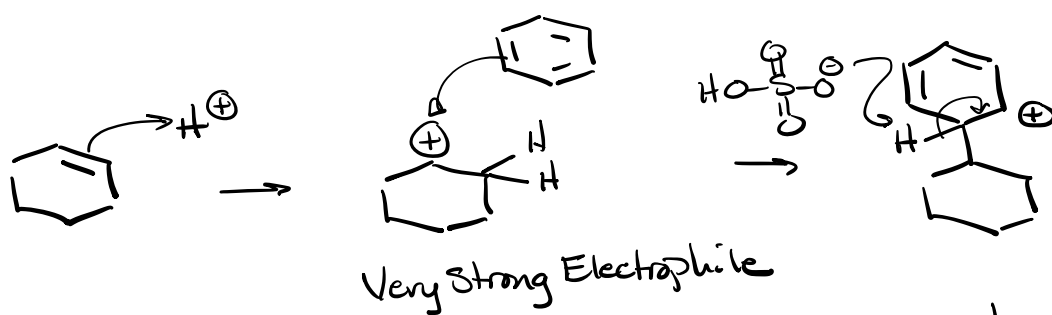
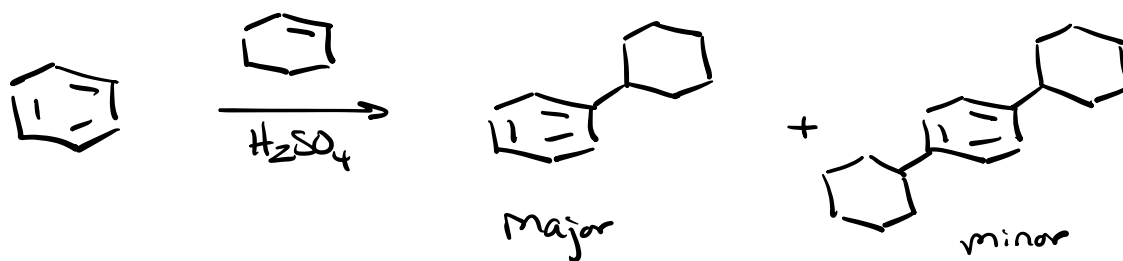


ortho vs. para is governed by sterics

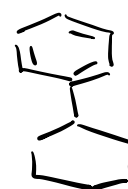
CH_3 or smaller directs into ortho

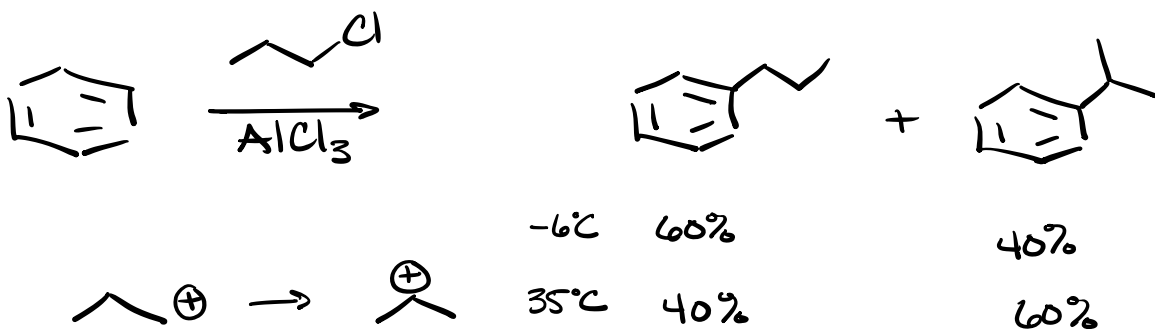
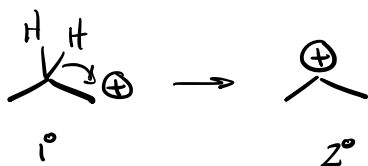
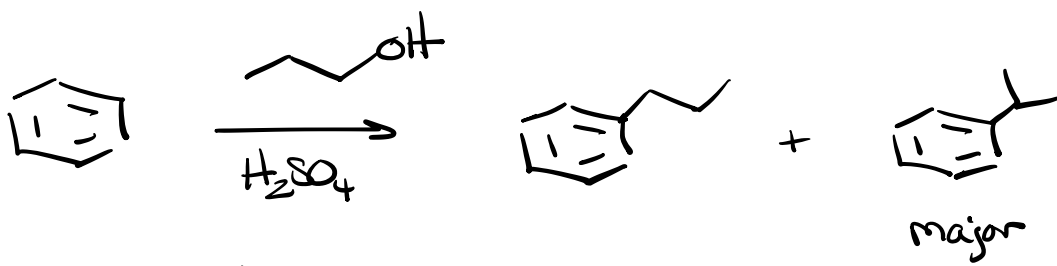
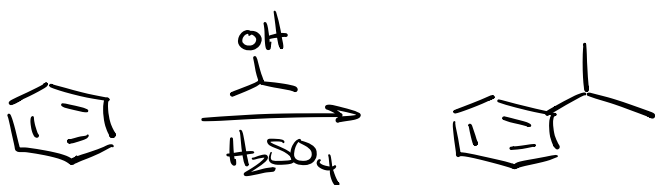
Larger than methyl directs para

⇒ If one of the ortho positions is blocked, then major becomes para, even w/ small directing group.



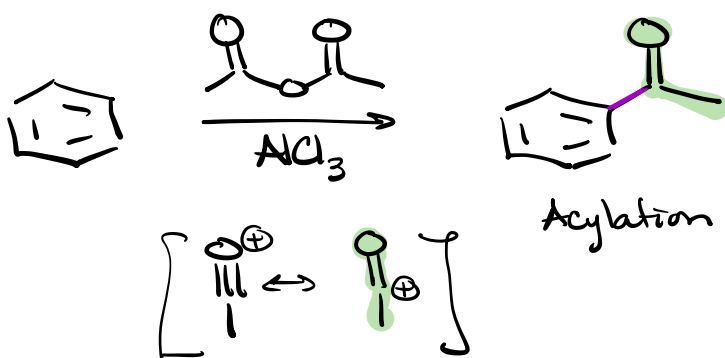
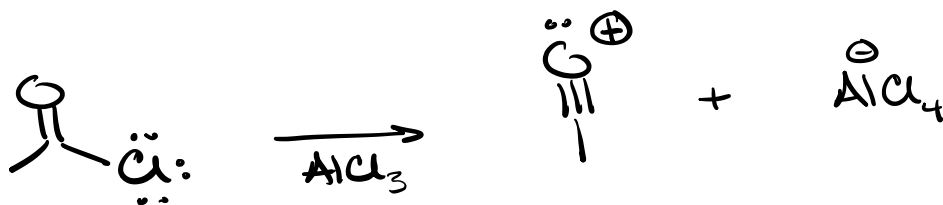
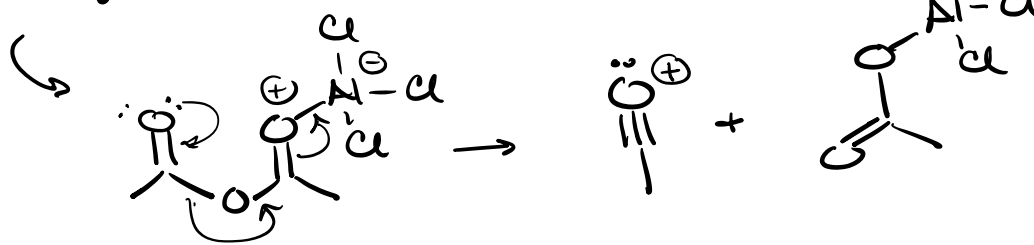
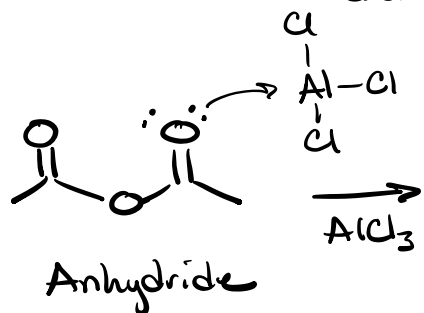
Friedle Crafts Rxn

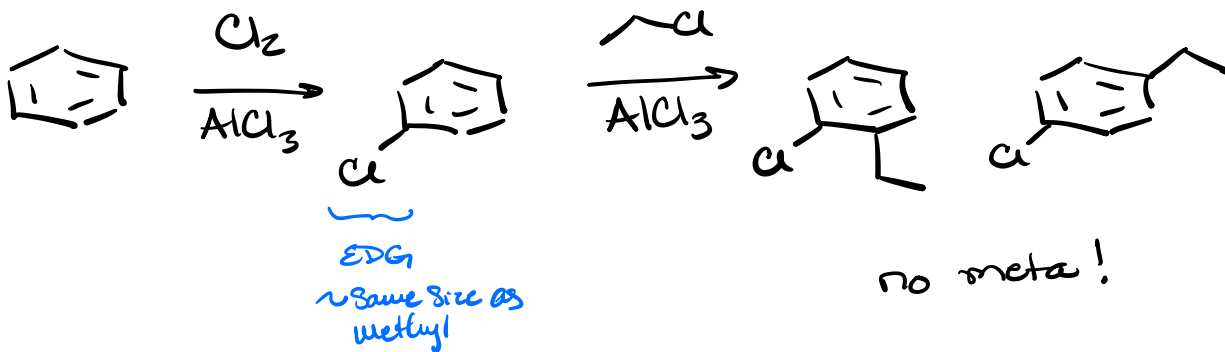
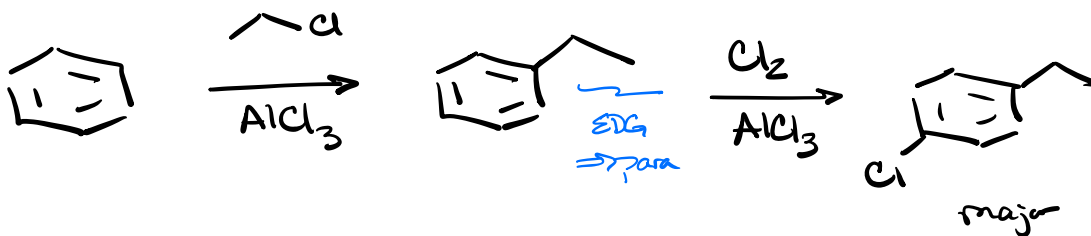
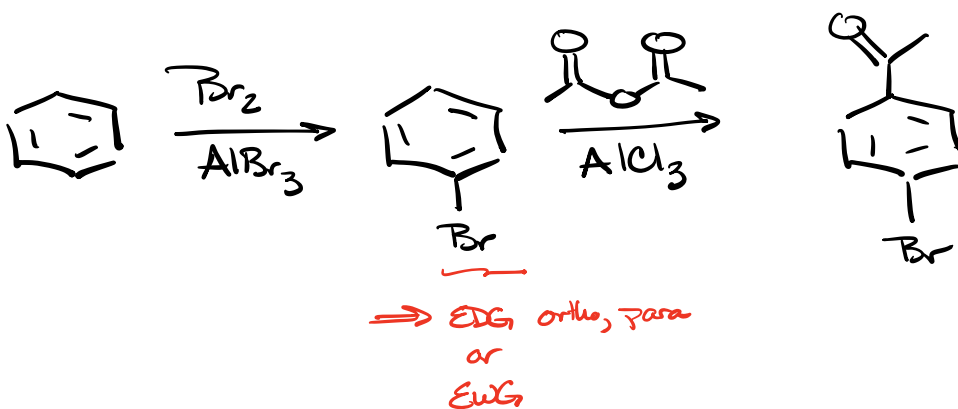
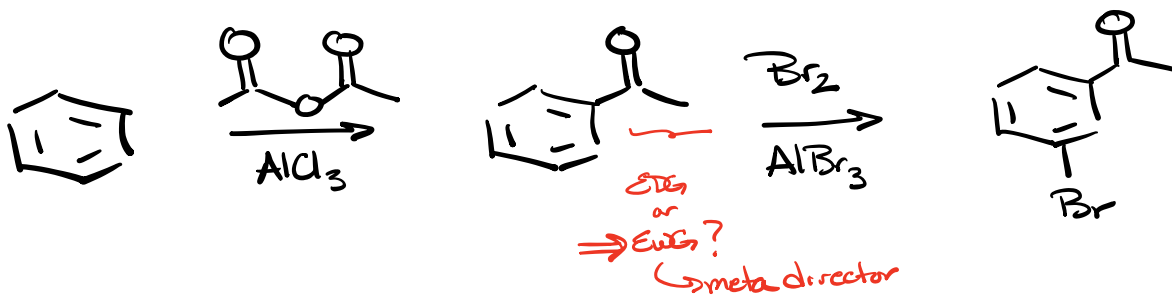


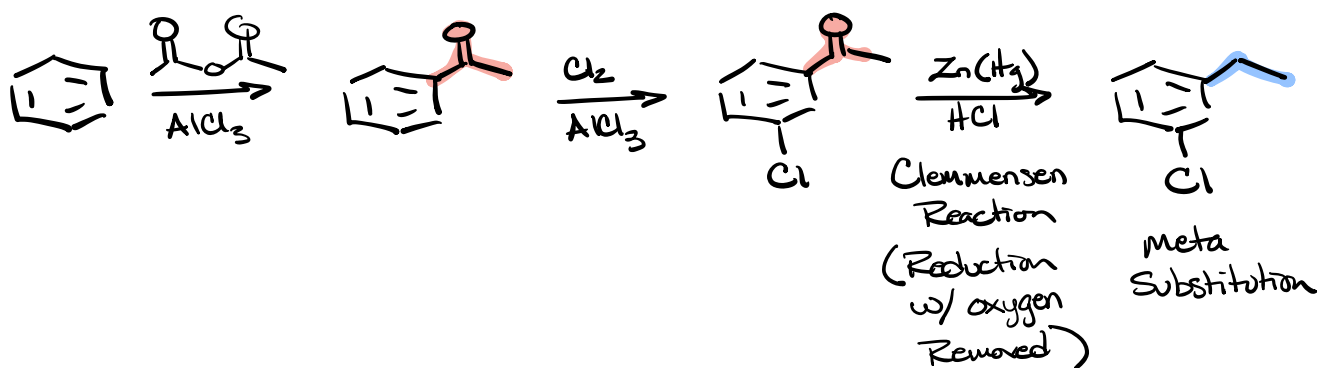




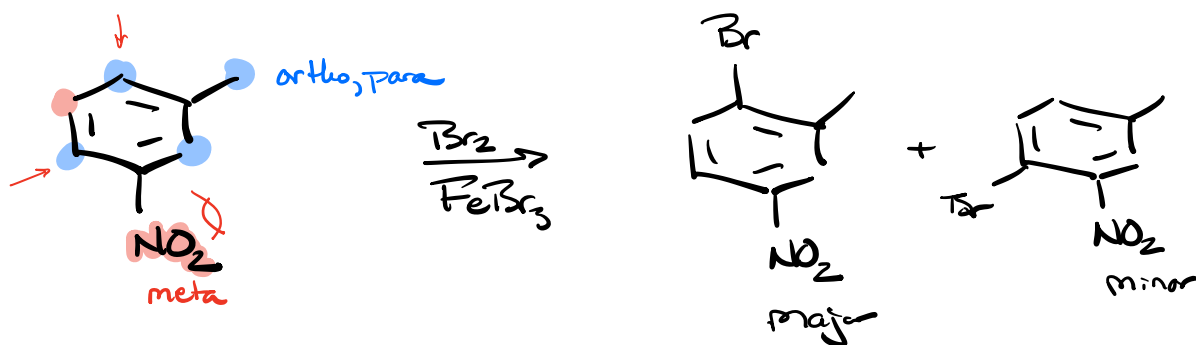
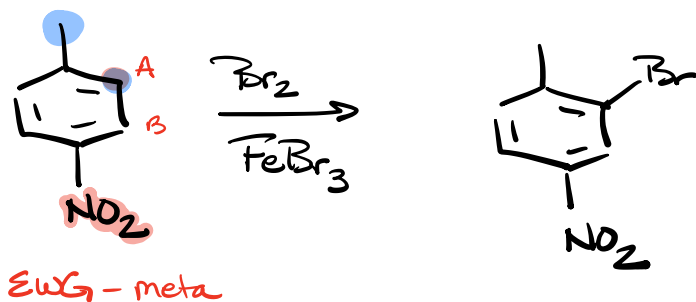
Oxonium ions







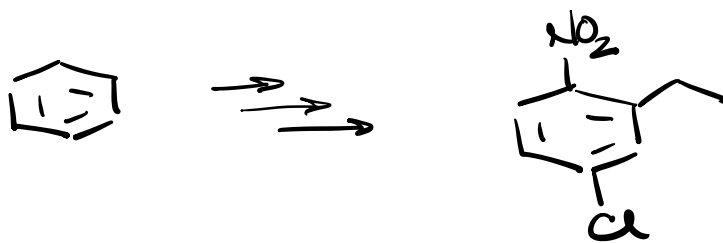
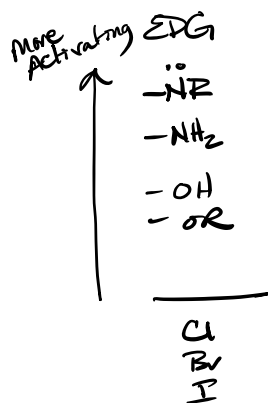
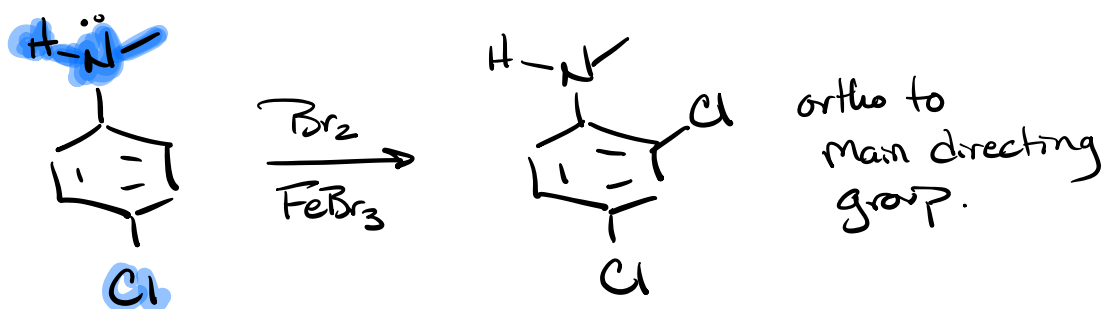
EDG - ortho Which group directs ?



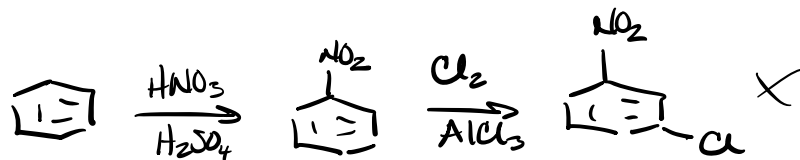
\Rightarrow EDG directs ortho, para by direct support of C^+ by resonance \Rightarrow lowering E_A


EWG directs meta by least bad resonance
 \Rightarrow still destabilizing, just the least destabilizing
 \Rightarrow Raising E_A

Substitution is guided by the strongest EDG!



Try ~~NO₂~~, Cl, \sim



Try Cl, , NO₂

