

Test 3 May 3

Test on everything since last test up until section 18.11 (Wednesday's class). Up through review sheet 6.

Substituents can activate or deactivate the

ring

donate e^-
made more
 e^- rich

withdraw e^-
made less
 e^- rich

18.12

For ring to be more reactive ... more attractive to
an electrophile E^+

Directing the E^+ to a specific positions

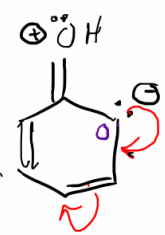
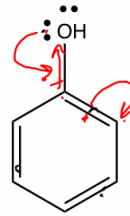
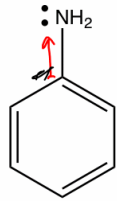
stabilize or destabilizing the intermediate 18.13

The Effect of Substituents on Reactivity Towards EAS: Strongly Activating

Section 18.12 & 18.13

More e^- rich

σ bonds
electronegativity
+ inductive effects



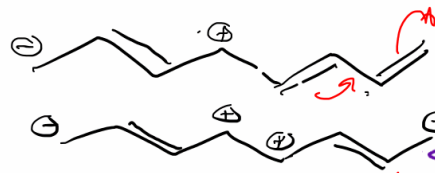
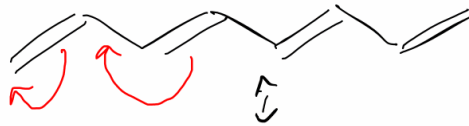
these are the πe^- s being donated into the ring



lp e^- s

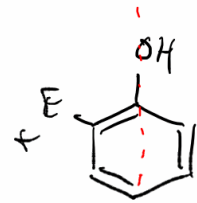
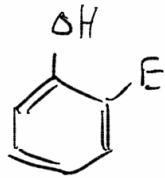
π bonds
resonance/
extended π systems

σ withdrawing
 π donating



don't do this

lp e^- s into π systems
make certain to walk
lp e^- s through entire π
system



~~two~~ products
turn over
rotate 180

\rightarrow empty p adjacent to π
 \rightarrow π adjacent to π

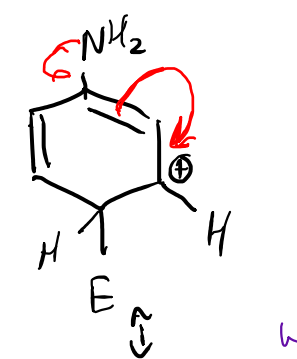
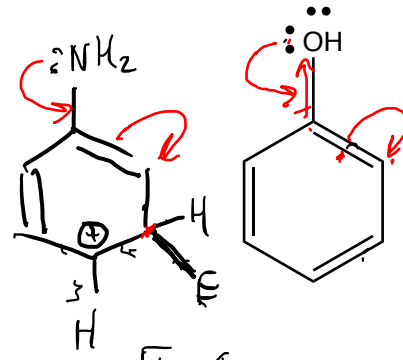
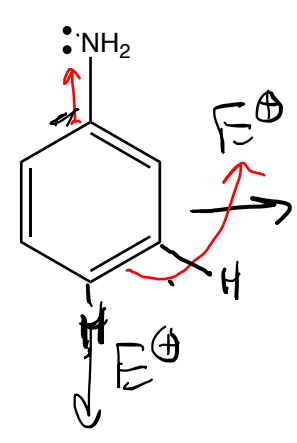
when drawing
resonance contrib
3 is better than
2 so we draw 3

resonance \rightarrow O, p vs m \leftarrow resonance skips More e^- rich
 The Effect of Substituents on Reactivity Towards EAS: Strongly Activating Section 18.12 & 18.13

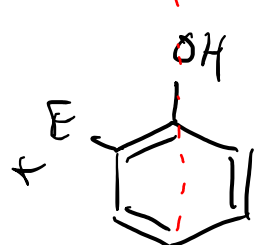
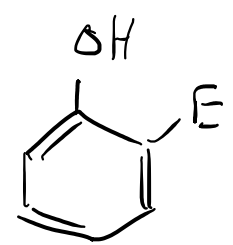
σ bonds
 electronegativity
 + inductive effects

π bonds
 resonance/
 extended π systems

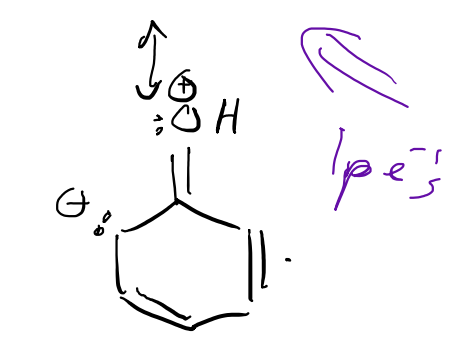
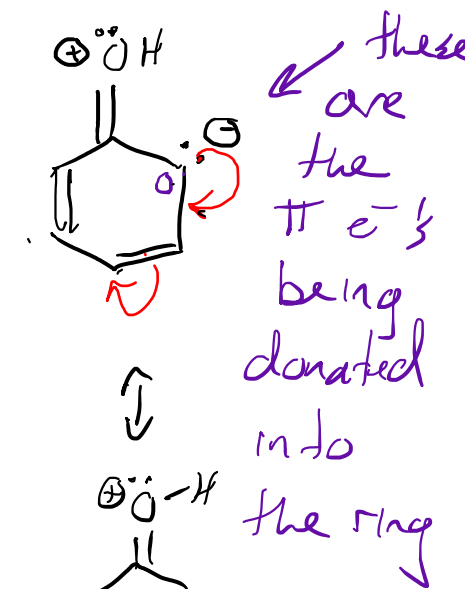
σ withdrawing
 π donating



when the E^+ adds
 to p or O the
 extended π system
 stabilizes the \oplus
 lp e^- 's into π systems
 make certain to walk
 lp e^- 's through entire π
 system
 \rightarrow empty p adjacent to π
 \rightarrow π adjacent to π

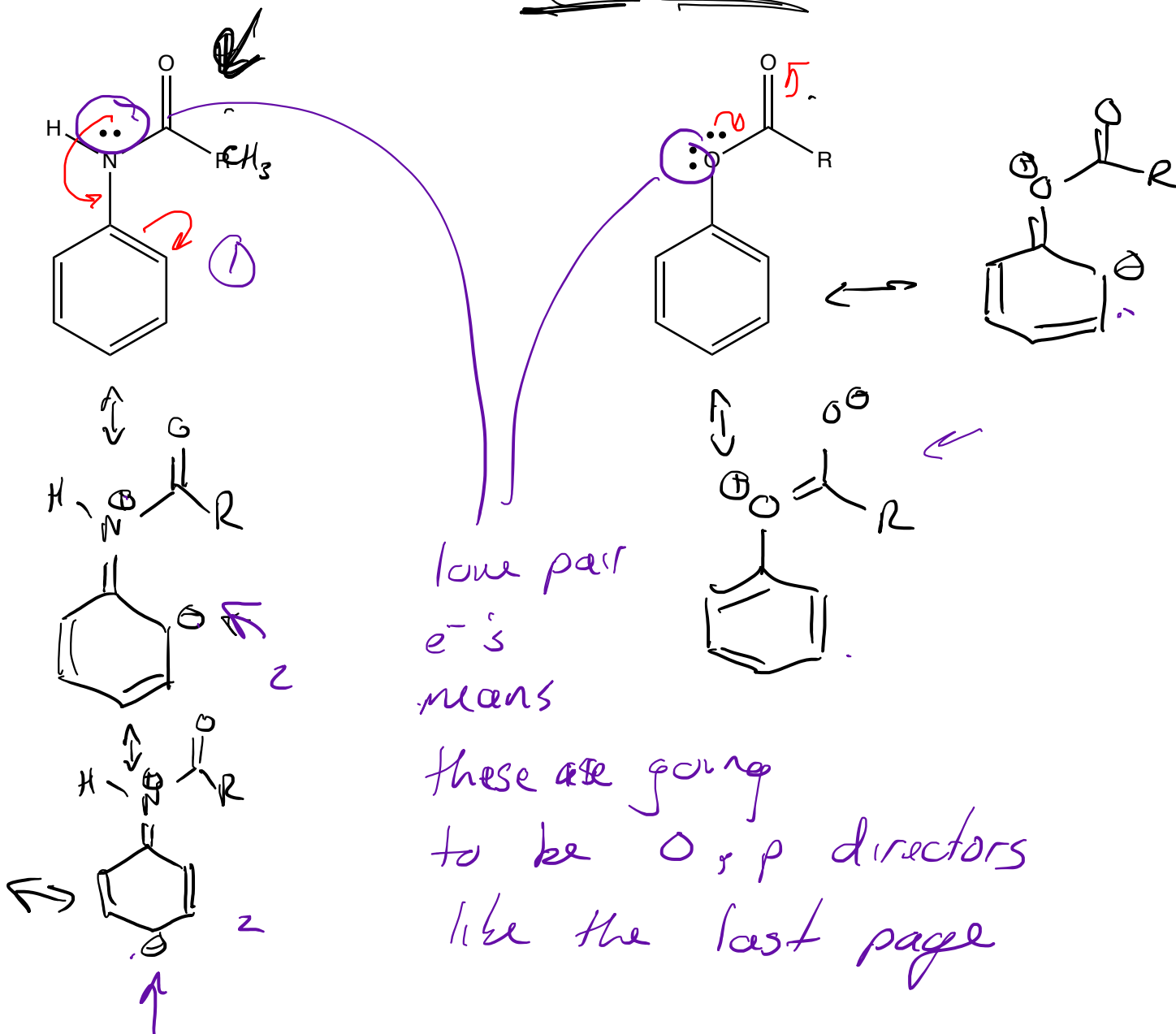


~~two products~~ turn over
 rotate 180



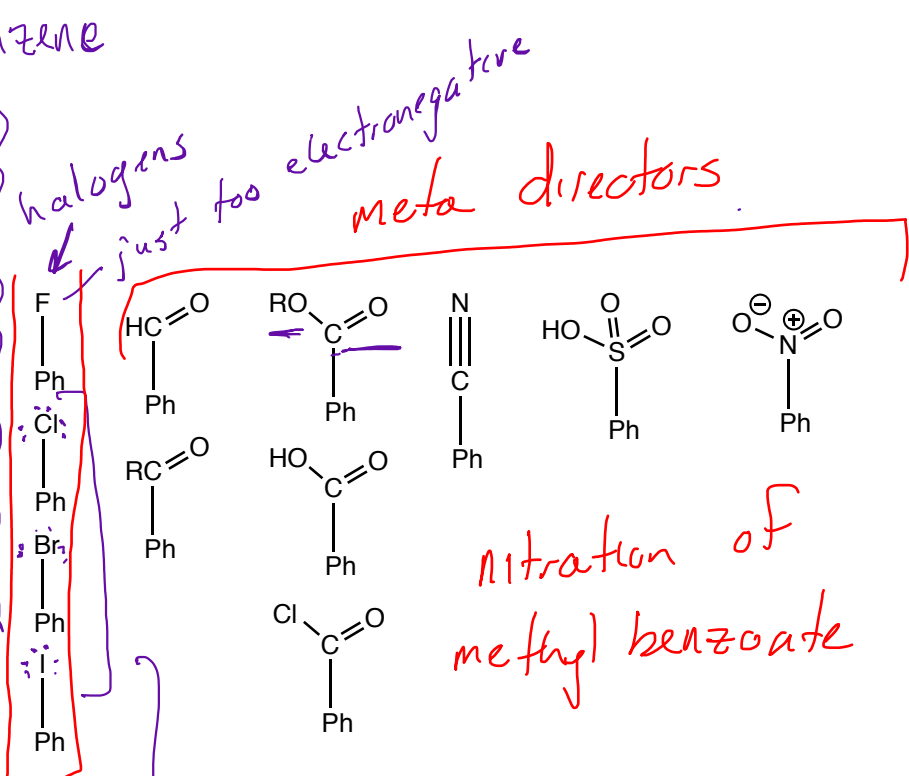
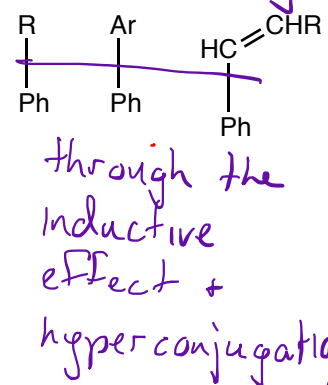
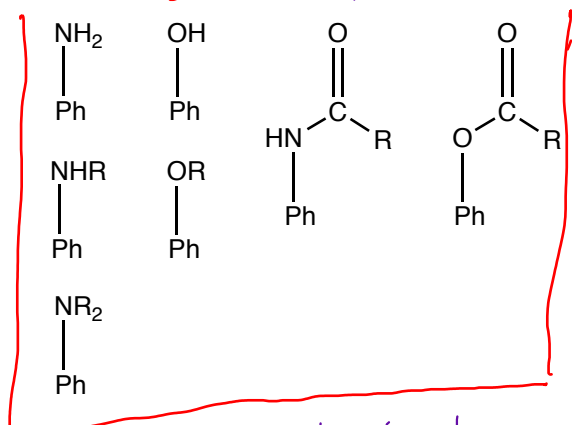
when drawing
 resonance contrib
 3 is better than
 2 so we draw 3³

σ -withdrawing
 π -donating
 enough to be
 activators
 weaker than
 $\text{NR}_2 + \text{OR}$
 because of
 $\text{C}=\text{O}$



low part
 e^- 's
 means
 these are going
 to be o, p directors
 like the last page

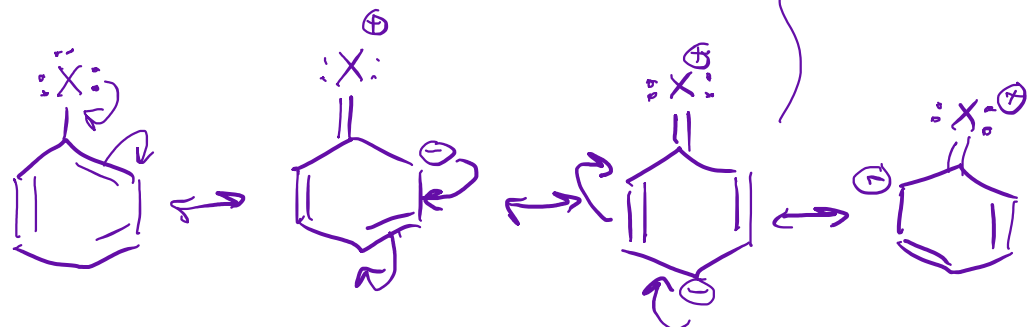
benzene rings with substituents that have lp-e's adjacent to the ring are **ortho/para directors**



atom adjacent to the ring has a lone pair of e's

nitration of methyl benzoate

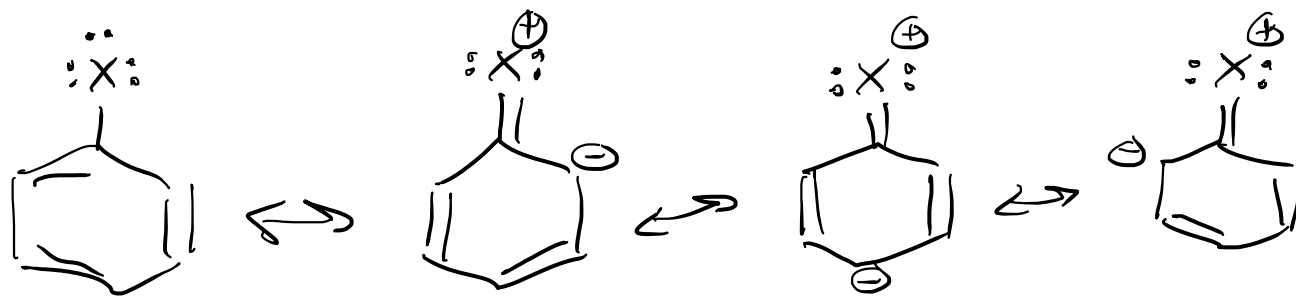
too big to be really good at pi donation



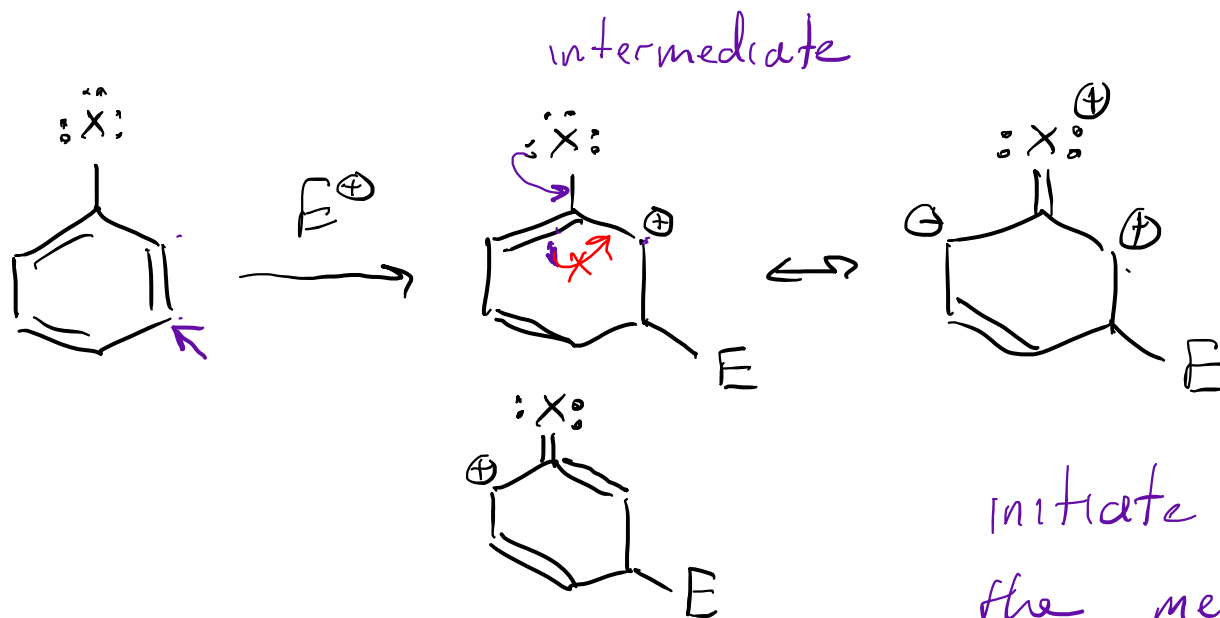
conjugation \equiv resonance \equiv extended π system

resonance effects always shows up at ortho + para positions

ortho/para director



ortho + para positions are more e^- rich, more attractive to electrophiles

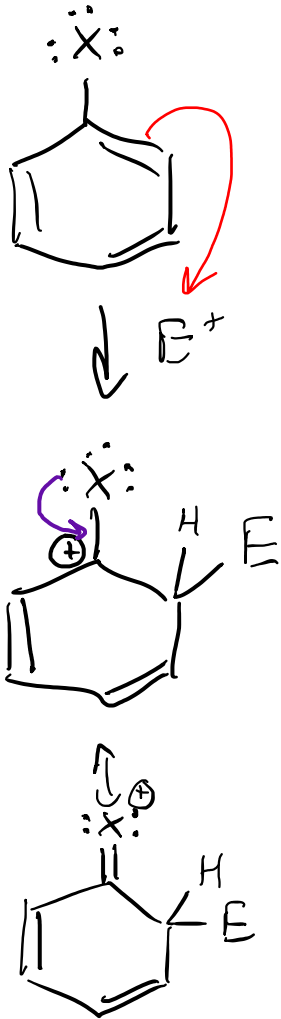


initiate the reaction at the meta position

lone-pair e^- 's on substituents don't help

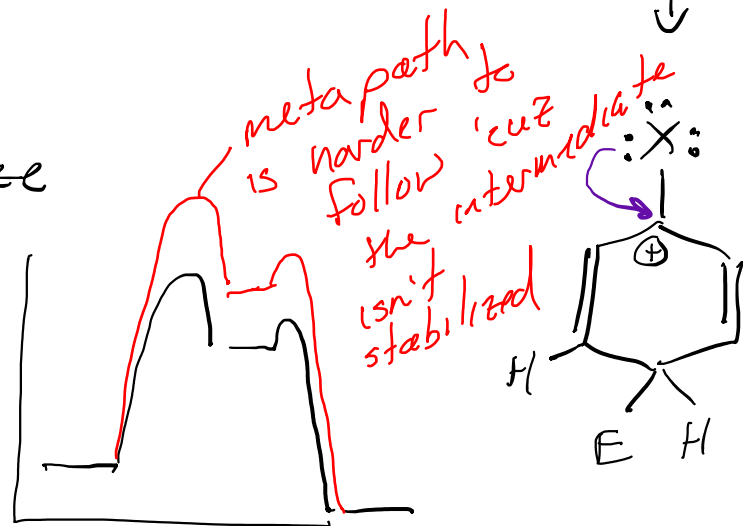


ortho

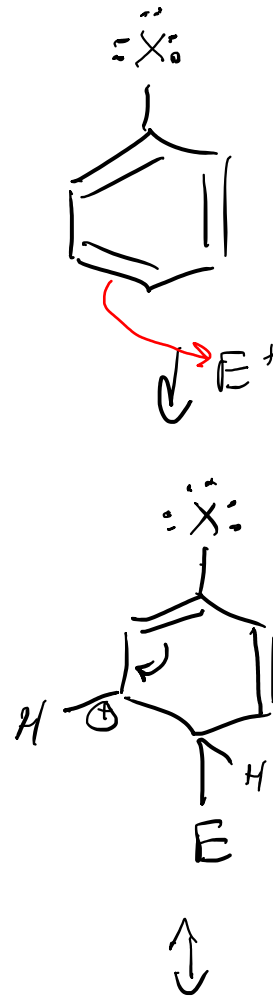


X helps to stabilize \oplus charge

1. finish drawing intermediate
2. draw resonance contributors to show how X affects stability of intermediate



para



lp e^- 's on the atom adjacent to the benzene ring can stabilize the intermediate when E^+ adds to ortho + para positions

