

Today

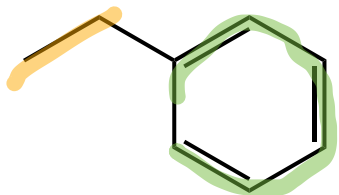
Electrophilic Aromatic Substitution and Explaining
the Nitration Lab

8.21, 18.2, 18.4, 18.12, 18.13

Next Class

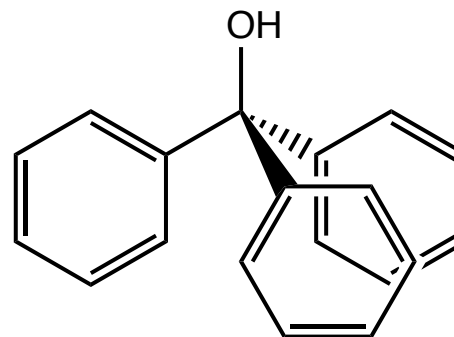
Electrophilic Aromatic Substitution and
Explaining the Bromination Lab

Rework test 3 by Monday, May 2.



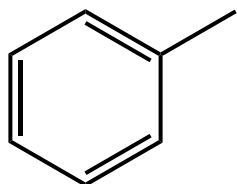
Benzene ring is highest priority functional group.

ethylbenzene

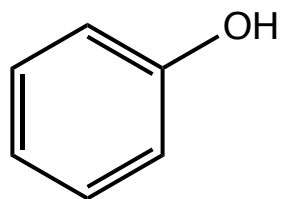


Higher priority alcohol functional group; thus, the benzene ring is a phenyl substituent.

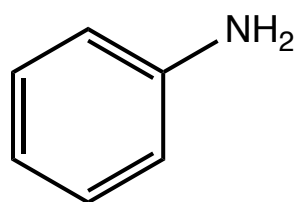
triphenylmethanol



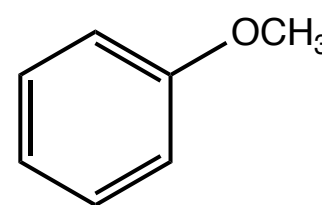
toluene



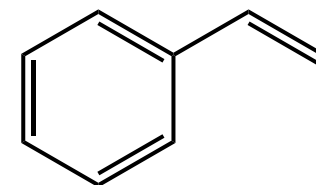
phenol



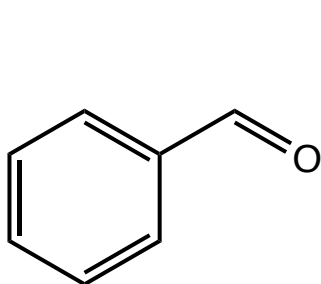
aniline



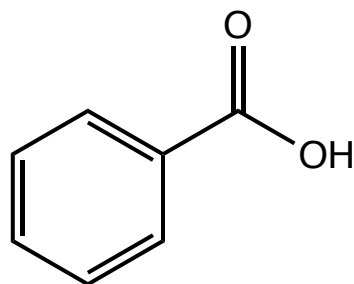
anisole



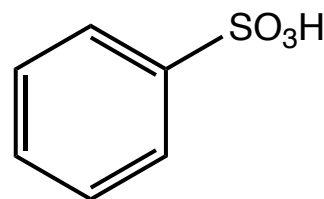
styrene



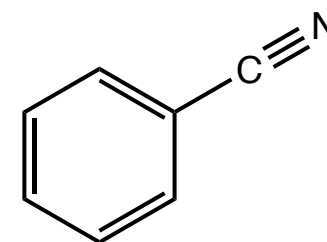
benzaldehyde



benzoic acid



benzenesulfonic acid

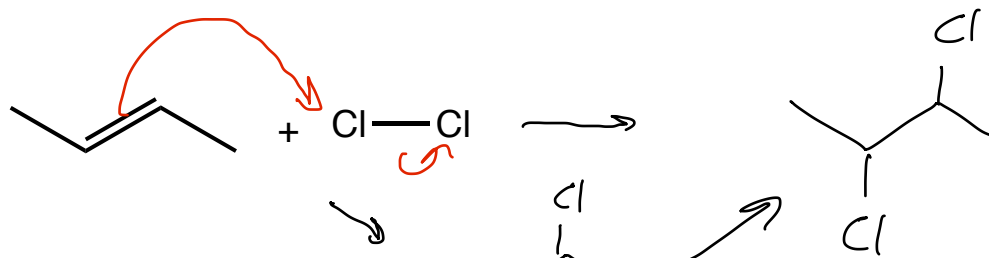


benzonitrile

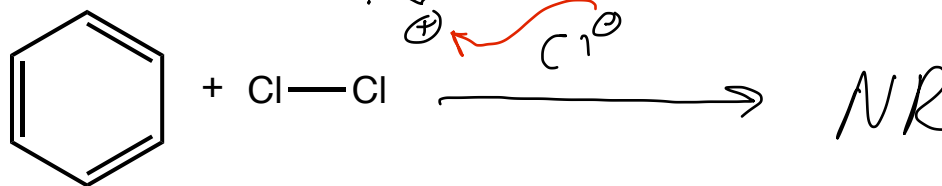
Electrophilic Aromatic Substitution (not electrophilic addition): Net Reaction

Section 8.21

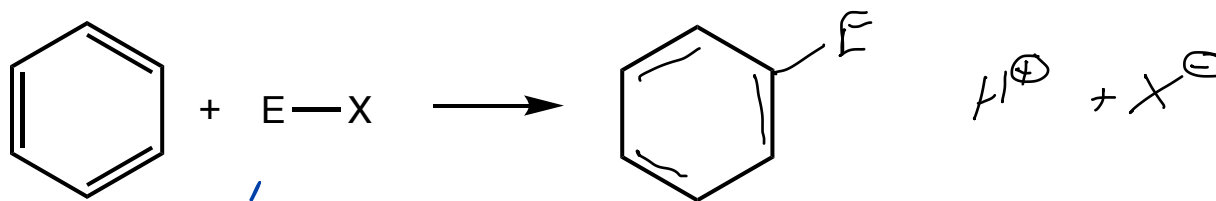
π bond
e⁻ rich



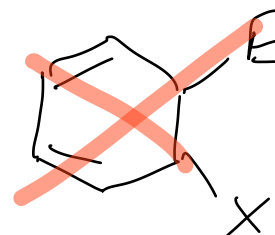
aromaticity
makes benzene
ring less
reactive



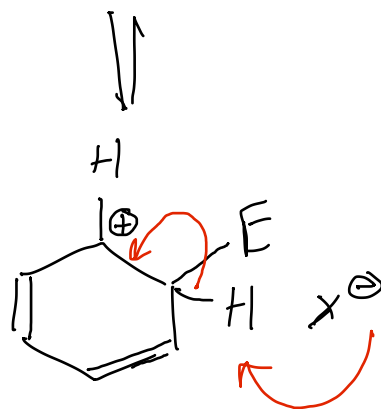
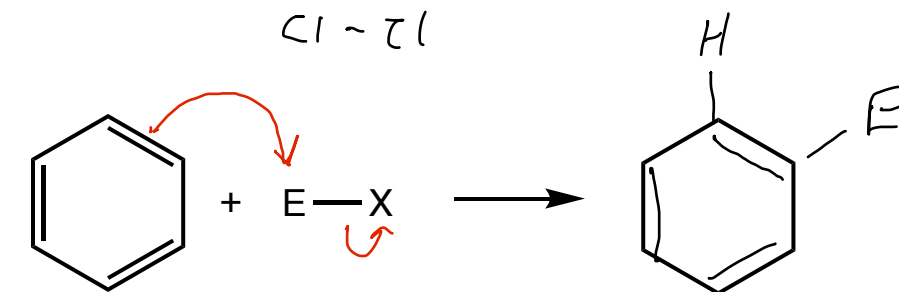
π bond
e⁻ rich



extremely
reactive
electrophiles



this
? would
be higher
in E because
it lost
aromaticity

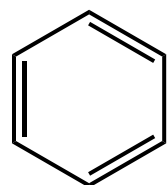
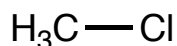
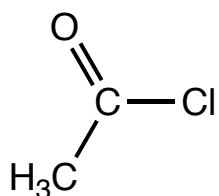
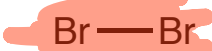


any weak base

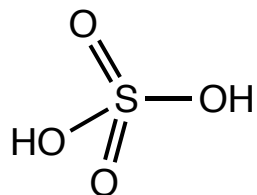
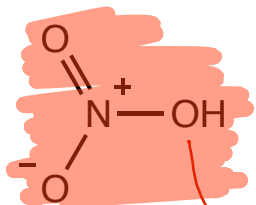
(with the exception of sulfonation reactions)
 the H^+ that came off here is not strong enough an acid to break back into aromatic π system.



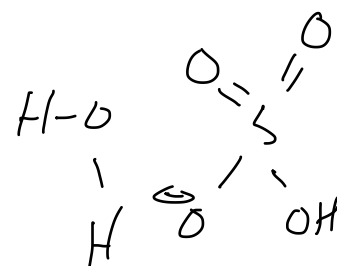
make the E more E
by adding an acid



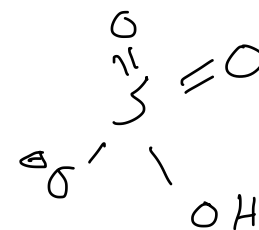
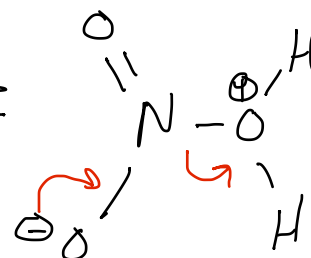
+

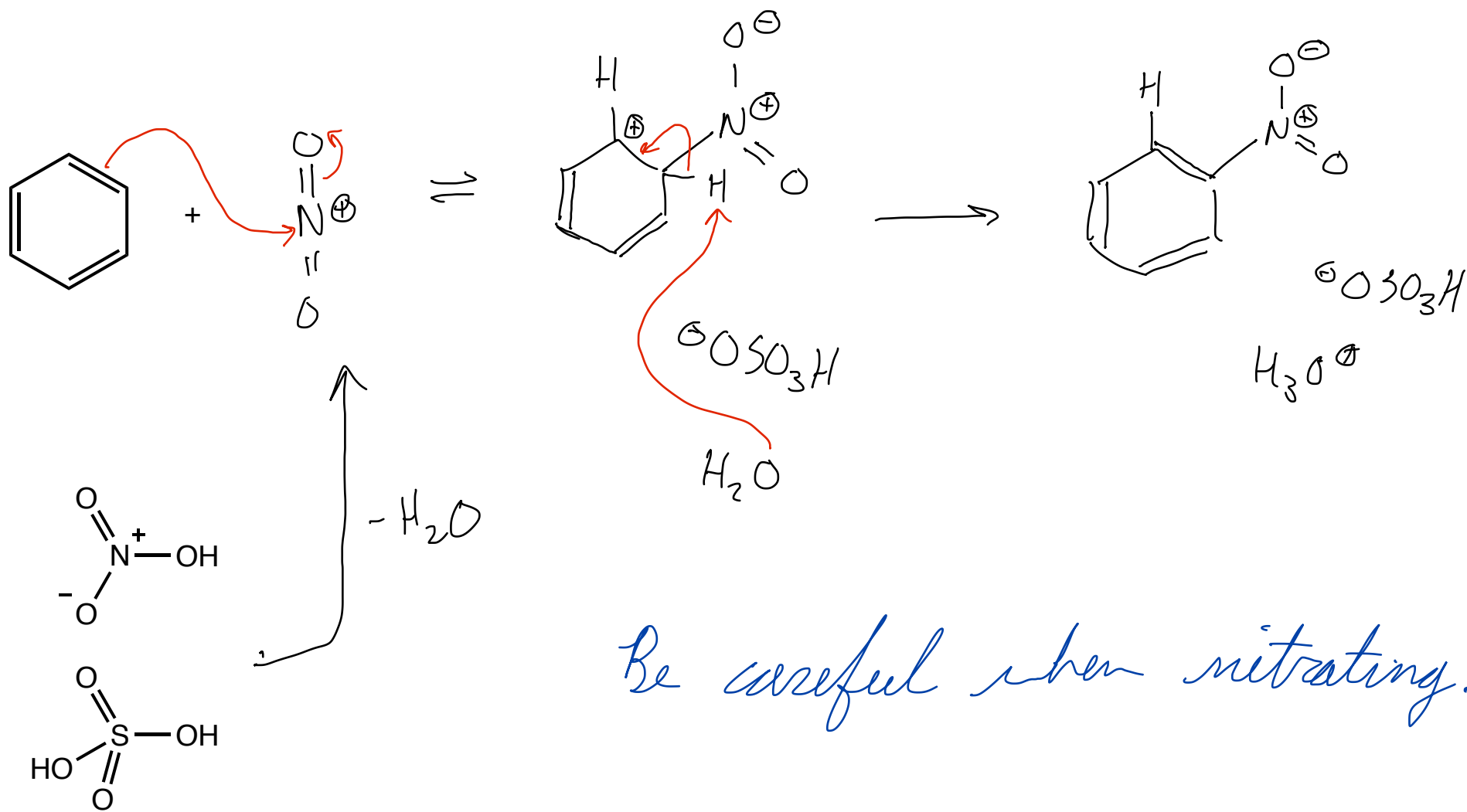


this
is our strong
crazy electrophile



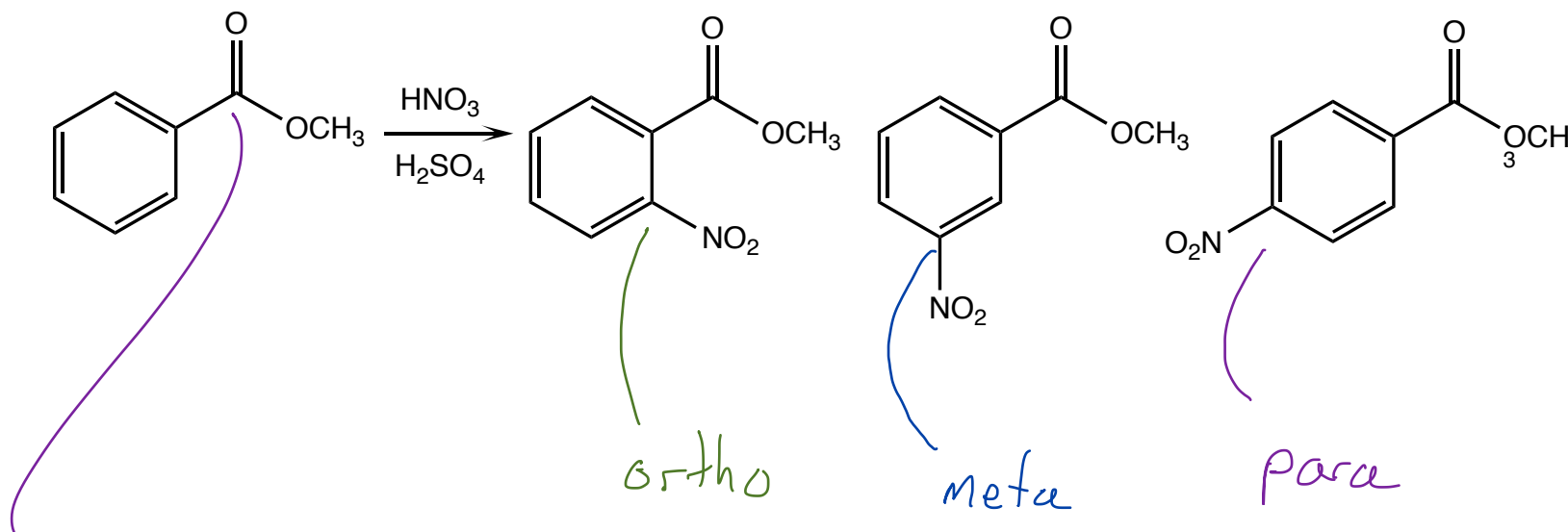
\rightleftharpoons





Nitration of Methyl Benzoate

Section 18.4, Nitration of Methyl Benzoate Lab, 18.12, and 18.13



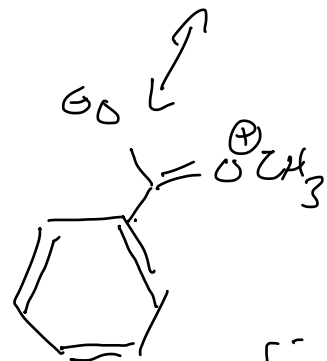
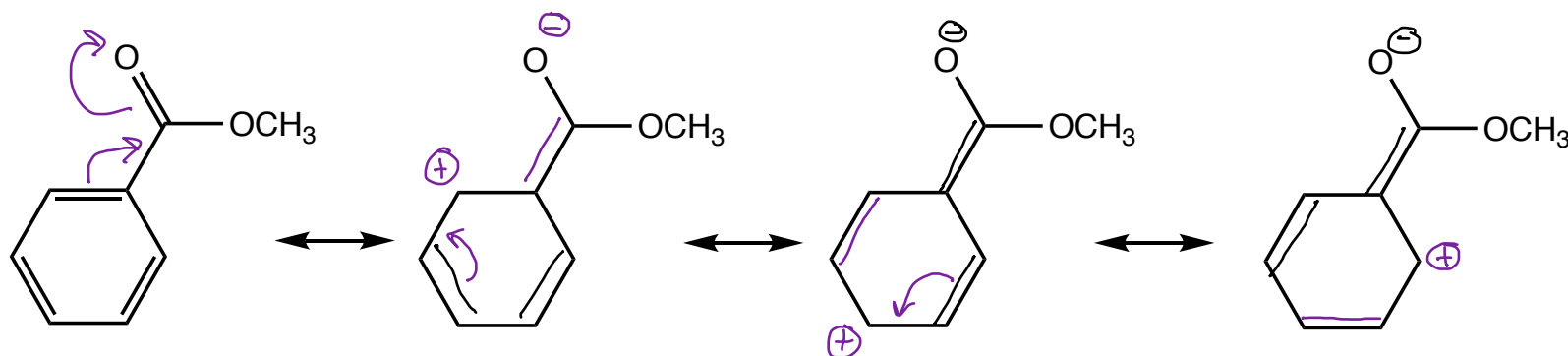
what does the substituent do to the benzene ring to cause the meta version to form

In lab we found that the substitution occurred at the meta position

How Does the Ester Affect the Benzene Ring

Nitration of Methyl Benzoate Lab,
Section 18.12 and 18.13

e⁻ withdrawing



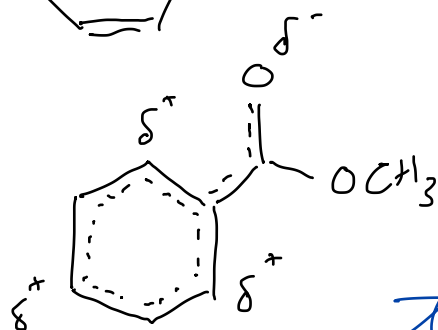
electron withdrawing

groups

deactivate the benzene ring toward EAS. Slower reaction.

ortho + para positions become less e⁻ rich + less reactive towards electrophiles.

meta position most e⁻ rich/least e⁻ deficient



How Does the Ester Affect the Nitration Reaction

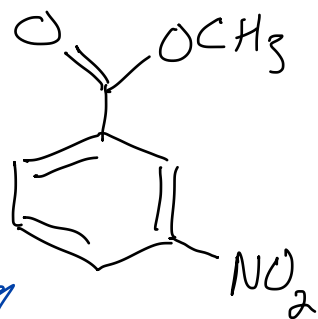
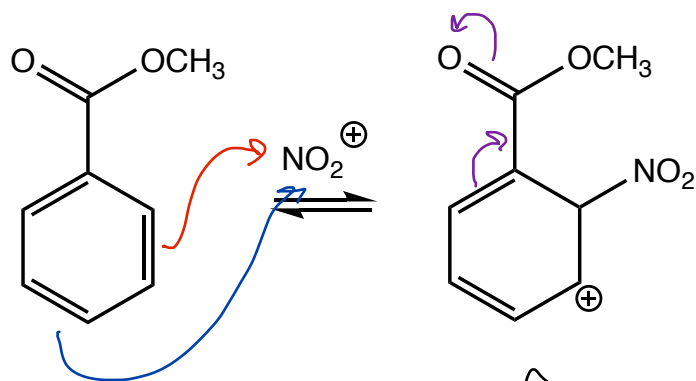
Nitration of Methyl Benzoate Lab,
Section 18.12 and 18.13

The ester deactivated the ring towards

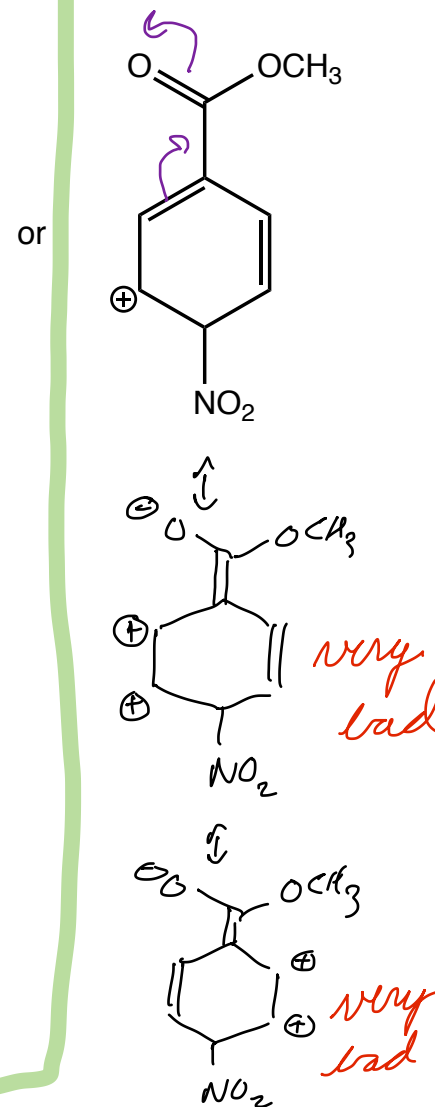
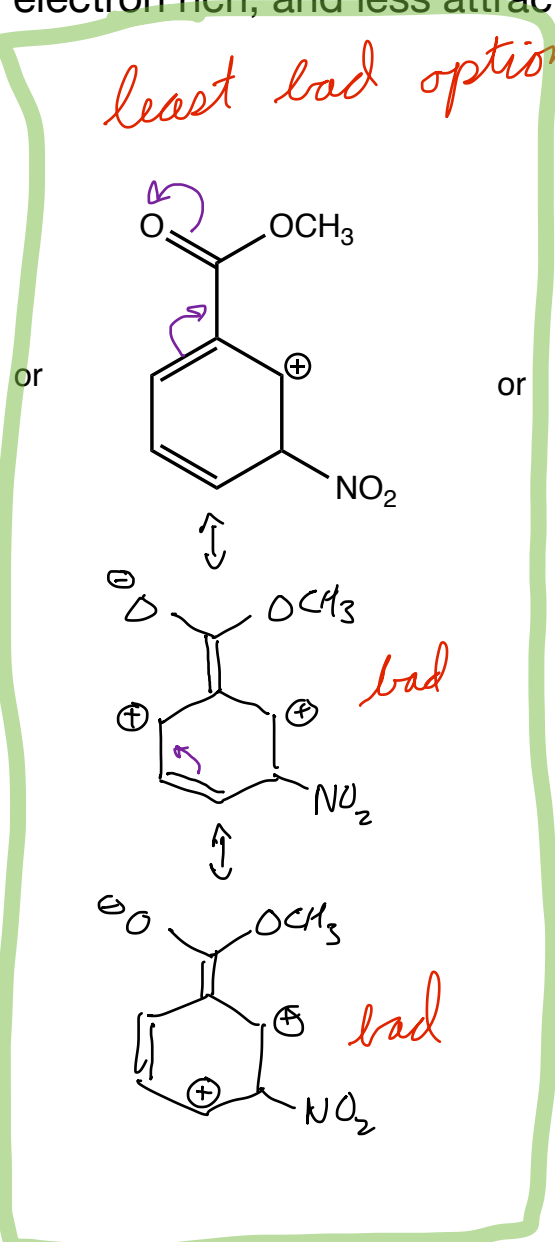
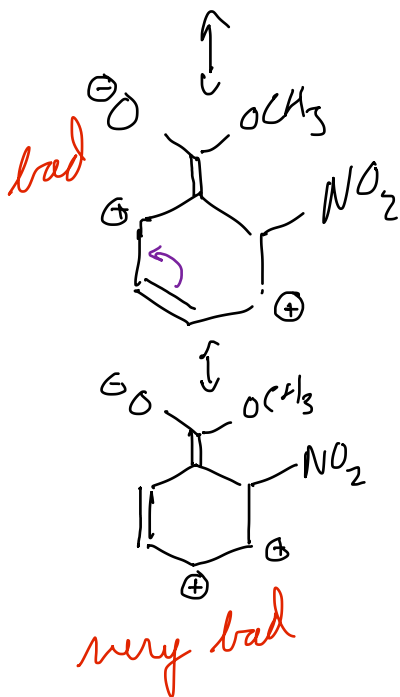
EAS

The ester made the ortho and para positions less electron rich, and less attractive to the NO_2^+ electrophile.

How does the ester affect the intermediate?



what we saw in lab



How does the ester affect the intermediate?

Nitration of Methyl Benzoate Lab,
Section 18.12 and 18.13

