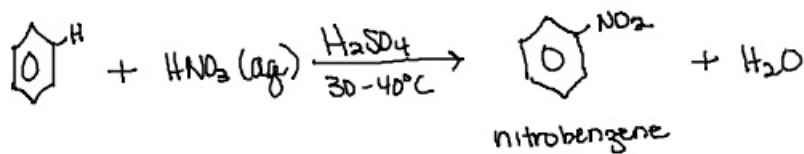
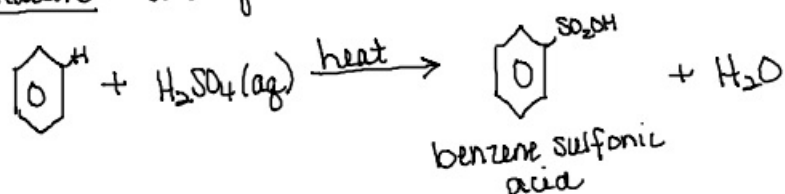


11/7/16 Reactions of Benzene (substitution)

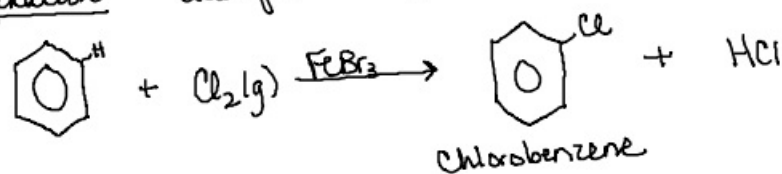
Nitration catalyst: H_2SO_4 @ $30-40^\circ C$



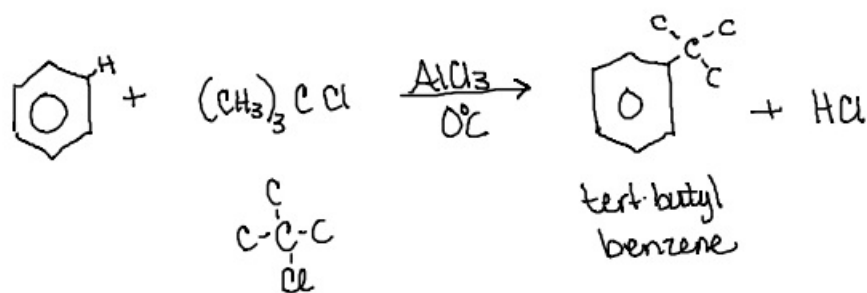
Sulfonation catalyst: heat



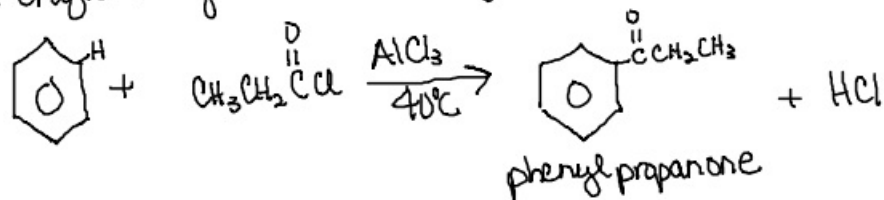
Halogenation catalyst: $FeBr_3$



Friedel-Crafts Alkylation Alkyl = carbon branch
Catalysts: $AlCl_3$, $0^\circ C$

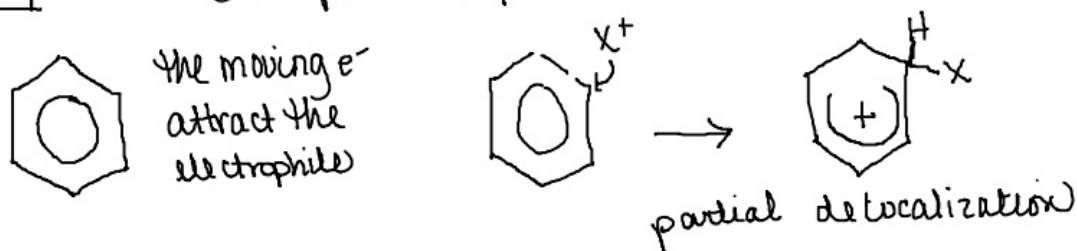


Friedel-Crafts Acylation Acyl - $-\overset{\text{O}}{\parallel}{\text{C}}-$ catalysts: $AlCl_3$, $40^\circ C$



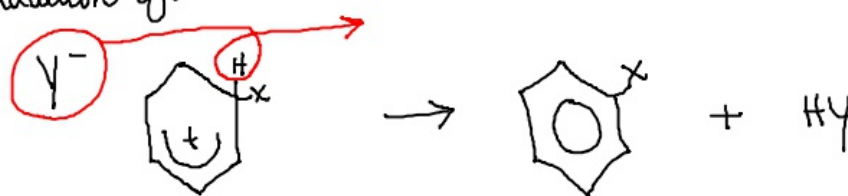
General Mechanisms for Substitution Reactions with benzene

1st Step Electrophile - a positive ion X^+



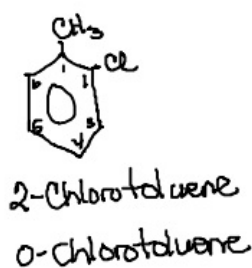
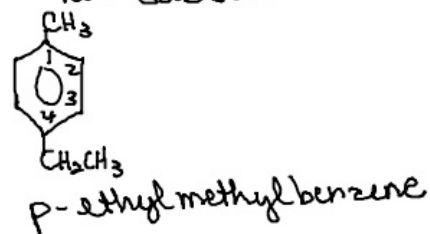
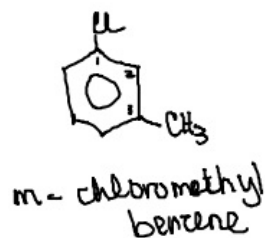
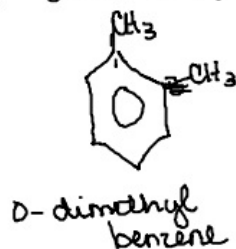
2nd Step

addition of an anion helps stabilize the complex



How to name if there are multiple substituents on benzene.

- ① # the ring with the highest order functional group as C₁
- ② Ortho (o), meta (m) + para (p) — use when there are two substituents



* if there is a common name for benzene + the functional group record as # - attachment common name

Homework:

4.3 aromatic compound = benzene and benzene derivatives
(any compound containing one or more benzene rings)

- 4.12 a) 1-chloro-4-nitrobenzene or p-chloronitrobenzene
b) 1-bromo-2-methylbenzene or o-bromotoluene
or 2-bromotoluene
c) 1-chloro-3-phenylpropane or 1-(3-chloropropyl)benzene
d) 2-bromo-2-phenylbutane
e) 2-nitroaniline or o-nitroaniline
f) 2-phenylphenol or o-phenylphenol
g) trans-1,2-diphenylethane
h) 2,4-dichlorotoluene

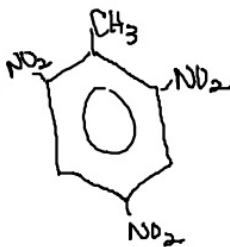
4.13 a)



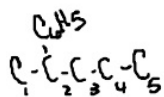
b)



c)



d)



e)



f)



Phenols - benzene w/ one or more hydroxyls.

uses - antioxidants, they work by reacting w/ ^{hydrocarbons +} carboxylic acids to produce a hydroperoxide group.

Radical - an atom of a molecule with an unpaired e^-