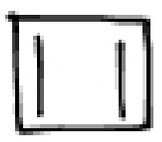
Chem 2520 Final Study Guide

Chapter 15: Benzene and Aromaticity

Aromaticity
-Huckel's Rule: electron count of a cyclic, conjugated system (planar) must fit the formula 4n + 2 (n=0, 1, 2...) to be aromatic
-4n are aromatic (unstable)
-Systems that do not apply are called nonaromatic

Examples:

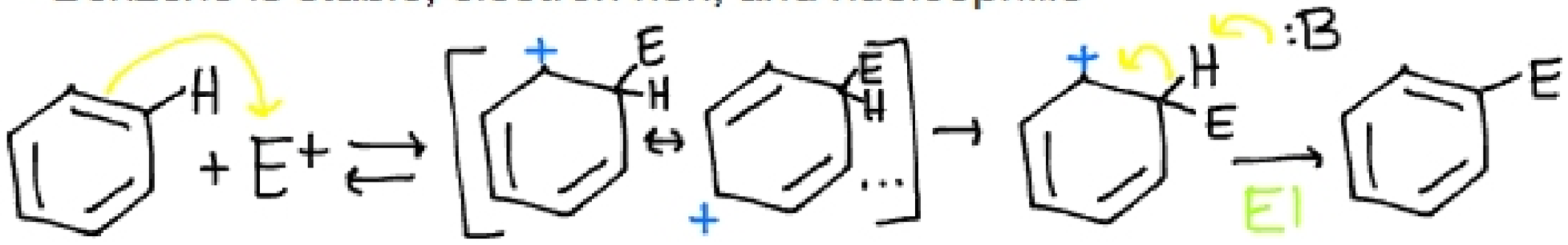
Cyclic + conjugated
6 π e's
fits 4n+2
→ Aromatic



Cyclic + conjugated
4 π e's
fits 4n
→ Antiaromatic

Cyclic
not conjugated
→ Nonaromatic

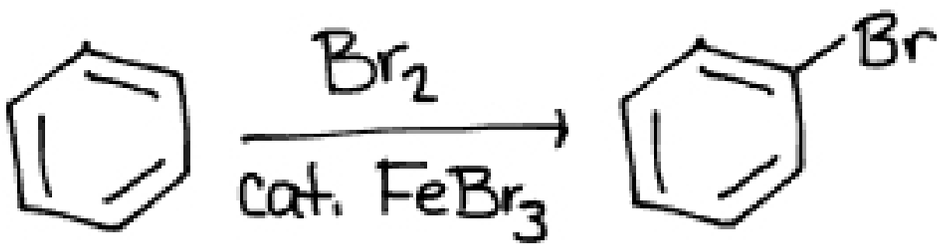
Electrophilic Aromatic Substitution (EAS)
-Benzene is stable, electron rich, and nucleophilic



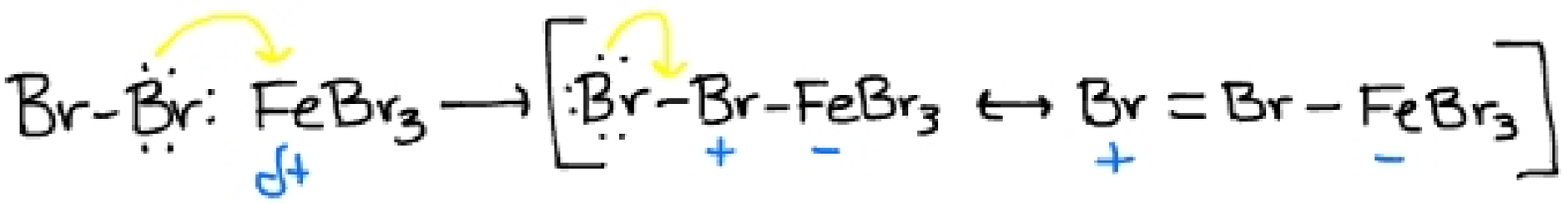
-aromaticity is destroyed, then restored

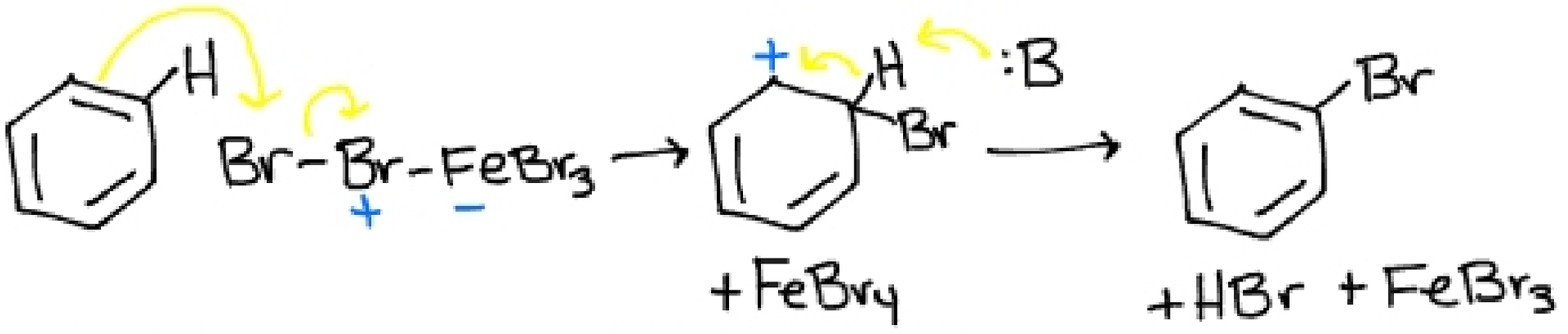
Halogenation

-a catalyst is needed because halogens are weak electrophiles



-mechanism

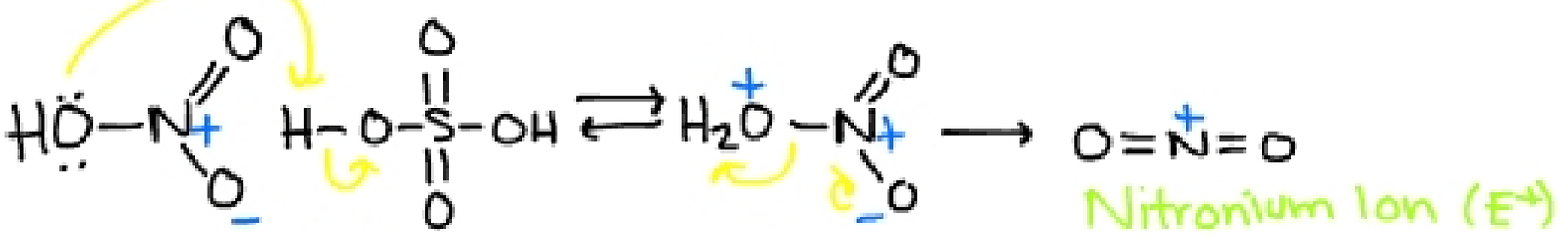




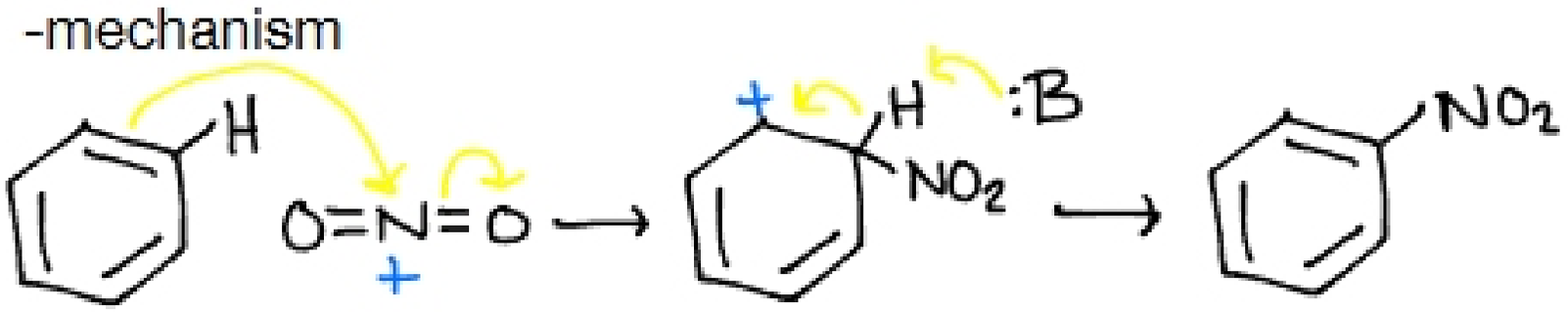
-chlorinations are possible (Cl2, FeCl3), but F2 and I2 are not

Nitration

-The electrophile is a nitronium ion



-mechanism

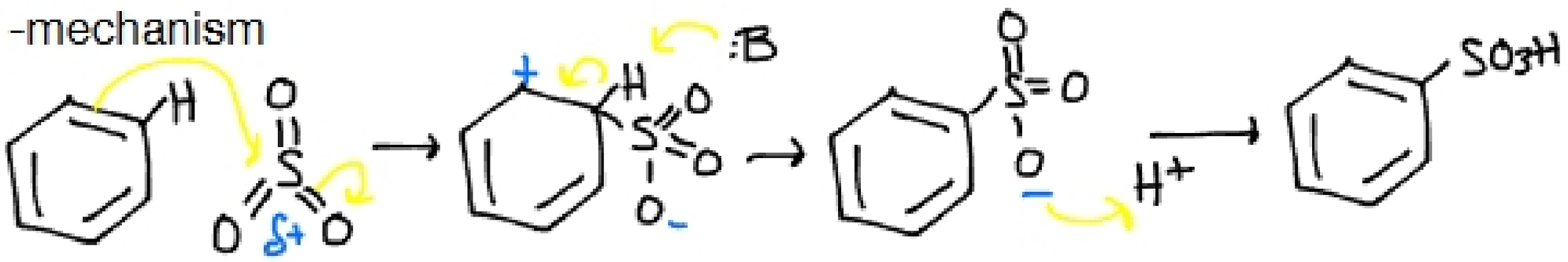


Sulfonation

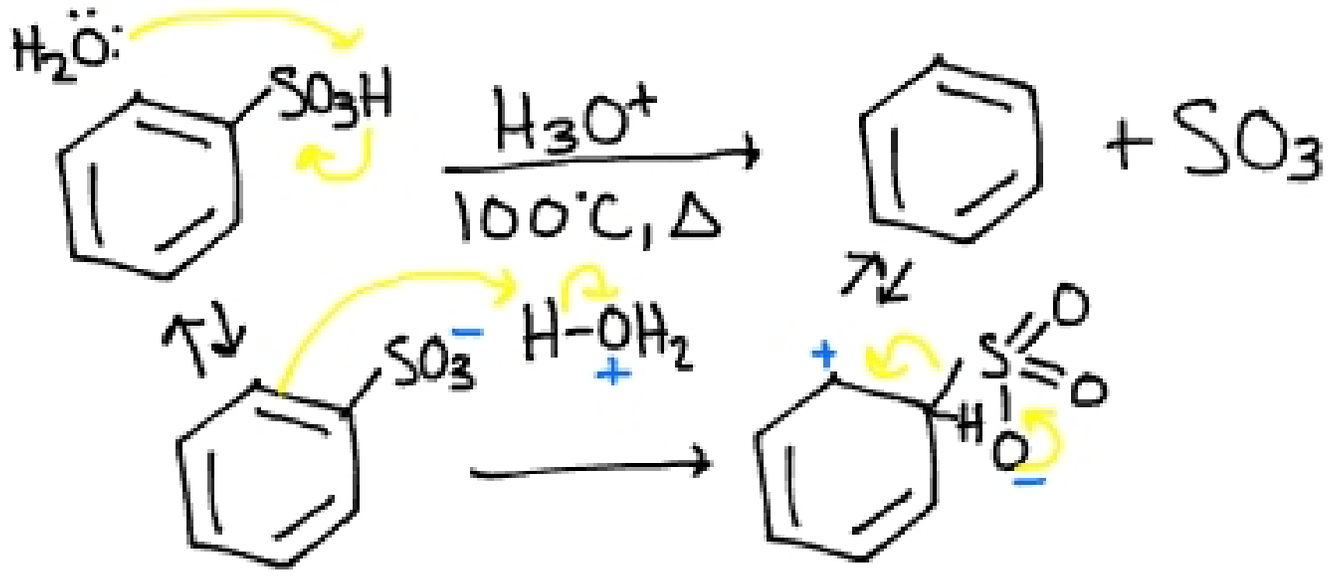
-The electrophile is sulfur trioxide (SO_3)

-fuming H_2SO_4 (about 8% SO_3)

-mechanism



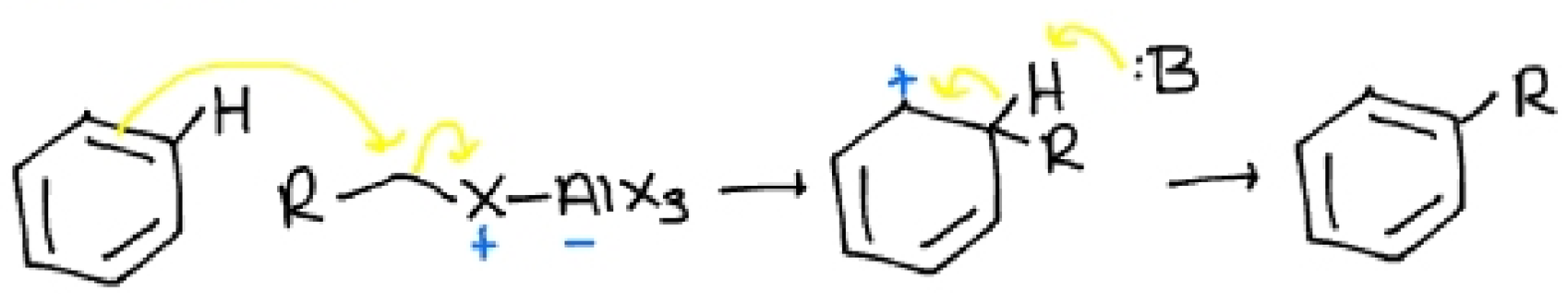
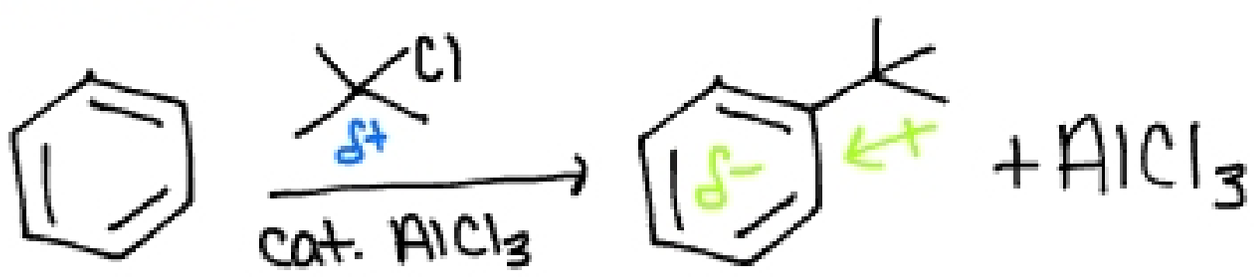
-sulfonation is reversible



Friedel-Craft Alkylation

-The electrophile is a metallated alkyl halide

-mechanism



Example: