

Chem 2520 Final Study Guide

Chapter 15: Benzene and Aromaticity

Aromaticity

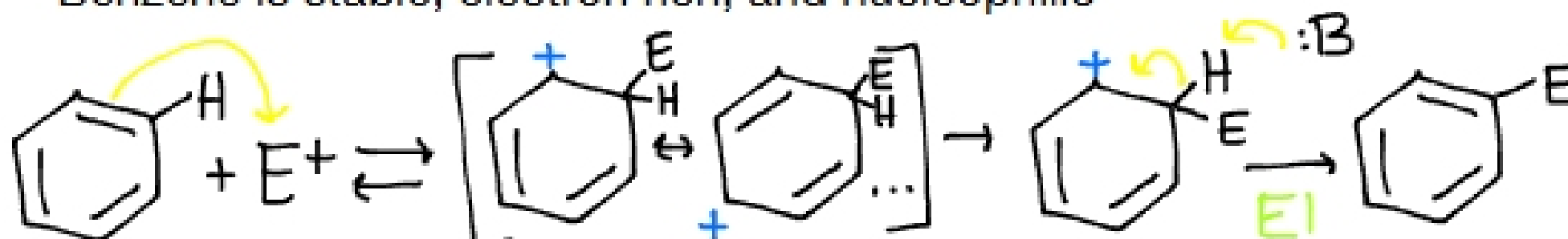
- Huckel's Rule: electron count of a cyclic, conjugated system (planar) must fit the formula $4n + 2$ ($n=0, 1, 2, \dots$) to be aromatic
- $4n$ are aromatic (unstable)
- Systems that do not apply are called nonaromatic

Examples:



Electrophilic Aromatic Substitution (EAS)

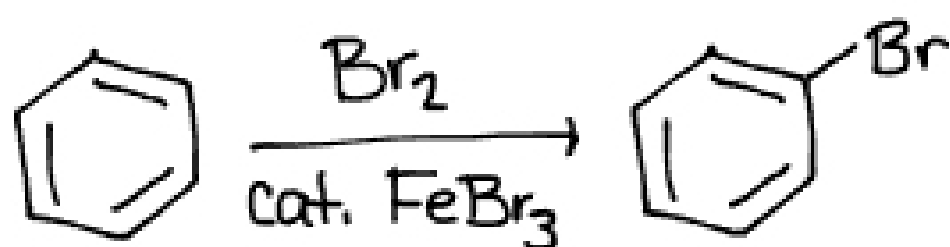
- Benzene is stable, electron rich, and nucleophilic



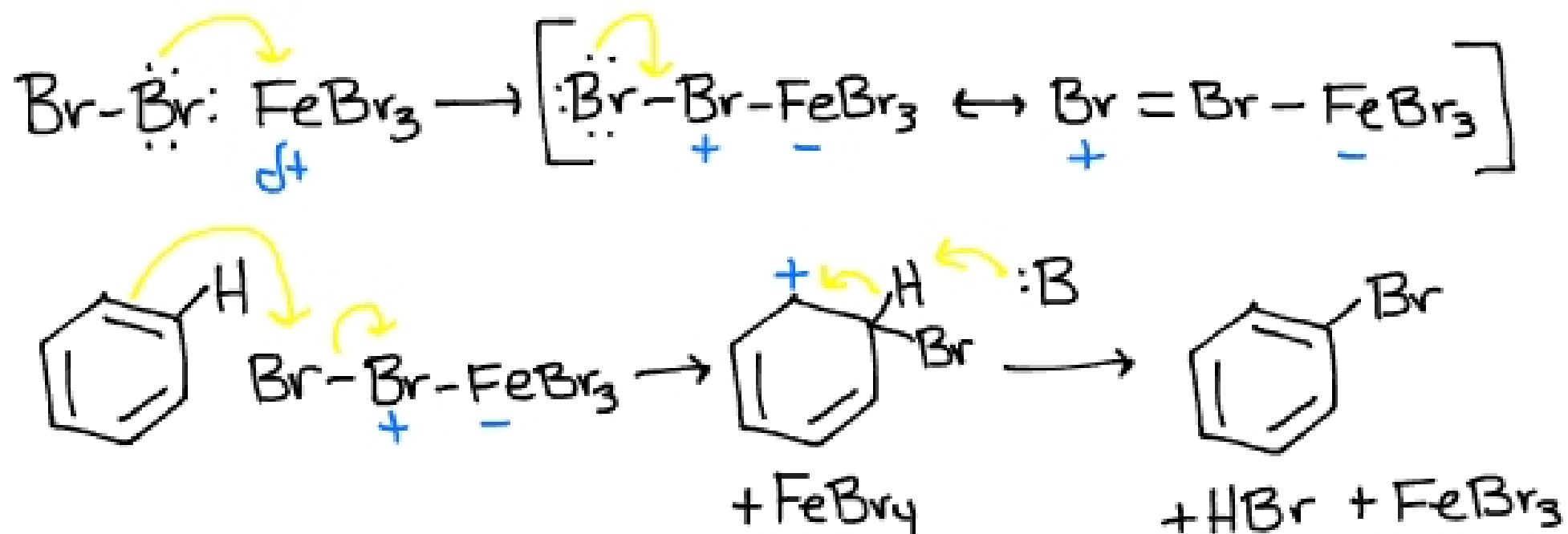
- aromaticity is destroyed, then restored

Halogenation

-a catalyst is needed because halogens are weak electrophiles



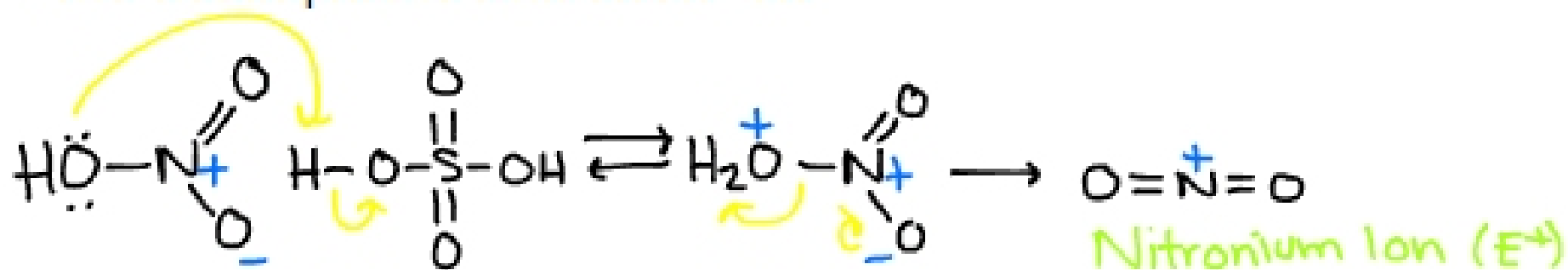
-mechanism



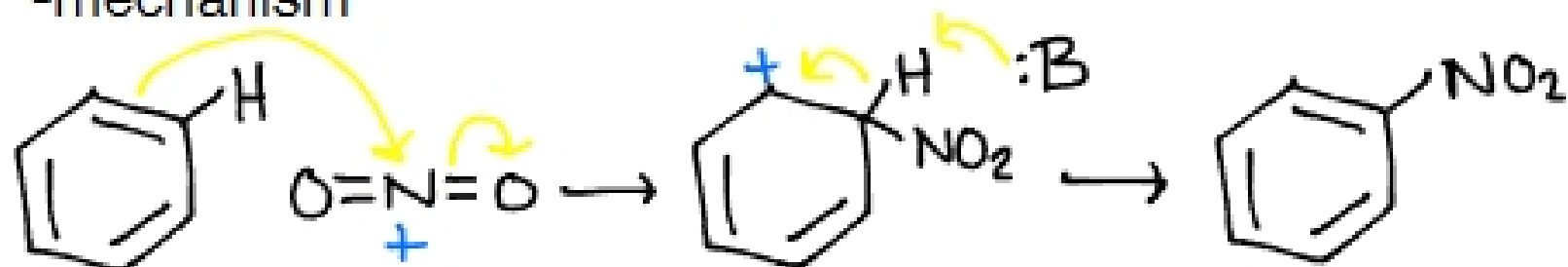
-chlorinations are possible (Cl2, FeCl3), but F2 and I2 are not

Nitration

-The electrophile is a nitronium ion



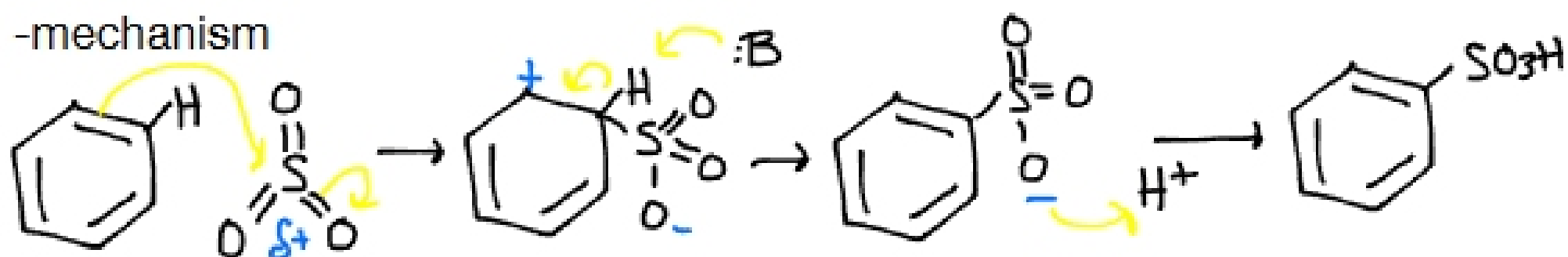
-mechanism



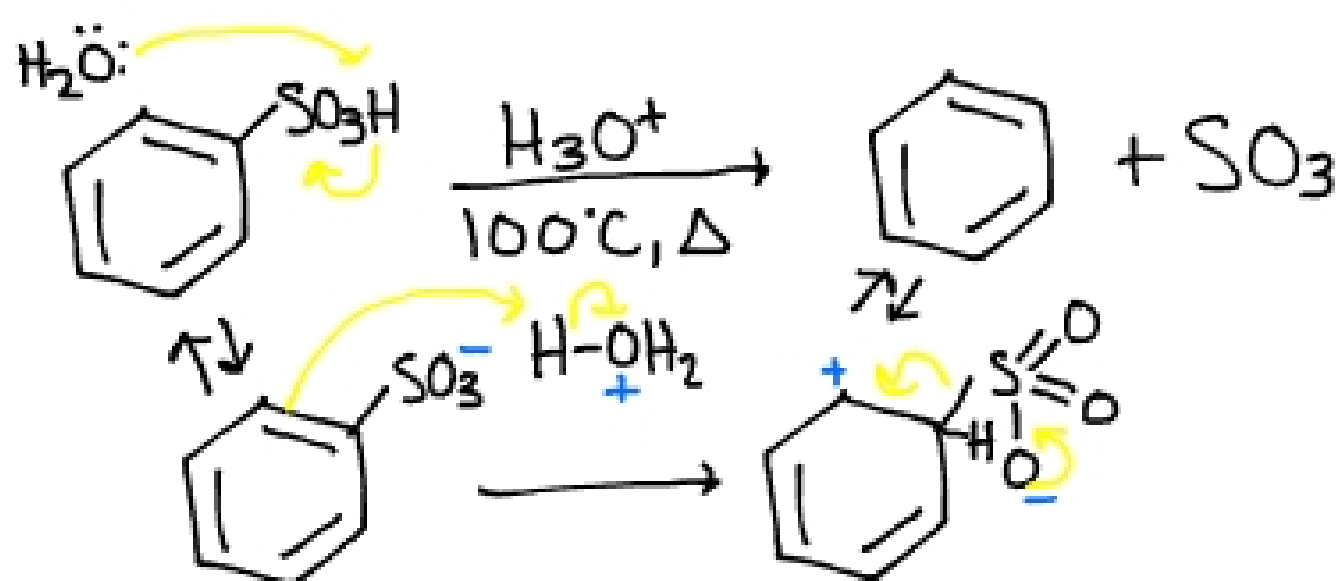
Sulfonation

- The electrophile is sulfur trioxide (SO₃)
- fuming H₂SO₄ (about 8% SO₃)

-mechanism



-sulfonation is reversible

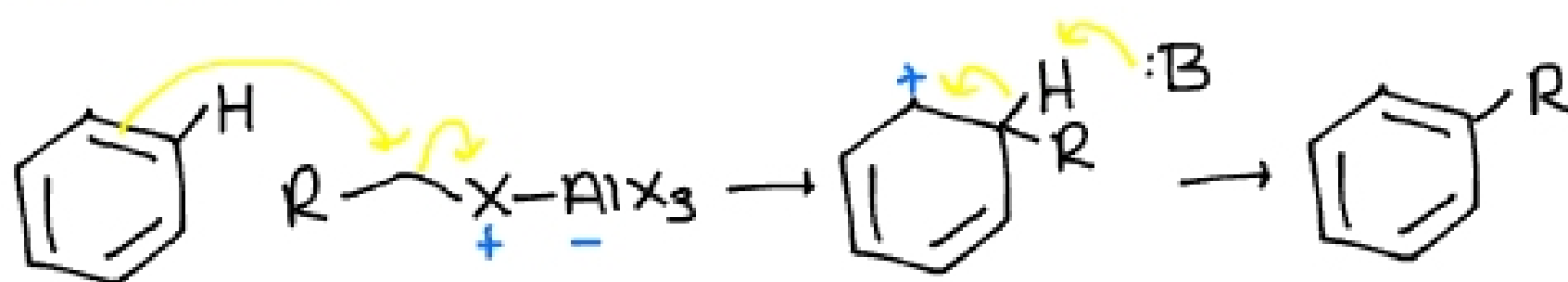


Friedel-Craft Alkylation

-The electrophile is a metallated alkyl halide



-mechanism



Example:

