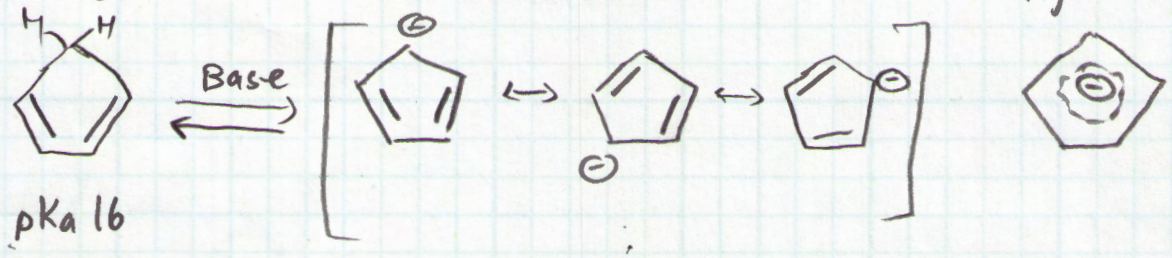
Charged Aromatics

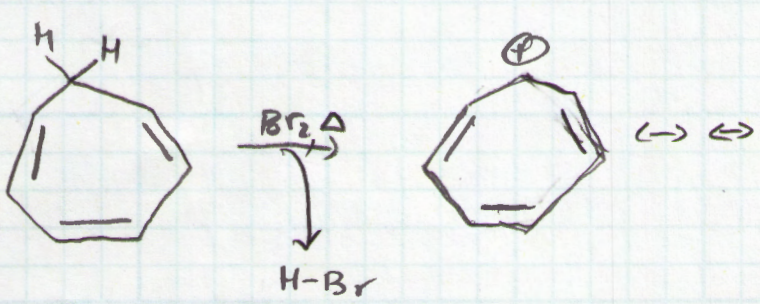


pKa 16

6 e⁻, 6 p orbitals, conj π system

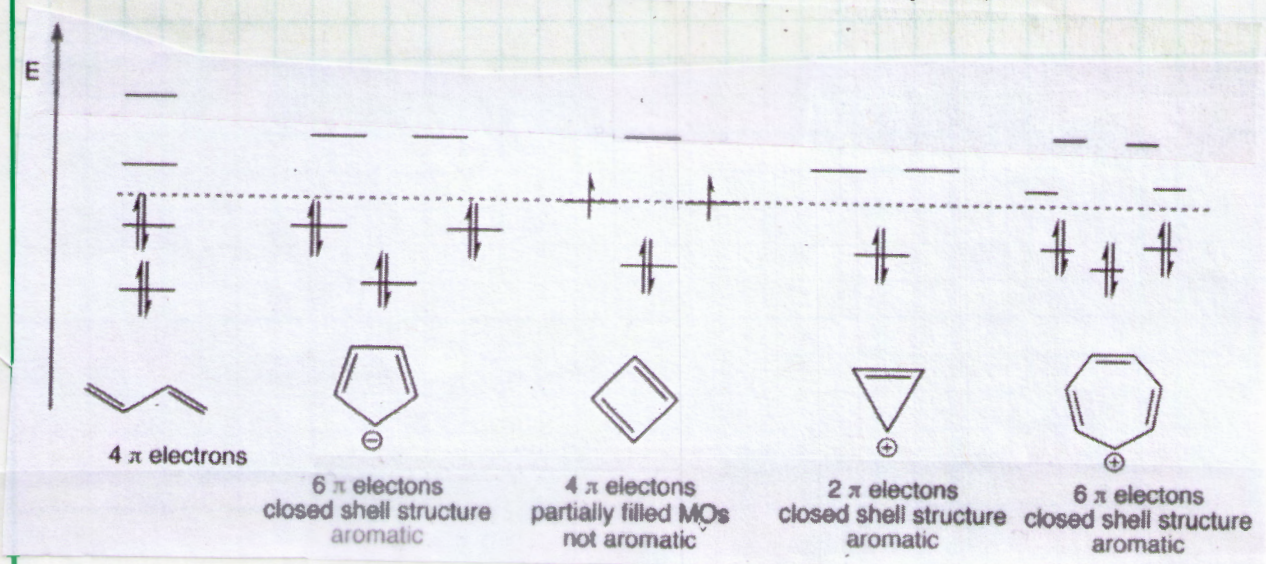
$4n+2 = 6$, $n = 1$ Follows Hückel ∴ Aromatic

- Cyclic ✓
- Conj cyclically ✓
- $4n+2$ π e⁻ ✓
- Flat ✓

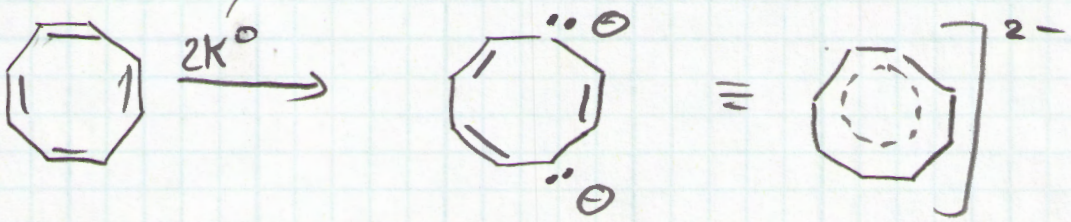


Follows Hückel

- Cyclic ✓
- conj cyclic ✓
- $4n+2$ e⁻ ✓
- Flat ✓ ∴ Aromatic



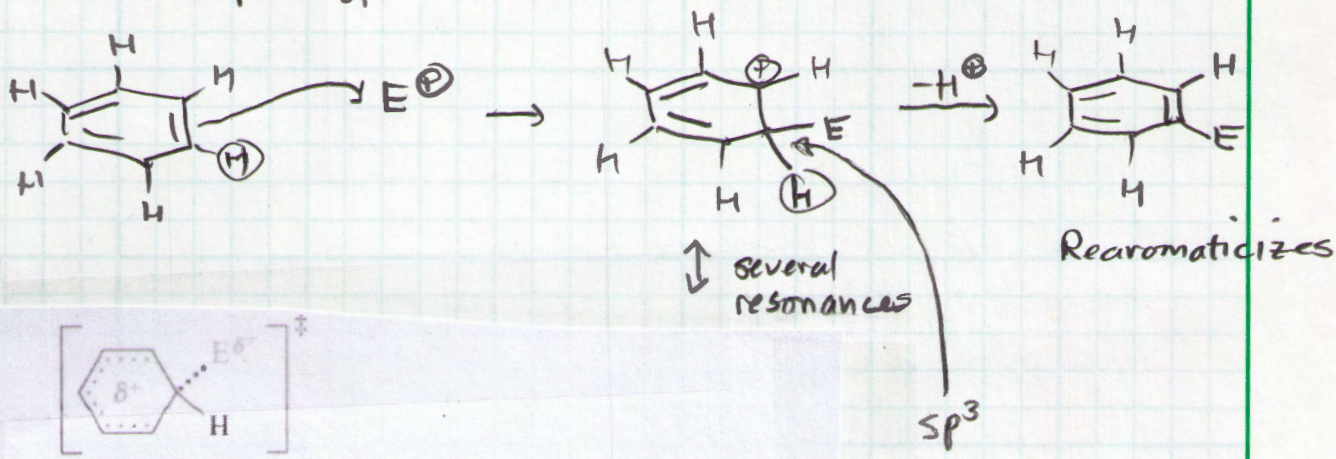
Converting cyclooctatetraene (non-aromatic) to aromatic as dianion

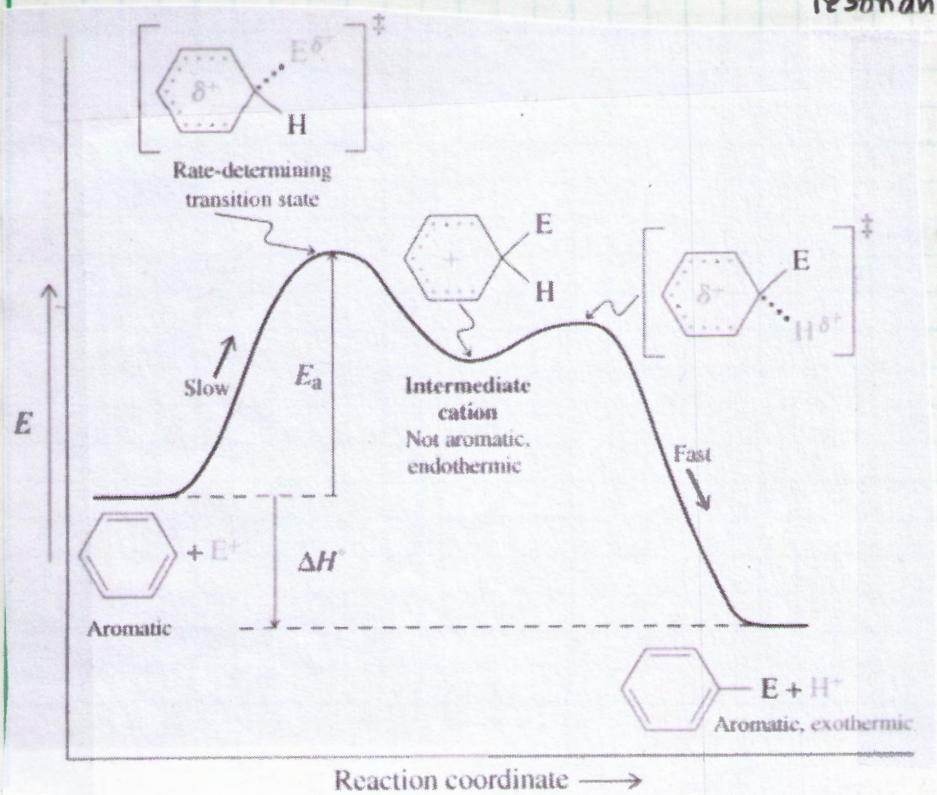


✓ Aromatic (planar)
✓ 4n+2

Reactivity of benzenes (aromatic rings)

Aromatic compounds are e⁻ rich ∴ they will generally act as nucleophiles that will attack electrophiles.





Halogenation of Benzene

- the π bonds of benzene are unusually stable

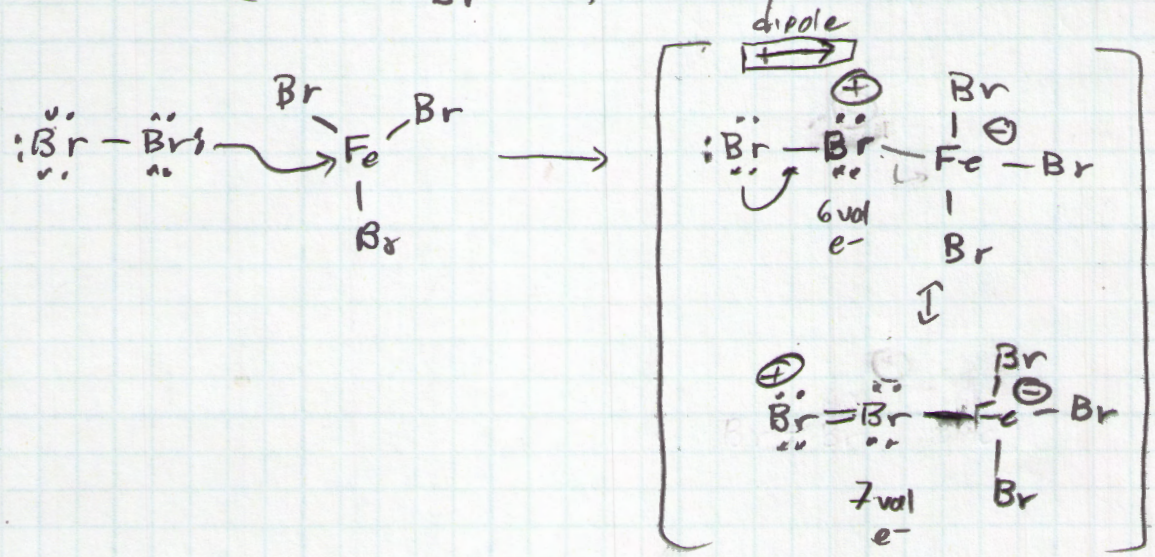
∴ NO RXN

→ Need an activator to either ⓐ ↑ reactivity of the benzene π bonds or ⓑ ↑ reactivity of the Br_2 reactant.

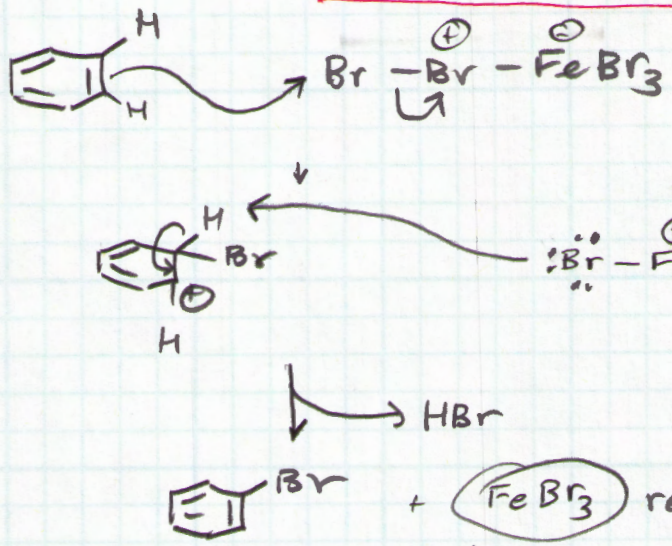
Option ⓑ is chosen! A Lewis acid is used as a recyclable catalyst to activate Br_2

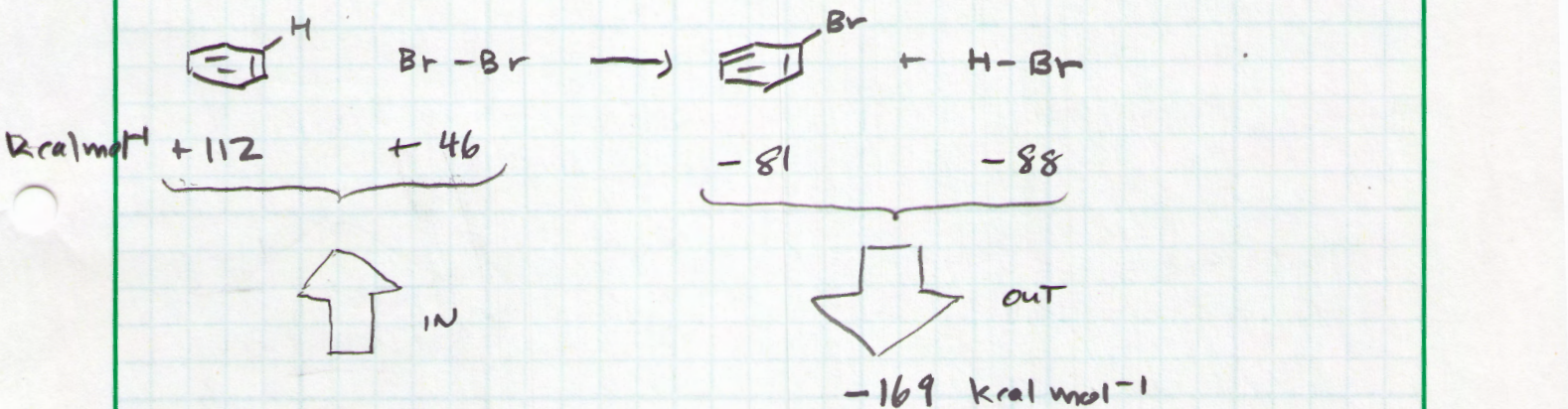
this momentary dipole was all that was needed to react with an alkene

$FeBr_3$ $\left(Br-\underset{\displaystyle Br}{\overset{\displaystyle Br}{\overset{|}{Fe}}}-Br \right)$ Lewis acid metal helps activate Br – Br



$Cl-\overset{\oplus}{Cl}-\overset{\ominus}{FeCl_3}$ <Chlorination Equivalent>





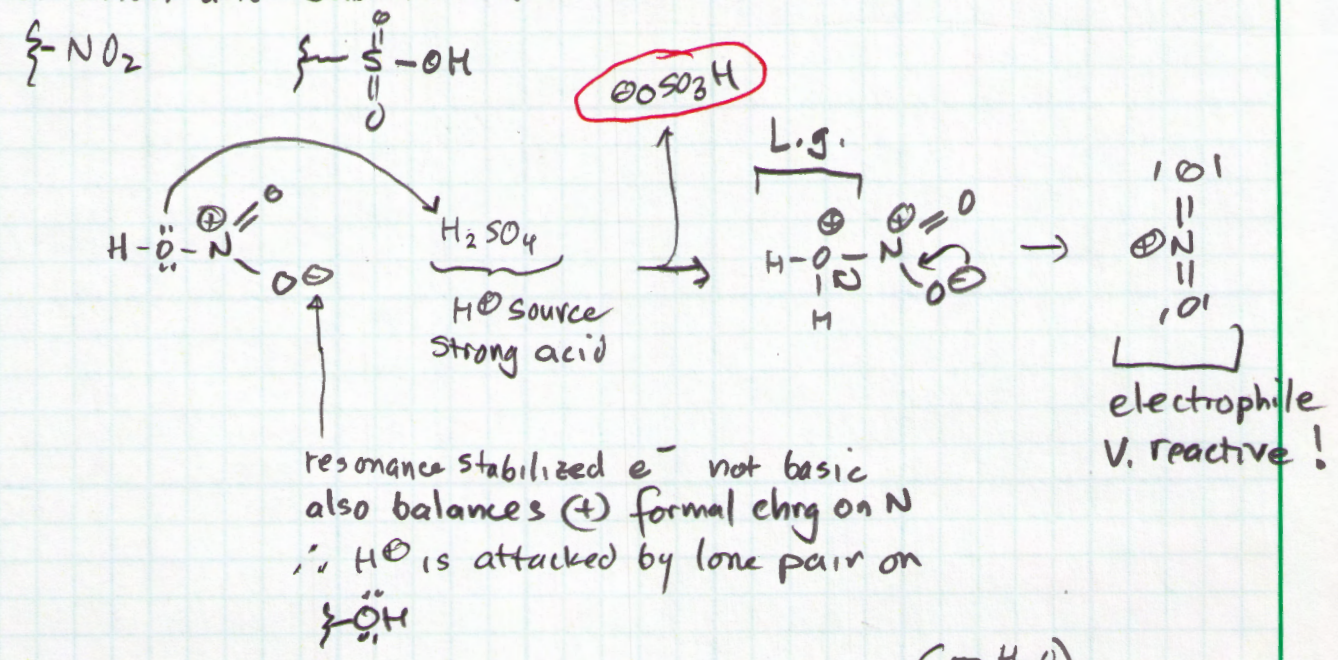
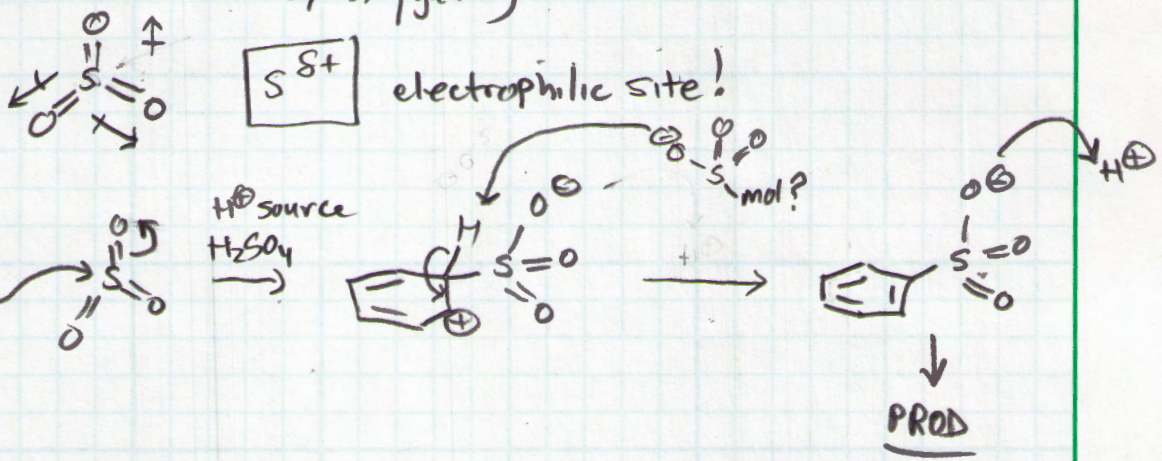
NET -10 kcal mol^{-1} Released!
EXOTHERMIC

Fluorination via

F-F FeF_3 Explosively exothermic

I-I FeI_3 Largely endothermic, Not practical

Nitration and Sulfonation of Benzene



Sulfonation (S uses d-orbitals to make hypervalent bonds w/ oxygens)