

Course Chem 345Lecturer FreemanDay Wed.Date 7/4/15Notes Taken By C. WeatherlyTotal # of Pages 5

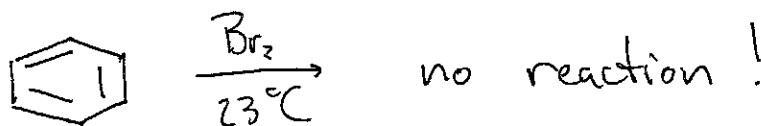
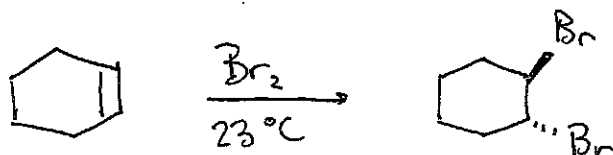
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Ch. 16 Benzene + derivatives

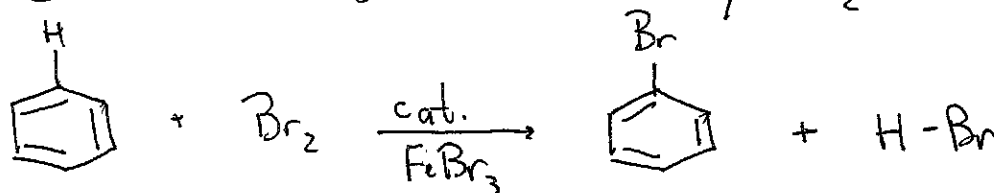
- Electrophilic aromatic substitution (EAS)

Background: π -system of benzene rings show much lower reactivity than alkene π systems

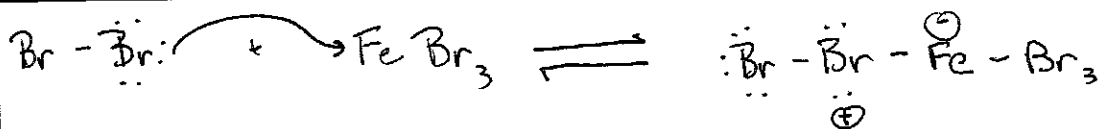
Rationale: energetic penalty from loss of aromaticity



But if we use a Lewis acid catalyst, aromatic rings can undergo reaction w/ Br_2 .

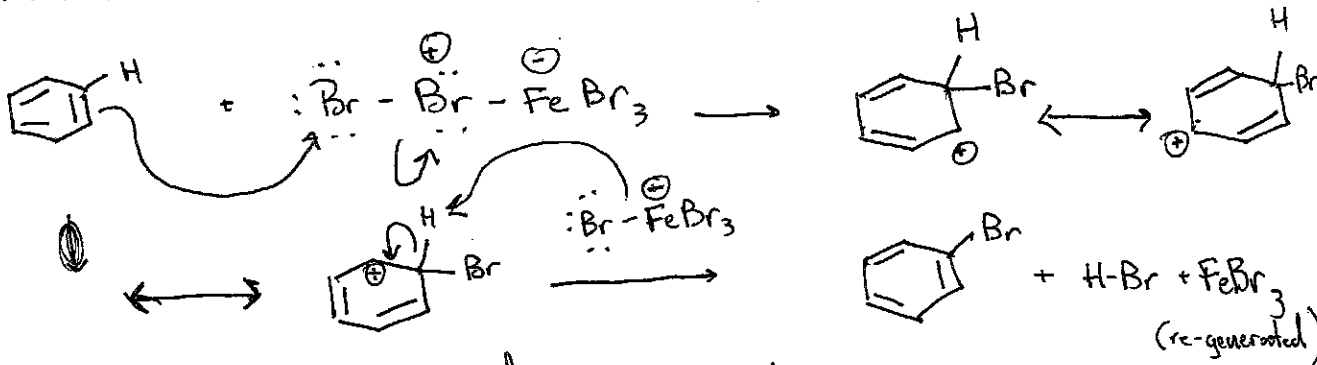


Key: generate a very reactive electrophile

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Br-Br bond is now weaker
than in Br_2
 $\therefore$ reacts w/ aromatics

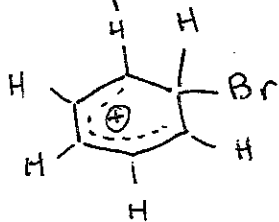
Mechanism:



Note: don't use curved arrows to show changes in electrons between resonance structures

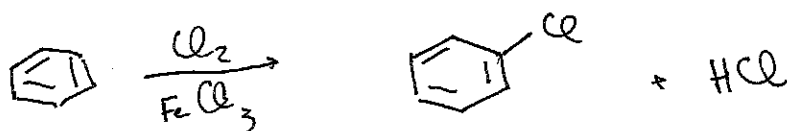
* The cationic intermediate is highly resonance delocalized, but ring is no longer aromatic

Another representation of intermediate:

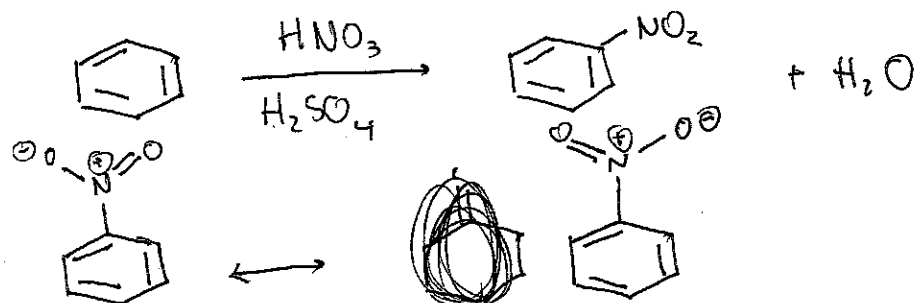


- $4 \pi e^-$

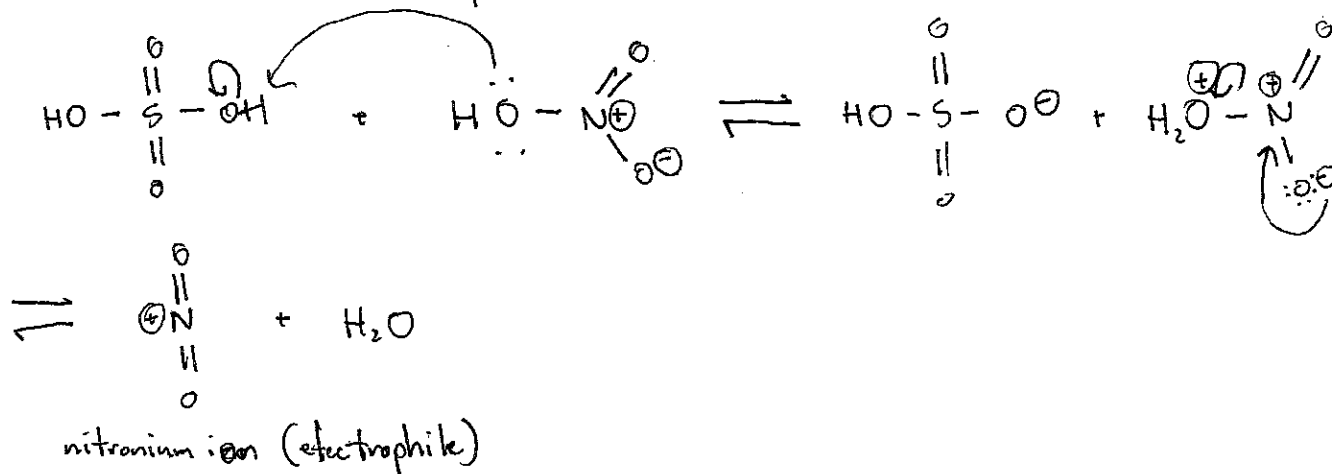
- π system isn't cyclic
(ring isn't fully conjugated)

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Nitration:



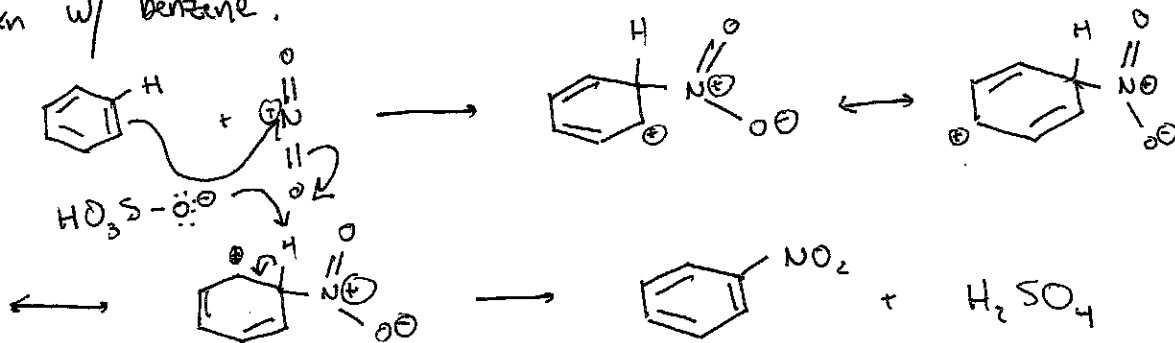
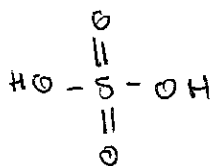
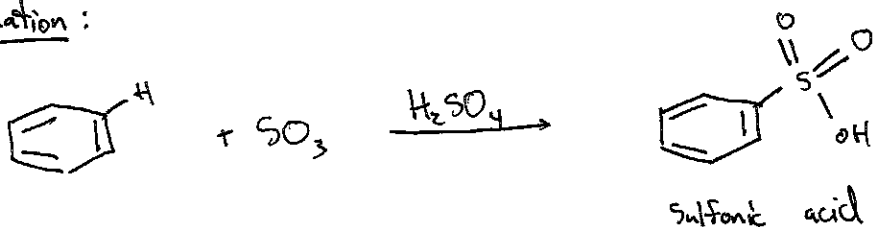
Generation of electrophile:



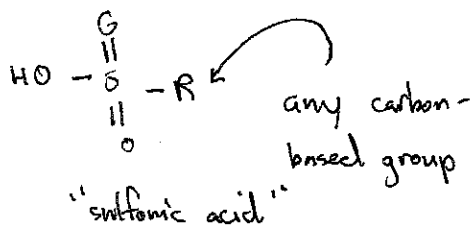
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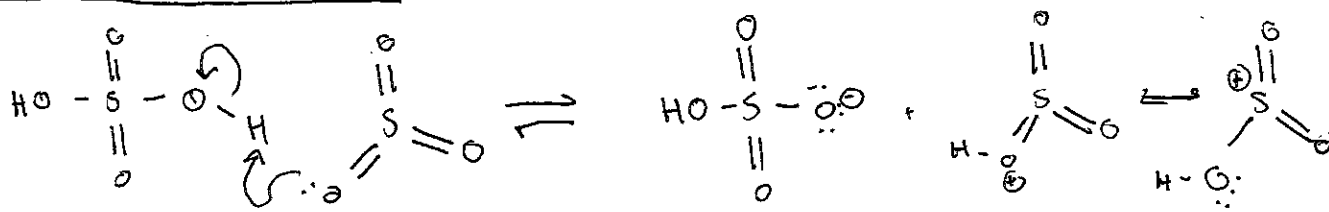
Rxn w/ benzene:

Sulfonation:

"sulfuric acid"

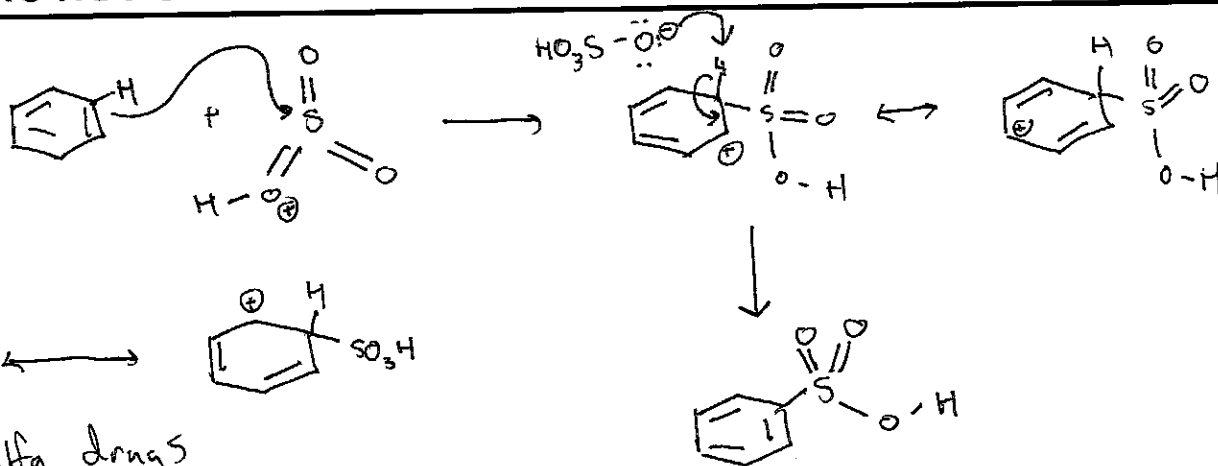


"sulfonic acid"

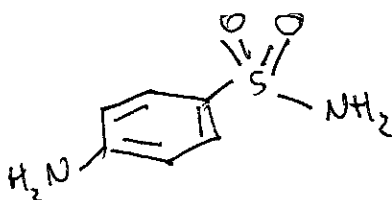
Electrophile generation

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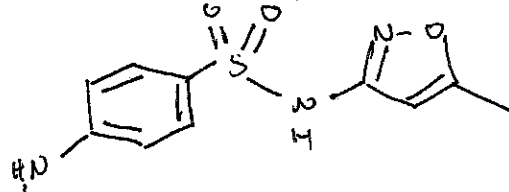
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Sulfa drugs

Sulfanilamide



Sulfamethoxazole



- SO_3 itself can serve as the electrophile in some cases $\Rightarrow$ crucial for synthesis of sulfa drugs