B.Sc. Semester-II
Core Course-III (CC-III)
Organic Chemistry-I

IV. Aromatic Hydrocarbons

5. Bromination of Aromatic Ring

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IV Aromatic Hydrocarbons **10 Lectures**

Aromaticity: Hückel's rule, aromatic/anti-aromatic/non-aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples.

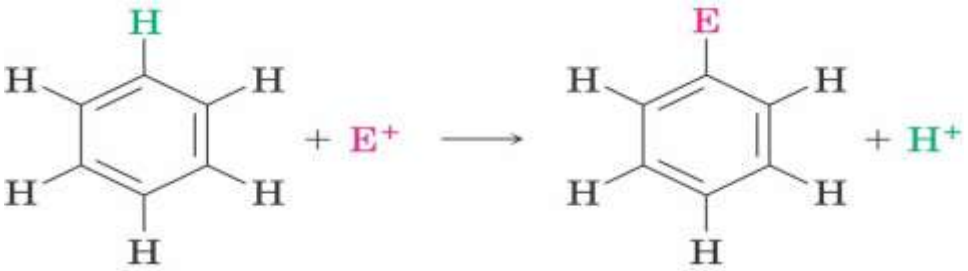
Electrophilic aromatic substitution: Halogenation, Nitration, Sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directing effects of mono-functional groups.

Coverage:

1. Bromination of Aromatic Ring

Substitution Reactions of Benzene Ring

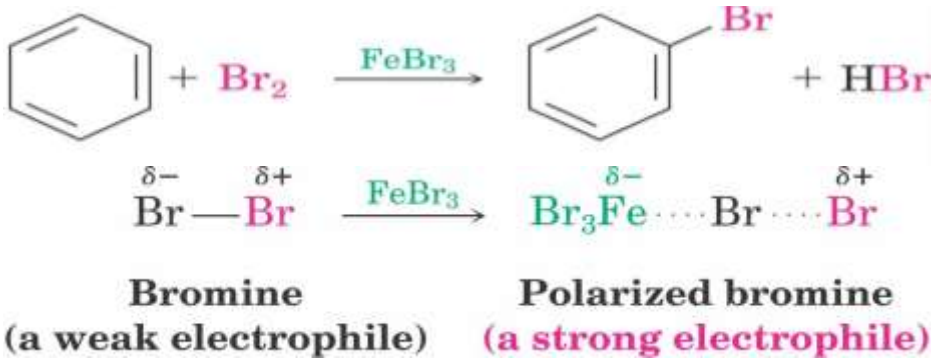
- Benzene is aromatic: a cyclic conjugated compound with 6 π electrons
- Reactions of benzene lead to the retention of the aromatic core
- Electrophilic aromatic substitution replaces a proton on benzene with another electrophile



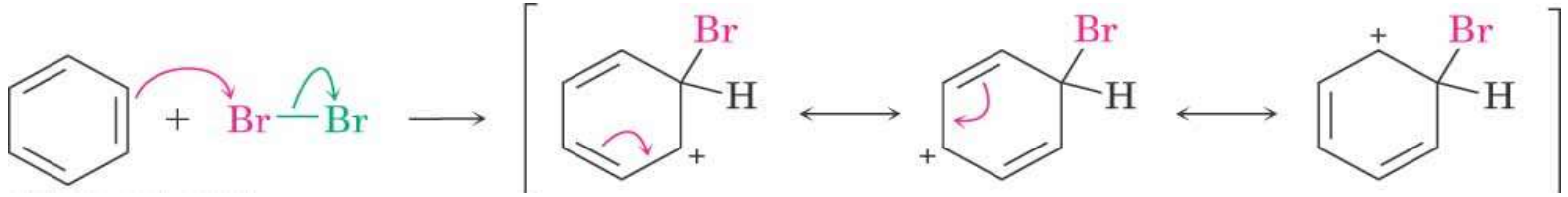
Bromination of Aromatic Rings

- Benzene's π electrons participate as a Lewis base in reactions with Lewis acids
- The product is formed by loss of a proton, which is replaced by bromine
- $FeBr_3$ is added as a catalyst to polarize the bromine reagent

Mechanism:

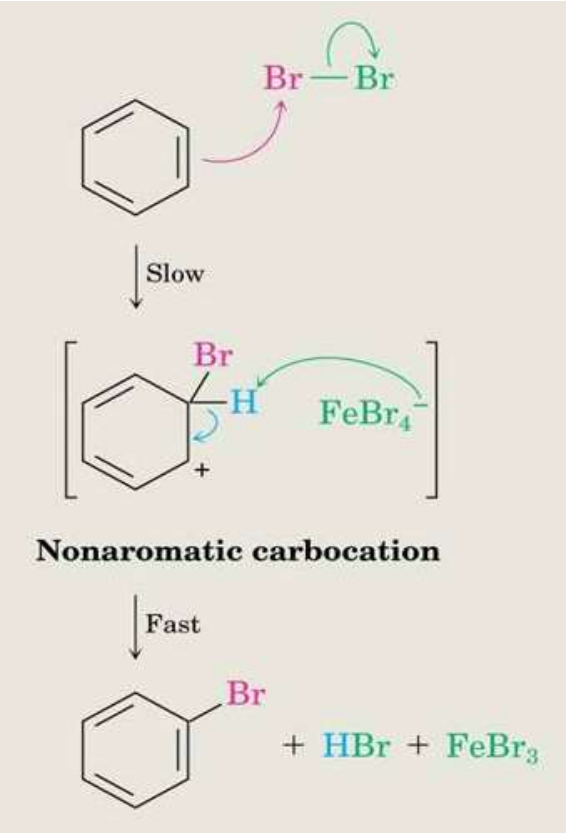


- The addition of bromine occurs in two steps
- In the first step the π electrons act as a nucleophile toward Br_2 (in a complex with $FeBr_3$)
- This forms a cationic addition intermediate from benzene and a bromine cation
- The intermediate is not aromatic and therefore high in energy.

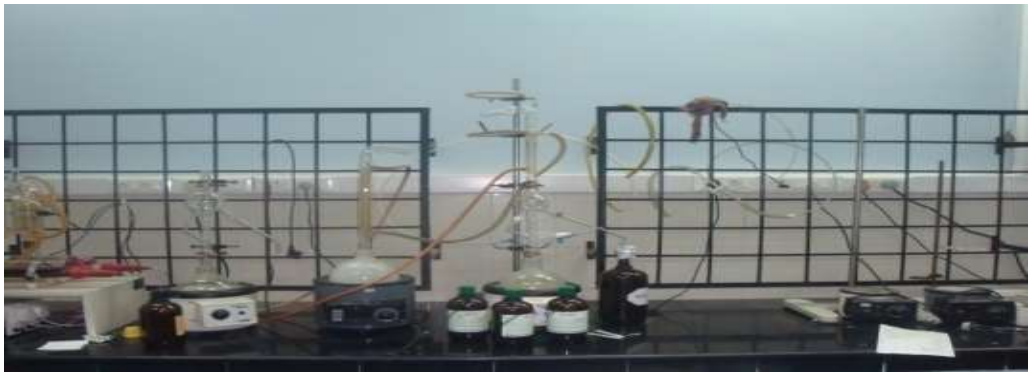


Formation of Product from Intermediate

- The cationic addition intermediate transfers a proton to $FeBr_4^-$ (from Br^- and $FeBr_3$)
- This restores aromaticity (in contrast with addition in alkenes)



Thank You



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