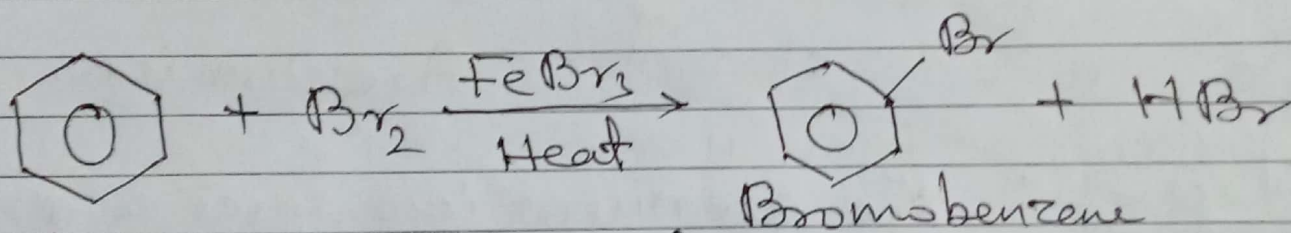
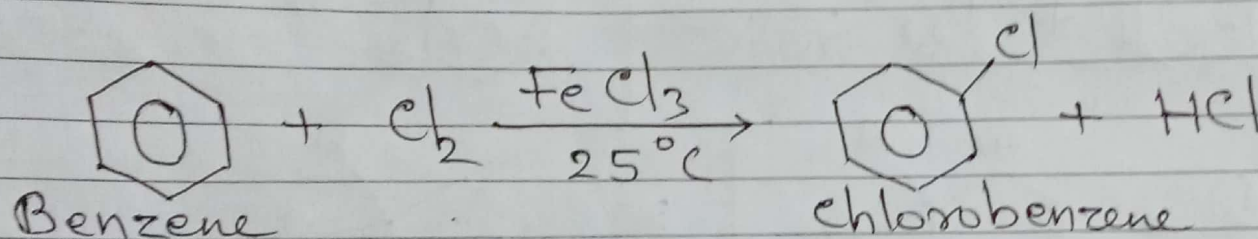


Halogenation

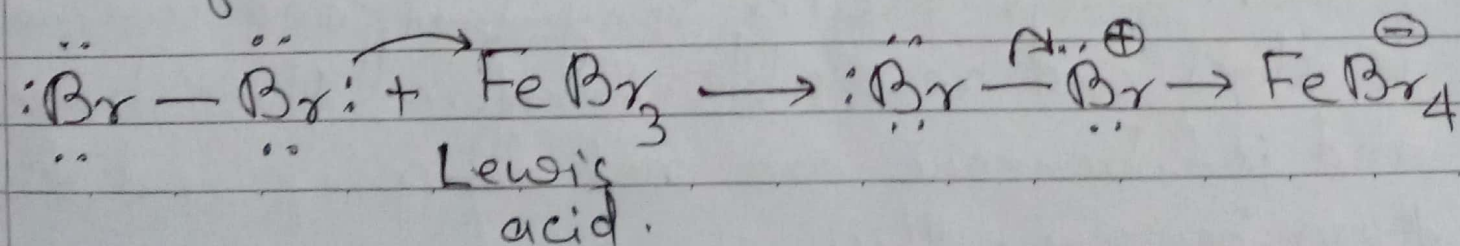
Replacement of H atom of benzene nucleus by -X group (-Cl, -Br) is called halogenation and product formed is called halobenzene (chlorobenzene, bromobenzene)

Benzene under goes to halogenation on treatment with halogens (X_2) in presence of a Lewis acid catalyst (~~Anhydrous~~ Anhydrous $FeCl_3$, $FeBr_3$)

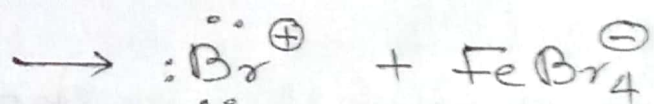
Mechanism of halogenation.

Following steps are involved in the mechanism of halogenation.

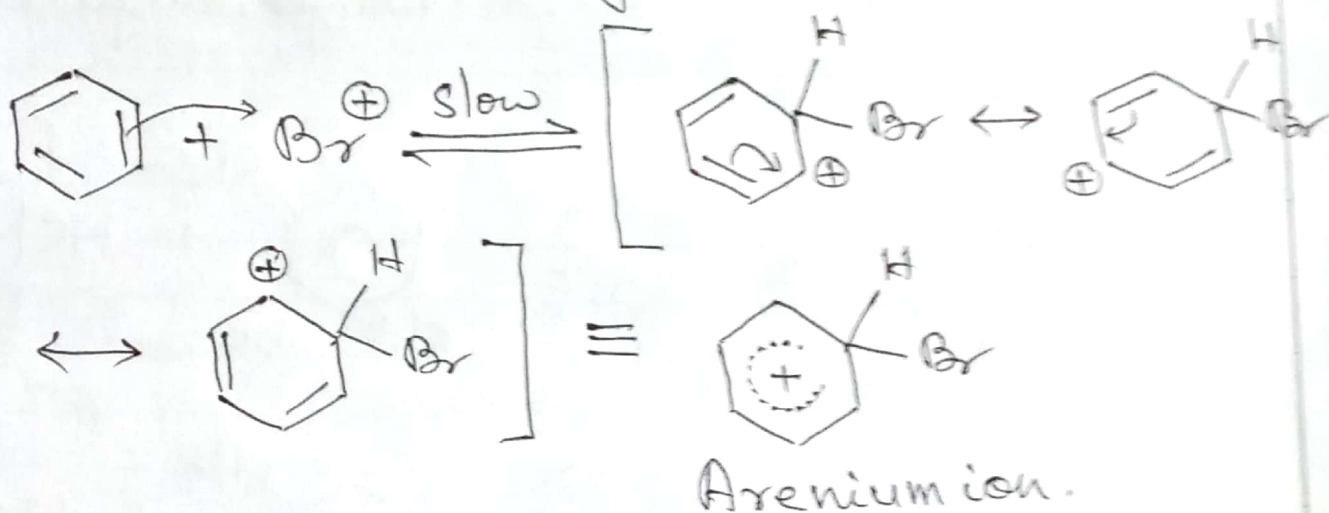
Step - 1: Bromine molecule combines with $FeBr_3$ to form a complex that dissociates to form a bromonium ion (Br^+) and $FeBr_4^-$



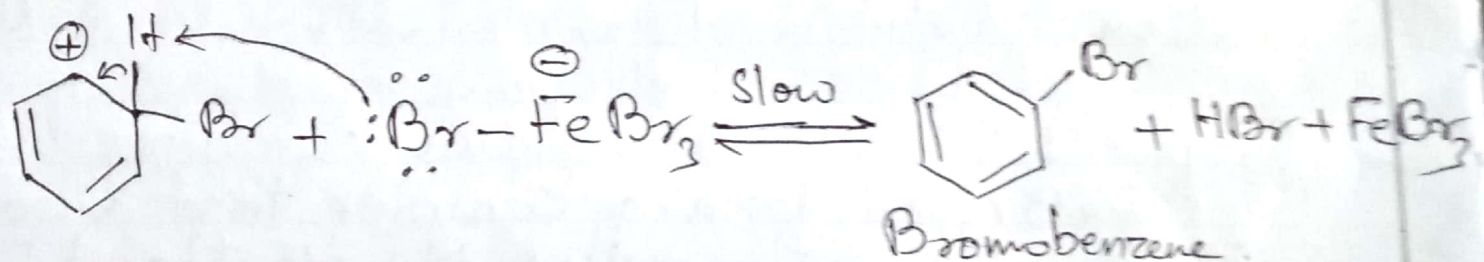
Teacher's Signature : _____



Step-2: The electrophile bromonium ion (Br^{\oplus}) accepts electron from π -bond of the aromatic carbon to form a σ -complex. It is slow and rate determining step.

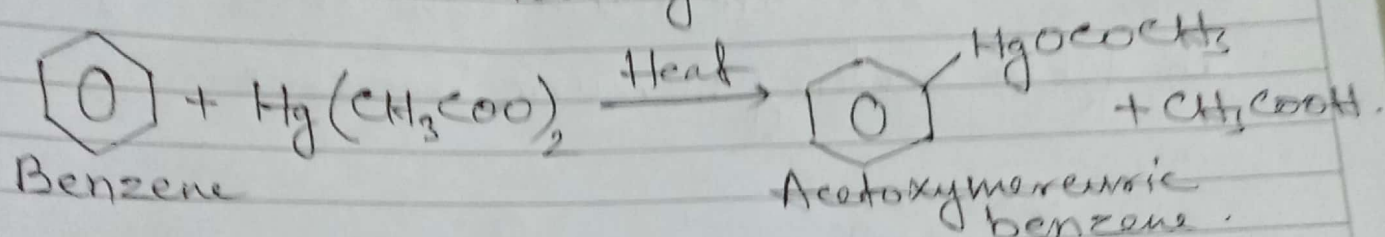


Step-3: The arenium ion loses a proton to form benzene sulphonate ion and retains aromatic character.



* Fluorination occurs very fast and iodination is slow and reversible. Therefore, fluorobenzene and iodobenzene are not ~~not~~ prepared directly from benzene. These compounds are prepared by indirect synthesis.

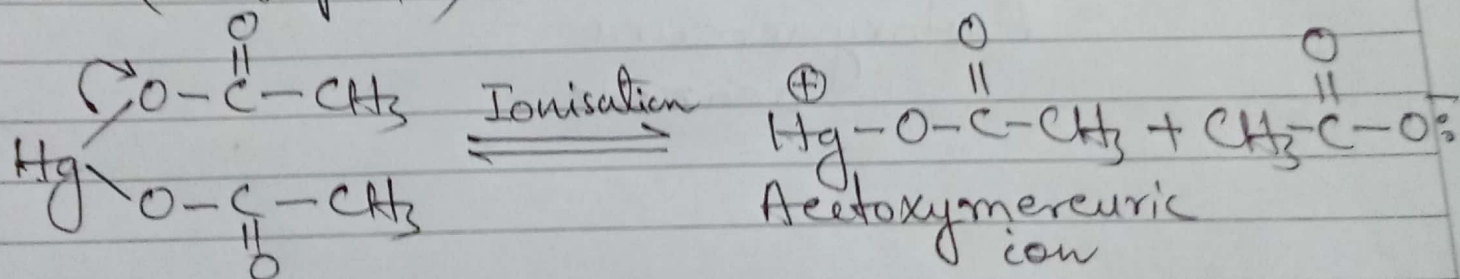
④ Mercuration - The replacement of H atom of benzene nucleus by acetoxy-mercuric group ($\text{CH}_3\text{-COOHg-}$) is called mercuration and the product formed is called acetoxymercuric benzene. Benzene undergoes to mercuration on heating with mercuric acetate.



Mechanism of mercuration

Following steps are involved in the mercuration of benzene.

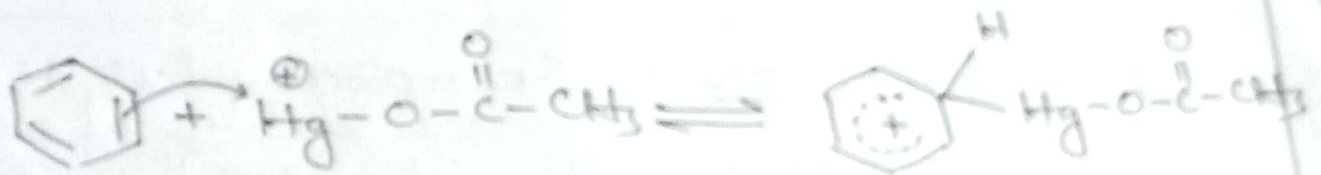
Step-1: Mercuric acetate under goes to ionisation and gives acetate ion and acetoxymercuric ion (electrophile)



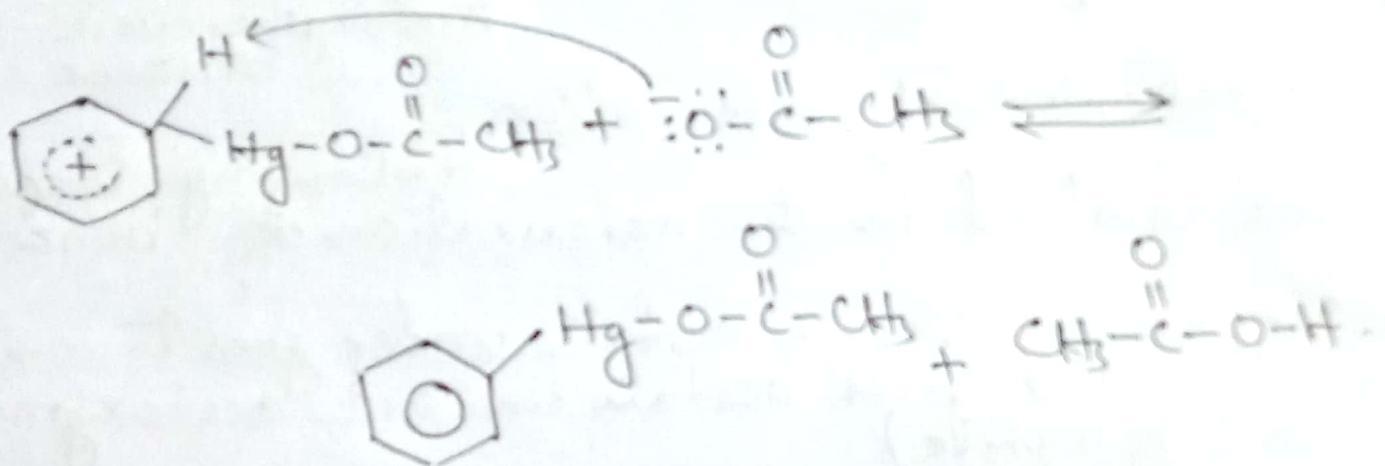
Step-2 - Electrophile acetoxymercuric ion accepts electron from π -bond of the aromatic carbon to form a sigma complex arenium ion.

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(10)



Step-3: The arenium ion loses a proton to form acetoxy mercuric benzene.



Acetoxymercuric
benzene