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AROMATIC COMPOUNDS

By khutjo

AROMATIC COMPOUNDS

➤ REACTIONS OF AROMATIC COMPOUNDS

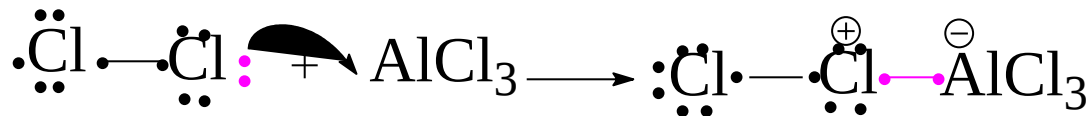
✓ Halogenation

-Chlorination

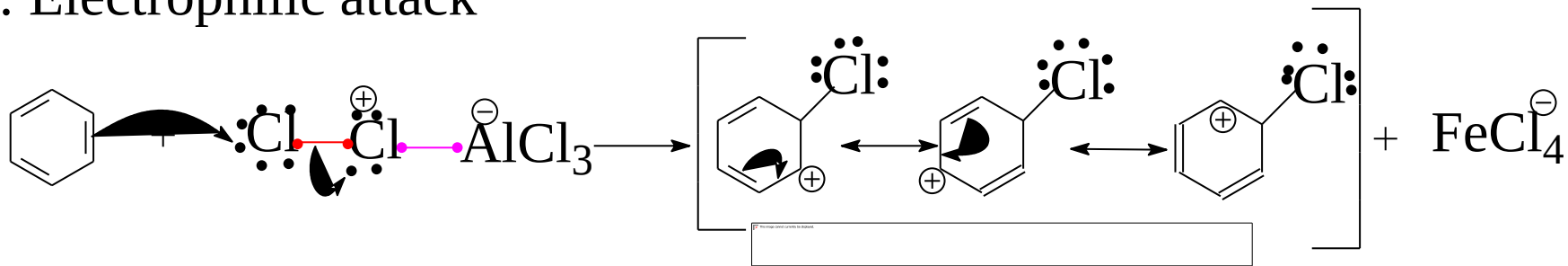
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- Chlorination of benzene works much like bromination, in addition of FeBr_3 , AlCl_3 can be used also as Lewis acid catalyst.

Step 1: Formation of a strong electrophile



Step 2: Electrophilic attack



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✓ Nitration of Benzene

- Aromatic compounds can be nitrated by reaction with a mixture of concentrated **nitric acid** and **sulfuric acid**.
- The electrophile used is **nitronium ion** (NO_2^+) which reacts with benzene.
- The product of the reaction is **nitrobenzene**.

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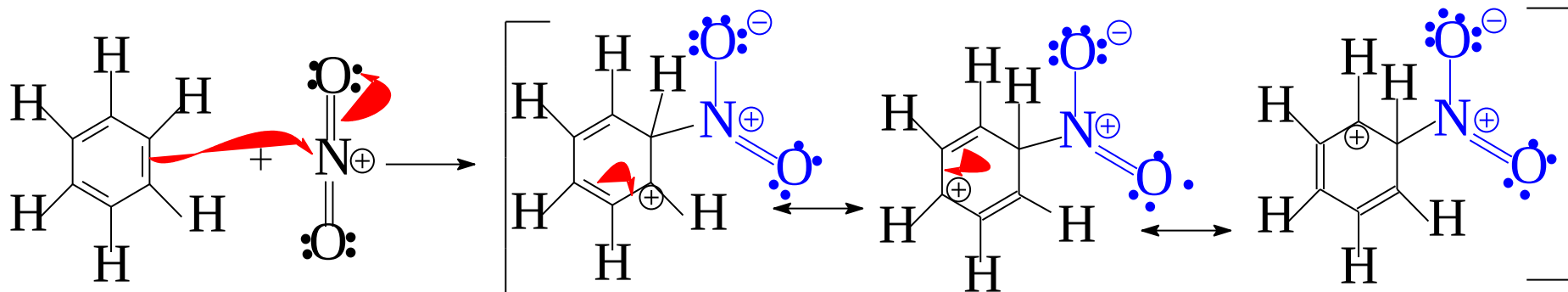
➤ REACTIONS OF AROMATIC COMPOUNDS

✓ Nitration of Benzene

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Mechanism:

Step 2: The aromatic ring attacks the electrophile (nitronium ion) to form sigma complex



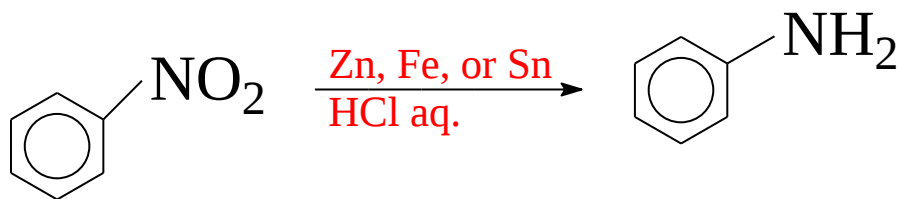
Sigma complex Resonance forms

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✓ Nitration of Benzene

Important: The aromatic nitro groups are easily reduced to amino ($-NH_2$) in presence of metals like **Sn, Fe, or Zn** in diluted HCl.

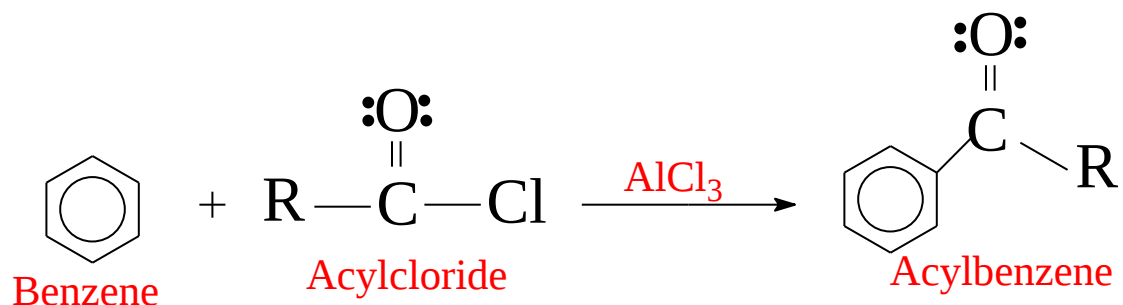


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➤ REACTIONS OF AROMATIC COMPOUNDS

✓ Friedel-Crafts Acylation reaction

- When an aromatic compound (benzene) is treated with a carboxylic acid chloride (RCOCl) in presence of Lewis acid (AlCl_3), an **Acylium ion** ($\text{R}-\overset{\oplus}{\text{C}}=\ddot{\text{O}}$) is formed at the first step of the reaction.
- At second step of the reaction, the acyl group is introduced into the ring to form the ketone (acyl benzene).



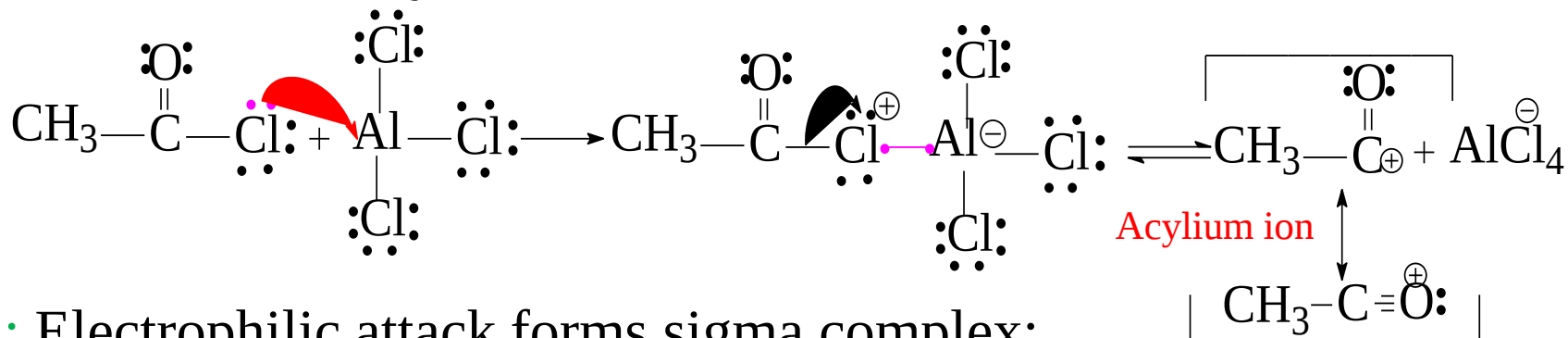
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➤ REACTIONS OF AROMATIC COMPOUNDS

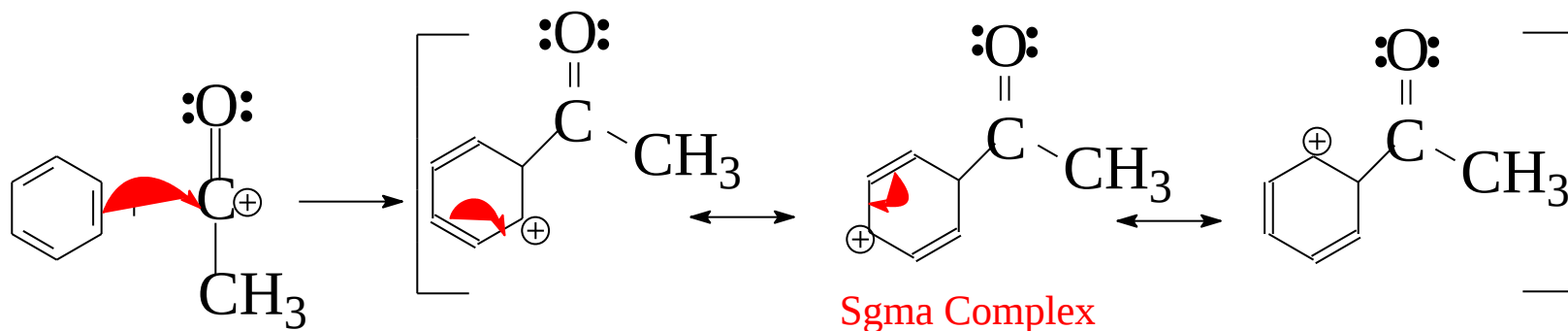
✓ Friedel-Crafts acylation reaction

Mechanism:

Step 1: Formation of acylium ion.



Step 2: Electrophilic attack forms sigma complex:



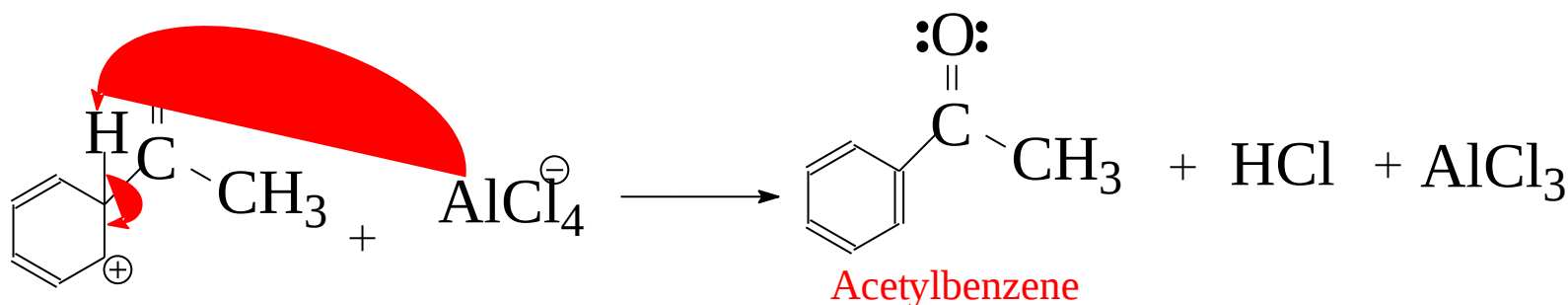
AROMATIC COMPOUNDS

➤ REACTIONS OF AROMATIC COMPOUNDS

✓ Friedel-Crafts acylation reaction

Mechanism:

Step 3: The loss of proton regenerates the aromatic system.



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Exercises

3. Carbocations generated by reaction of an alkene with a strong acid catalyst can react with aromatic rings in a Friedel-Crafts reaction. Propose a mechanism to account for the industrial synthesis of the food preservative BHT from *p* – cresol and 2 – methylprop – 1 – ene

