

JEE WEIGHTAGE: HIGH

9.10 Importance of Diazonium Salts in Synthesis

Unlocking the synthesis pathways for complex aromatic compounds.

The Locked Door of Aromatic Synthesis

Direct halogenation of benzene works perfectly for Chlorine and Bromine, but fails for Fluorine and Iodine due to severe reactivity constraints.

 Direct Substitution (Blocked)

Benzene + F₂ → Fluorobenzene (Too violent/explosive)

Benzene + I₂ ⇌ Iodobenzene (Reversible, incredibly slow)

These direct paths are chemically inaccessible.

The Diazonium Detour

Diazonium salts act as perfect intermediates, allowing the smooth introduction of F and I into the aromatic ring.

✓ The Diazotisation Route (Enabled)



Notice how the unstable N_2^+ group acts as a perfect leaving group (N_2 gas escapes).



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$$E=mc^2$$



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Key Highlights

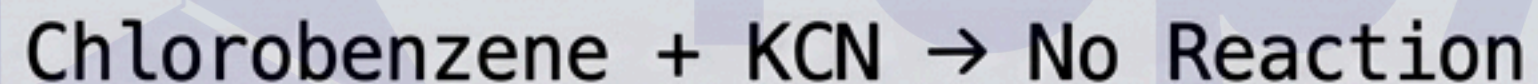
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The Nucleophilic Dead-End

Introducing a cyano ($-\text{CN}$) group directly to an aryl halide is another chemically blocked path.

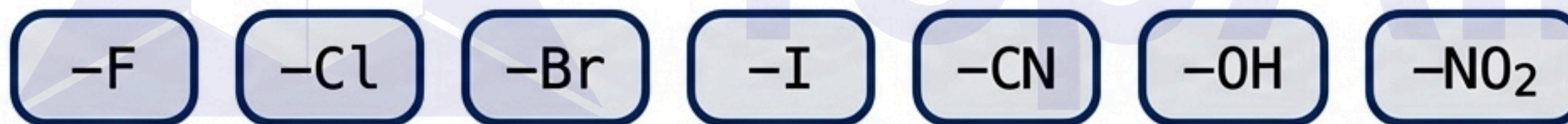
 Direct Nucleophilic Substitution (Blocked)



The C-Cl bond in chlorobenzene has partial double-bond character due to resonance, blocking nucleophilic attack by CN^- .

Diazonium: The Ultimate Intermediate

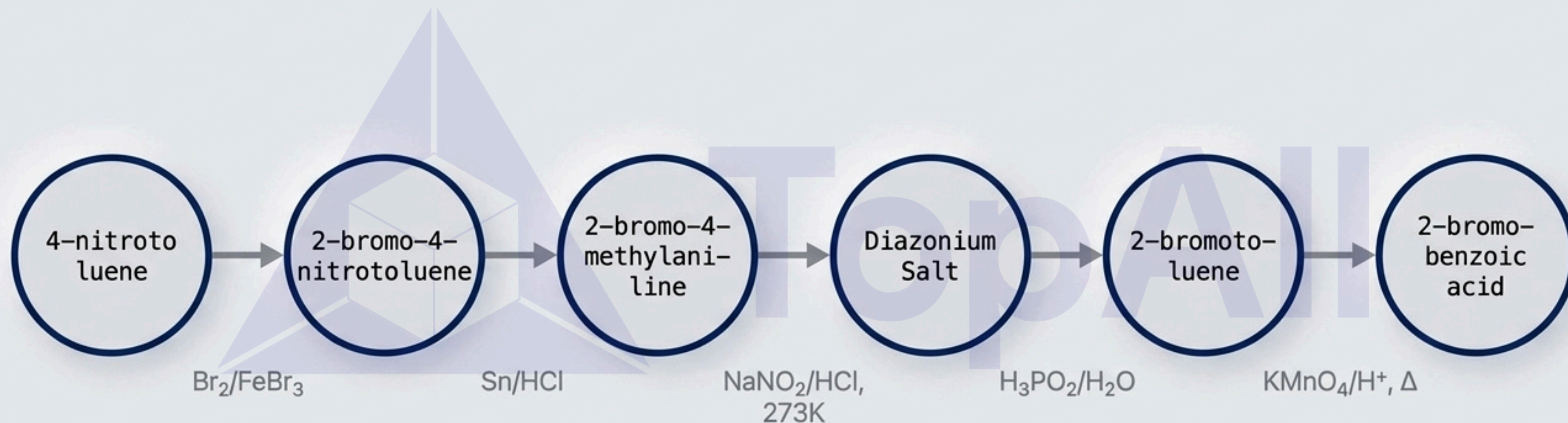
Cyanobenzene cannot be formed directly from chlorobenzene, but it can be easily obtained from a diazonium salt using CuCN (Sandmeyer Reaction).



Diazonium salts act as universal adapters for synthesizing substituted aromatic compounds that cannot be prepared directly.

Example 9.5: Multi-Step Synthesis

Converting 4-nitrotoluene into 2-bromobenzoic acid.



Chapter Summary



- **Excellent Intermediates:** Diazonium salts allow the smooth introduction of halogens, cyano, and hydroxyl groups into the aromatic ring.
- **Bypassing Limitations:** They provide successful detours for reactions that **fail** directly (like fluorination, iodination, or cyano-substitution on chlorobenzene).
- **Synthetic Utility:** Essential for preparing a wide variety of substituted aromatic compounds that are otherwise chemically inaccessible.

You've completed Unit 9.

You now understand the structure, reactions, and immense synthetic value of **Amines** and **Diazonium Salts**.

[Review all 10 concepts →](#)



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