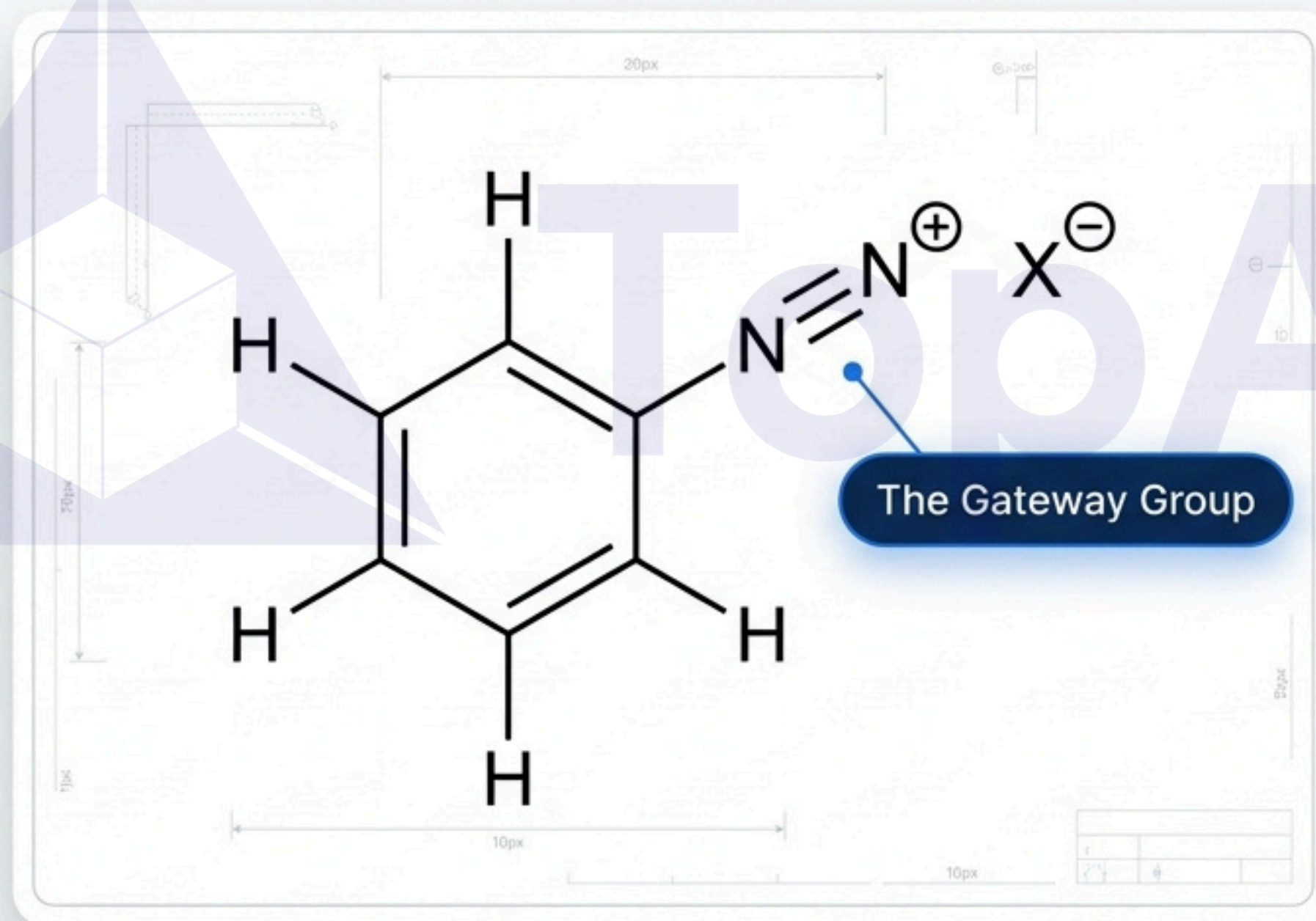


9.10 Importance of Diazonium Salts in Synthesis

Unlocking Difficult Aromatic Substitutions



THE SYNTHETIC ADVANTAGE

Overcoming Aromatic Limitations

Diazonium salts act as powerful intermediates, allowing chemists to introduce functional groups into the aromatic ring that are otherwise extremely difficult or impossible to attach directly.



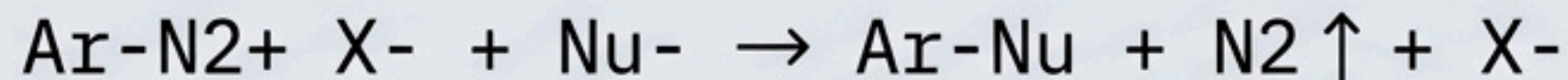
The Natural Barrier

Benzene rings inherently resist certain direct substitutions due to their high stability and dense electron clouds.



The Leaving Group

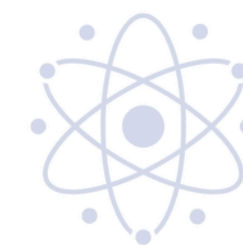
The diazonium group acts as an exceptionally good leaving group. It readily escapes as highly stable N₂ gas, thermodynamically driving the substitution forward.





You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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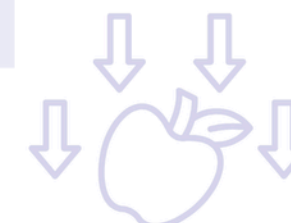
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THE ARSENAL

Functional Groups Introduced via Diazonium

The replacement of the diazo group is highly versatile, providing targeted routes to a wide variety of substituted aromatic compounds.

Halides & Pseudohalides (Sandmeyer / Gatterman)

[-Cl]

[-Br]

[-CN]

Special Halides

[-F]

via Fluoroborate

[-I]

via KI

Oxygen & Nitrogen Groups

[-OH]

via Hydrolysis

[-NO₂]via Fluoroborate + NaNO₂

Reduction (Removal)

[-H]

via H₃PO₂ or Ethanol

Direct Substitution vs. Diazonium Route

Aryl Fluorides & Iodides

Direct Method



FAILS.

Cannot be prepared by direct halogenation (fluorination is too violent; iodination is reversible and slow).

Diazonium Route



SUCCEEDS.

Easily prepared by treating diazonium with KI (for Iodine) or HBF_4 followed by heating (for Fluorine).

Cyano Group (-CN)

Direct Method



FAILS. Nucleophilic substitution of chlorine in chlorobenzene does not work easily.

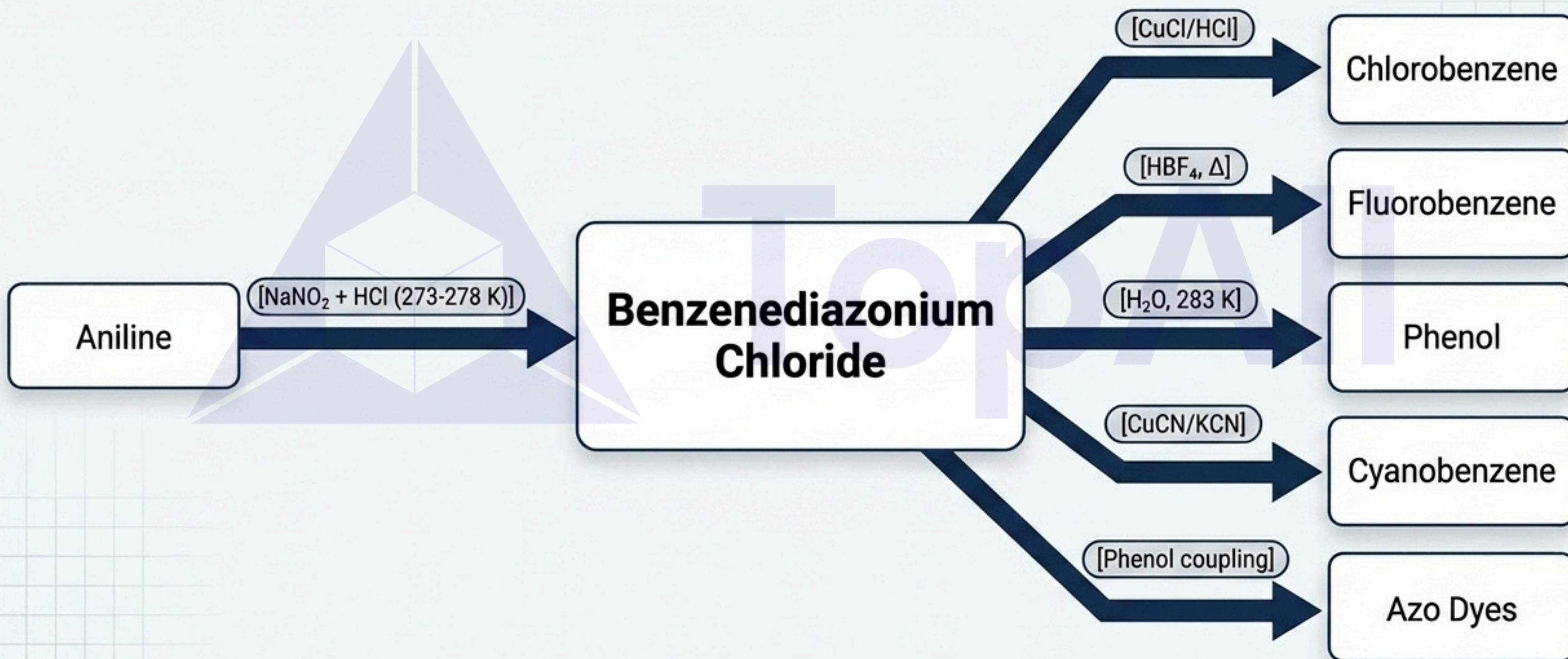
Diazonium Route



SUCCEEDS. Readily obtained via the Sandmeyer reaction using CuCN / KCN .

THE MASTER PATHWAY

From Aniline to Infinite Possibilities



The Power of Diazonium Intermediates

The Ultimate Intermediate

Serves as the crucial, highly versatile stepping stone from primary aromatic amines to diverse substituted arenes.

Unlocks the Impossible

Enables the synthesis of aryl fluorides, iodides, and cyanides where direct electrophilic or nucleophilic substitution completely fails.

Clean & Efficient

Reactions are thermodynamically driven by the exceptional leaving ability of nitrogen gas (N_2), resulting in clean, high-yield displacements.



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