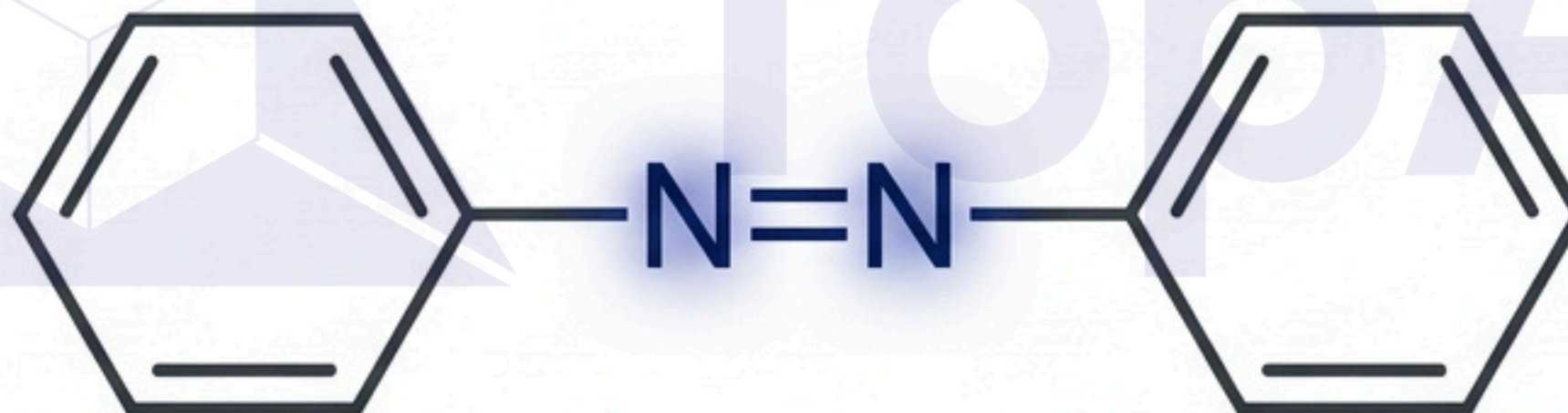
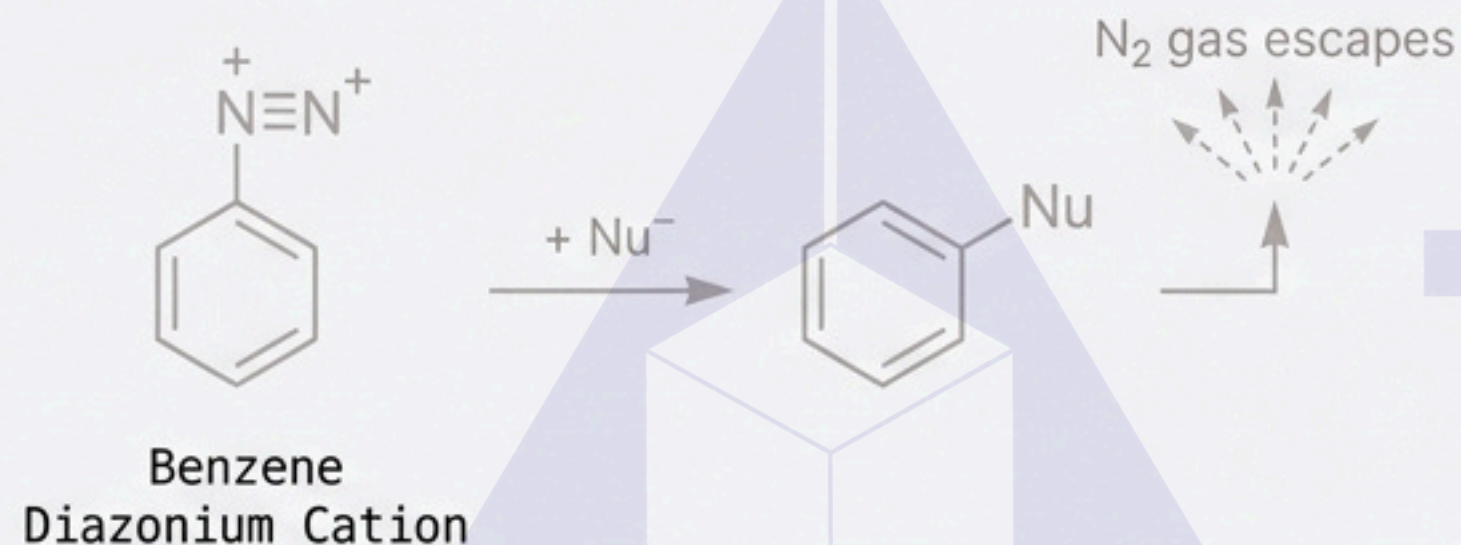


9.9.2 COUPLING REACTIONS OF DIAZONIUM SALTS

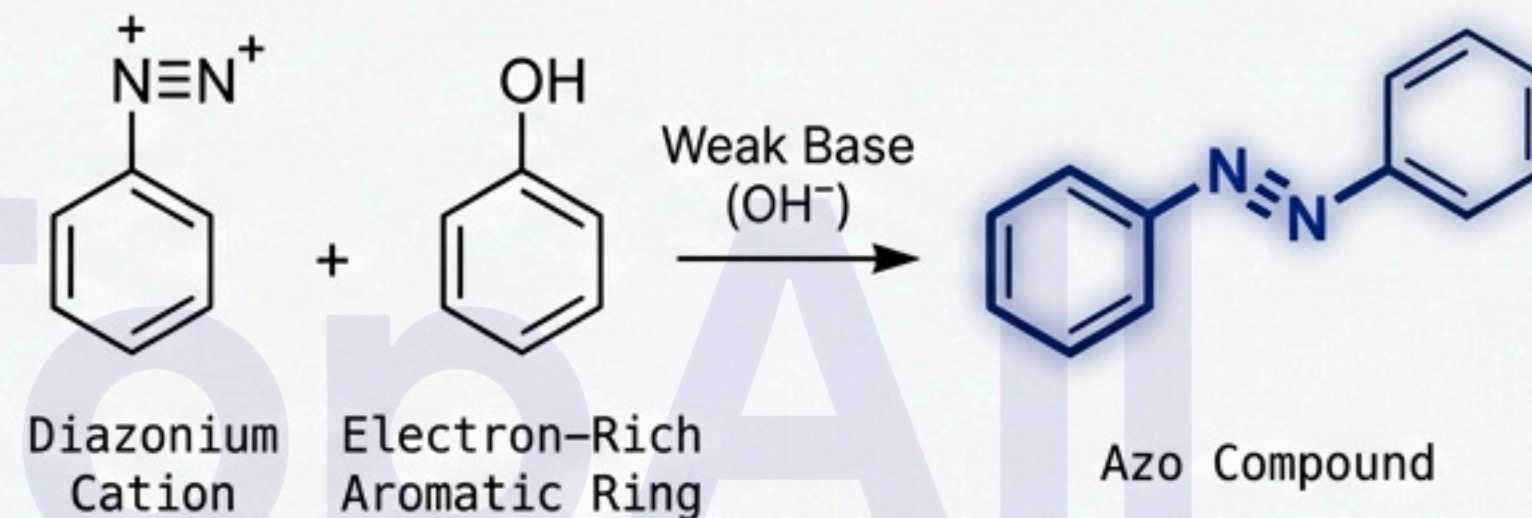


Retention of the Diazo Group

Displacement Reaction



Coupling Reaction



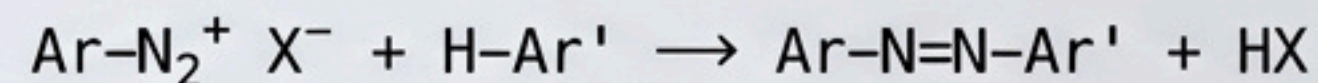
[The Mechanism]

Electrophilic Substitution.

The diazonium cation acts as the electrophile, attacking an electron-rich aromatic ring.

[The Target]

Coupling primarily occurs at the **para-position** of **highly reactive aromatic rings** to minimize steric hindrance.



Unlike displacement reactions, coupling retains nitrogen to build **larger, multi-ring molecules**.



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

$$E=mc^2$$



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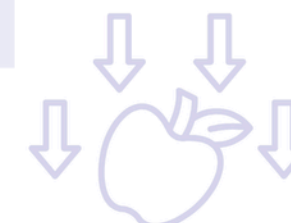
Practice Now



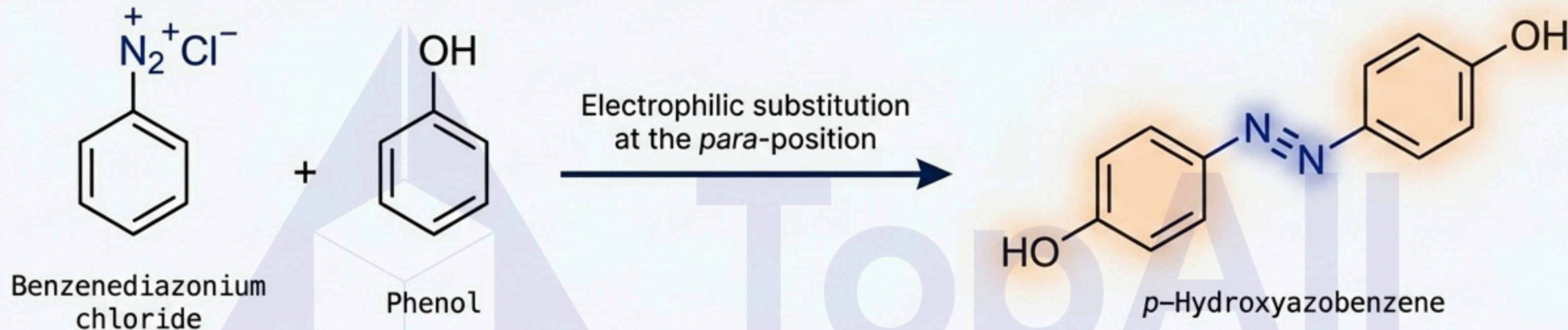
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Key Highlights

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- » Push Your Limits with Level-Based Challenges
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- » Get Clear Explanations, Not Just Marks
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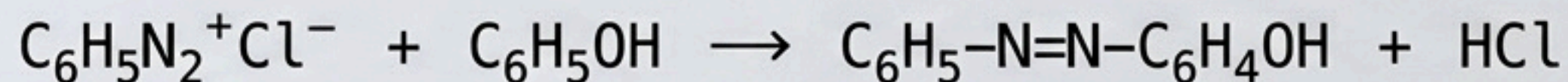


Formation of p-Hydroxyazobenzene



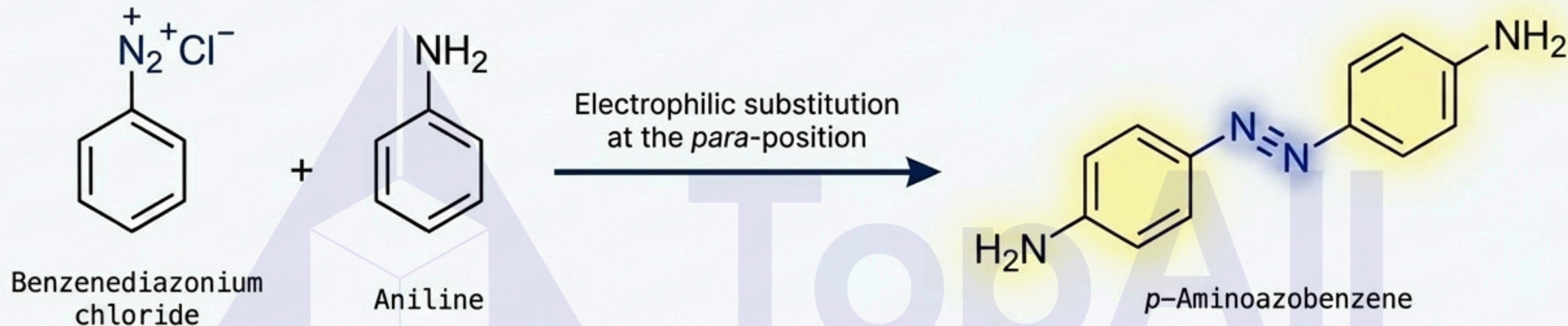
[Phenol (-OH)] acts as the electron-rich coupling partner.

Observation:  Yields a characteristic Orange Dye.



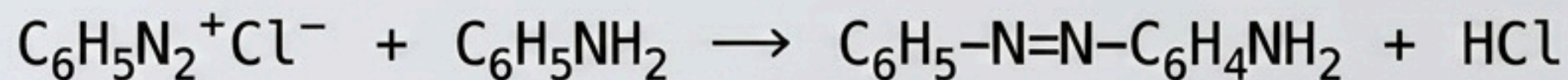
The -OH group activates the ring, directing the diazonium electrophile to the **para position**.

Formation of p-Aminoazobenzene



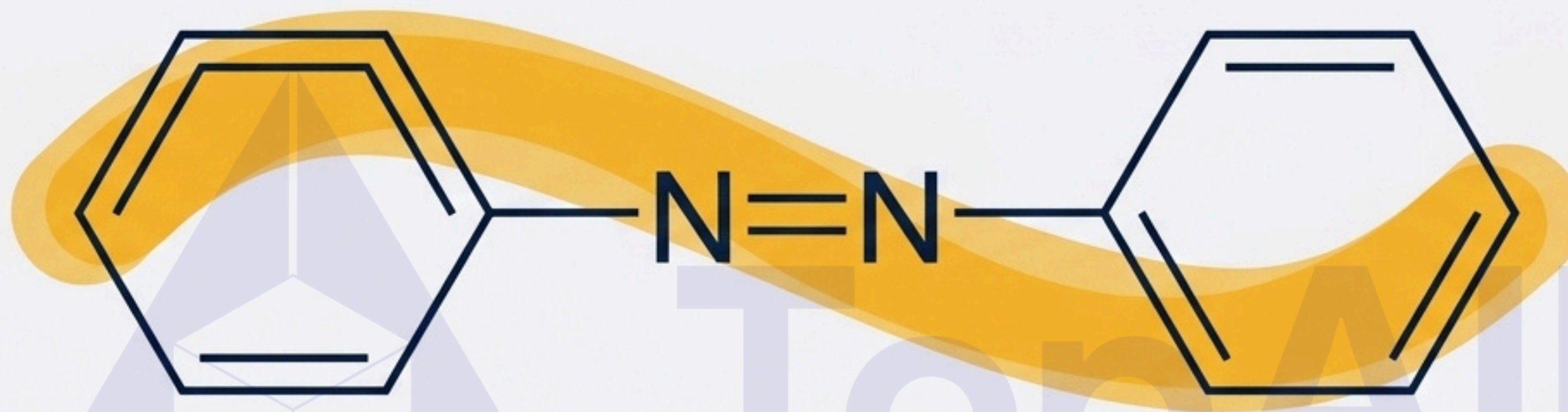
[Aniline ($-\text{NH}_2$)] acts as the electron-rich coupling partner.

Observation:  Yields a characteristic Yellow Dye.



Similar to phenol, the $-\text{NH}_2$ group activates the ring and directs coupling to the **para** position, bridging the molecules.

Extended Conjugation

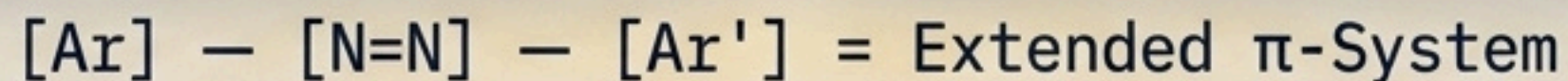


[The Bridge]

The -N=N- bond acts as a conductive bridge linking two separate aromatic π systems into one continuous network.

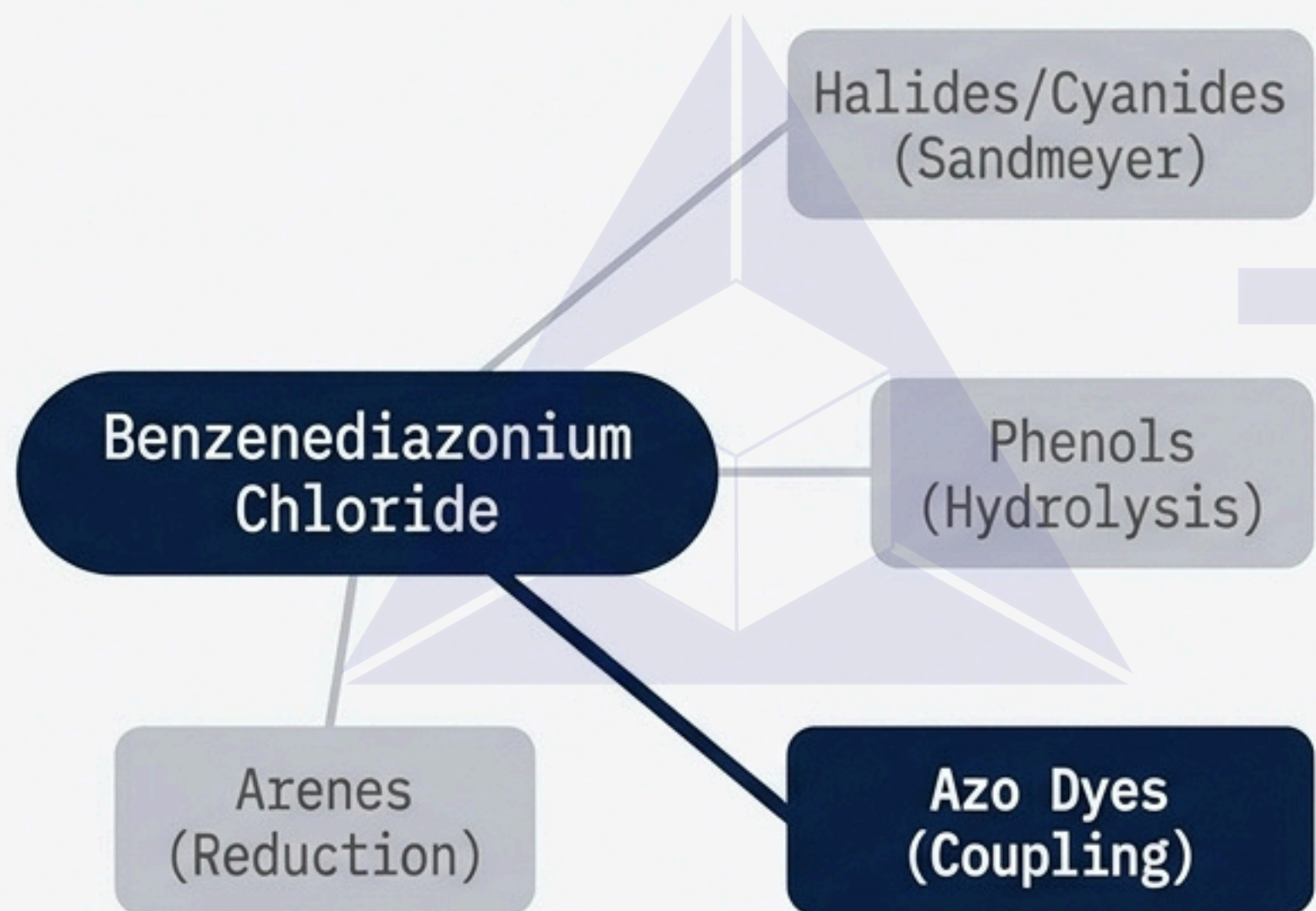
[The Effect]

This massive delocalization of electrons lowers the energy gap, absorbing specific wavelengths of visible light and reflecting vibrant colors.



The vibrant colors of azo dyes are a direct physical result of their extended electronic conjugation.

Diazonium Salts as Key Intermediates



Key Takeaway: 1. Versatility

Diazonium salts easily introduce -F, -Cl, -Br, -I, -CN, -OH, -NO₂, and Azo groups into aromatic rings.

Key Takeaway: 2. Coupling Specifics

A unique pathway that retains the N₂ group; requires electron-rich partners (Phenol/Aniline); specifically targets the *para*-position.

Key Takeaway: 3. Industrial Value

Azo compounds are the foundational chemistry behind the massive synthetic dye industry.

Mastering diazonium intermediates unlocks the synthesis of a vast array of complex aromatic compounds.



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