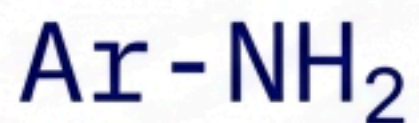
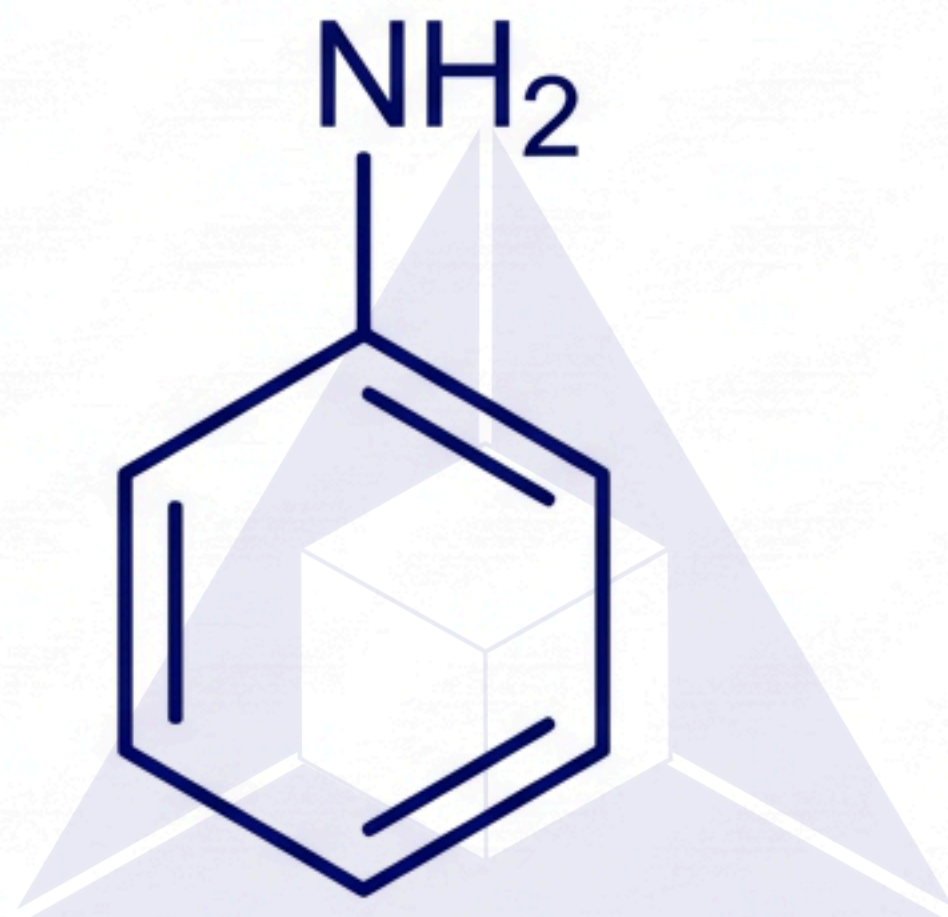


Organic Synthesis 101

From Aromatic Amines to Haloarenes

The Sandmeyer Reaction Pathway



Primary Aromatic Amine

The foundation of the Sandmeyer reaction. An amino group ($-\text{NH}_2$) attached directly to an aromatic ring.

Acts as the starting substrate, providing the nitrogen framework that will soon be converted into a superior leaving group.

Critical Temperature Zone: 273-278 K (0-5°C)

Diazonium Salt Formation

The aromatic amine is dissolved in cold aqueous mineral acid and treated with sodium nitrite.



The diazonium group ($-\text{N}_2^+$) is an exceptionally good **leaving group**, setting the stage for halogen substitution.



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Replacement by Cl

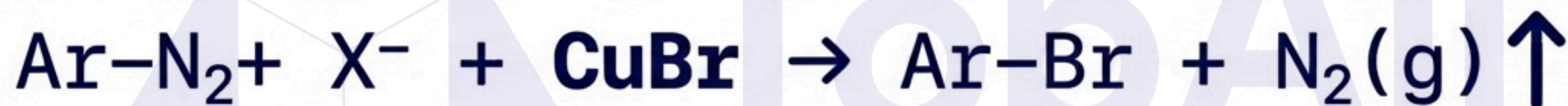
Mixing the freshly prepared diazonium salt solution with cuprous chloride (CuCl) forces the replacement of the diazonium group.



Nitrogen gas leaving the system, driving the reaction forward.

Replacement by Br

Similar to chlorination, cuprous bromide (CuBr) is utilized to facilitate the substitution, yielding an aryl bromide.



The diazonium group is cleanly ejected as nitrogen gas.

Replacement by I

No Cuprous Halide Required!

Unlike chlorine and bromine, replacement by iodine does not require a copper catalyst. It is achieved simply by shaking the diazonium salt with Potassium Iodide (KI).



Key Takeaways

The Sandmeyer Matrix

Chlorine Pathway

Reagent:

CuCl

Product:

Aryl Chloride

Bromine Pathway

Reagent:

CuBr

Product:

Aryl Bromide

Iodine Pathway

Reagent:

KI (Shaking)

Product:

Aryl Iodide

All pathways rely on the critical instability of the diazonium intermediate formed at 273-278 K, driven by the thermodynamic release of N₂ gas.



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