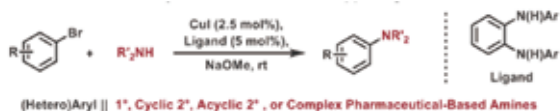


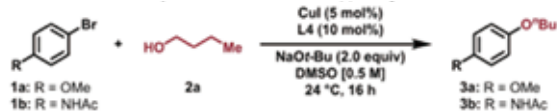
NEW LIGANDS FOR ULLMANN REACTION

N¹,N²-diarylbenzene-1,2-diamine ligands

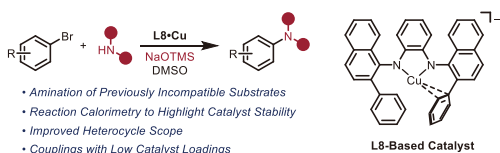
The Stephen L. Buchwald research group addressed the core challenges of traditional copper-catalyzed Ullmann reactions, such as high reaction temperatures, poor functional group tolerance, and catalyst deactivation, by developing a series of novel ligands with anionic *N¹,N²-diarylbenzene-1,2-diamine* as the core skeleton. Guided by density functional theory, these ligands enabled mild room-temperature Ullmann-type C-N/C-O coupling reactions, broadened substrate compatibility, and facilitated chemoselective control, marking a landmark breakthrough in copper-catalyzed Ullmann reaction ligands.



J. Am. Chem. Soc. 2023, 145, 6966.

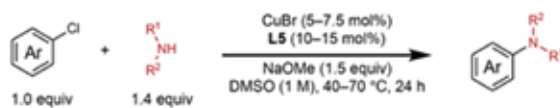


Angew. Chem. Int. Ed. 2024, 63, e202400333.

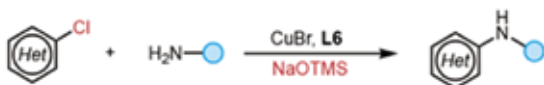


- Amination of Previously Incompatible Substrates
- Reaction Calorimetry to Highlight Catalyst Stability
- Improved Heterocycle Scope
- Couplings with Low Catalyst Loadings

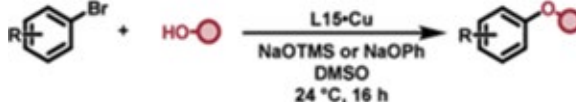
J. Am. Chem. Soc. 2024, 146, 18616.



J. Am. Chem. Soc. 2024, 146, 25949.

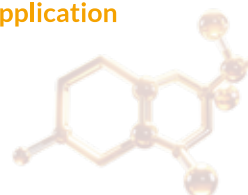


J. Am. Chem. Soc. 2025, 147, 38275.



Org. Lett. 2026, 28, 855.

The series of diamine ligands developed by Buchwald completely overturned the application limitations of traditional Ullmann reactions, with their core advantages lying in:



Mild reaction conditions

The first room temperature reaction of Ullmann type C-N/C-O coupling was achieved without high temperature, reducing energy consumption and minimizing side reactions.

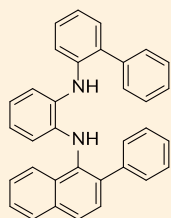
Wide Substrate Universality

Compatible with aryl/heteroaromatic bromides, alkylamines/alcohols, alkali sensitive sensory groups (carboxylic acids, amides, enolketones), small five membered heterocycles, and can also be used for post derivatization of drugs/natural products.

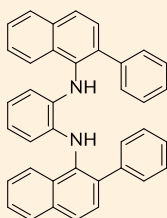
High Catalytic Efficiency

The reaction rate is increased by 7-30 times compared to traditional ligands, the catalyst/ligand loading is low, and the catalyst stability is strong without significant deactivation.

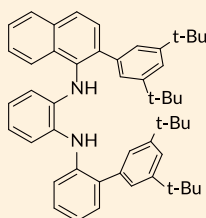
Series New Ligands



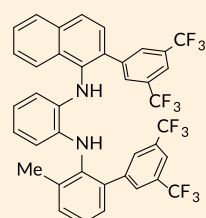
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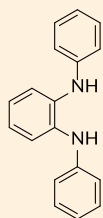
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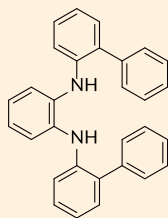
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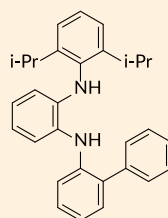
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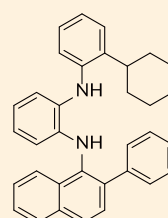
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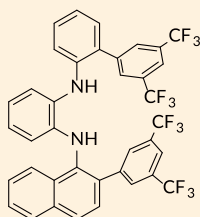
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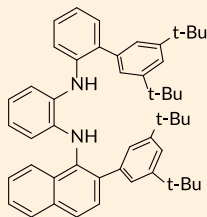
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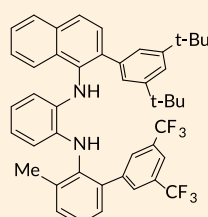
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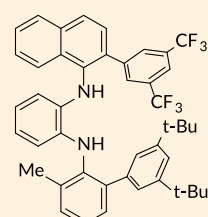
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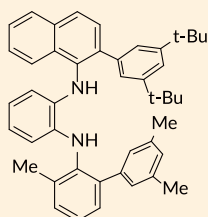
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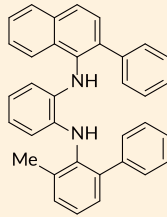
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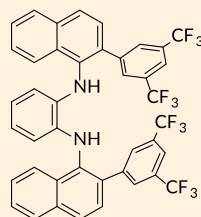
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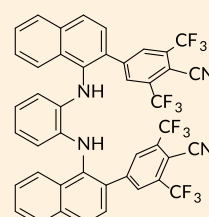
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