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MODULAR AND DIVERSITY-ORIENTED SYNTHETIC APPROACHES TO BENZOHETEROLES AND DIBENZOHETEROLES

This thesis describes the development of new synthetic approaches that enable expedient, modular, and divergent synthesis of benzoheteroles and related heterocycles from readily available starting materials. Our main approach capitalizes on the cobalt-catalyzed "migratory arylzincation" reaction of an alkyne, which affords an ortho-alkenylarylzinc species as a key intermediate. We have demonstrated that this common intermediate can be readily transformed into several members of the benzoheterole family such as benzothiophene, benzoselenophene, benzotellurophene, and benzophosphole, in a one-pot manner for some cases. Besides benzoheteroles, we have also established a new synthetic route to dibenzoheteroles based on the facile two-step conversion of 2-iodobiaryls into 2,2'-diiodobiaryls via a sequence of oxidative cyclization–iodinative ring opening. Collectively, the new approaches developed in this study have opened access to a diverse set of hitherto inaccessible or difficult-to-access functionalized benzoheteroles and related heterocycles, which may hold promise for applications as functional materials.

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