• Iron-Catalyzed C–H Activation and Cyclization of Oxime Derivatives with Alkynes to Produce Isoquinoline

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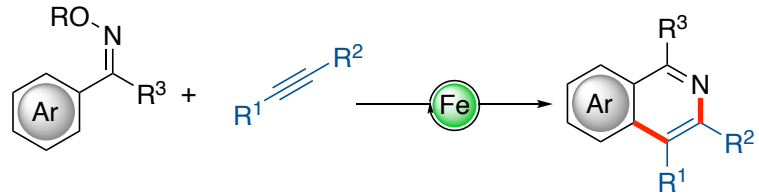
Transition-metal-catalyzed cyclization via C–H activation as a key step has been recognized as an efficient method for the synthesis of isoquinolines. Such reactions have been well developed with costly *4d*- or *5d*- transition-metal catalysts with an external oxidant to enable a catalytic process.[1] In the light of beneficial features of naturally abundant 3d transition metals, the focus has shifted in recent years to the application of environmental-friendly and less cheap base metal catalysts for C–H transformation process. As the most abundant heavy element in the universe, iron has been well applied as the catalyst for chemo-selective C–H functionalization in the past decade.[2]

Previously, we demonstrated that with $AlMe_3$ as a base and trisphosphine as a ligand, *ortho* C–H bond in aromatics and heteroaromatics bearing simple monodentate directing group could be smoothly converted into methyl group using iron catalysts.[3] We envisioned that with additives to generate an [Al]-Me reagents as a base to suppress undesired C–H methylation reactions, other types of C–H functionalization with electrophiles could be achieved. Herein we disclosed an iron-catalyzed cycloaddition of aromatic oxime derivatives with alkynes via ortho C–H bond activation to afford 3,4-disubstituted isoquinoline frameworks using trisphosphine, $AlMe_3$, and a diol as an additive under an oxidant-free condition. Versatile directing groups were found efficient for the observed C–H activation reactivity.



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