One-Pot Synthesis of Cationic (η^5-Cyclopentadienyl)(η^6-Arene)Iron(II) Complexes and Their Reactivity Studies

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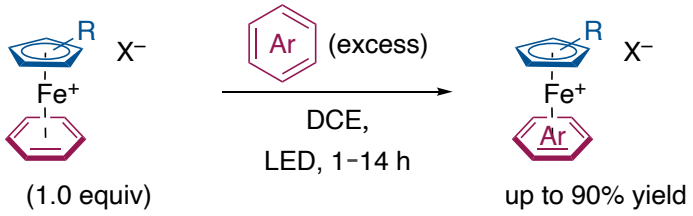
Cationic (η^5-cyclopentadienyl)(η^6-arene)iron(II)-type complexes are important organometallic compounds for catalysis and as intermediates in complex synthesis.[1] However, conventional synthetic methods require multi-step reactions from the corresponding cyclopentadiene derivatives.[2] In this study, we have achieved a one-pot synthesis of cationic (η^5-cyclopentadienyl)(η^6-arene)iron(II) complexes by using FeF_2 as the iron(II) source.[3] This reaction applies to various cyclopentadienyl and arene ligands and counter anions.

For the catalysts we synthesized, we conducted a series of studies on S_NAr and arene exchange reactions under stoichiometric conditions. For S_NAr, we found that the reaction yield decreased when more sterically hindered cyclopentadienyl ligands or more electron-rich arenes were used. In the arene exchange process, the influence of the cyclopentadienyl ligand was more pronounced. When the Cp ligand was used, the arene exchange products were obtained in excellent yields under green light irradiation at room temperature for one hour. However, with the Cp* ligand, higher temperature, blue light, and longer reaction time were necessary. In addition, we observed a strong effect of the counter anion of the complex on the rate of arene exchange.



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