Direct Borylation of Arenes Catalyzed by γ-Fe₂O₃

Significance: γ-Fe₂O₃ magnetic nanoparticles (particle size 58 nm) catalyzed the borylation of arenes with bis(pinacolato)diborane in the presence of di-tert-butyl peroxide and potassium carbonate under air to give the corresponding borylated products in up to 75% yield (10 examples, eq. 1). A sequential reaction via γ-Fe₂O₃-catalyzed borylation of benzene and Suzuki–Miyaura coupling with iodoarenes gave the corresponding biaryls in up to 56% yield (4 examples, eq. 2).

Comment: The catalytic activity of γ-Fe₂O₃ was superior to that of the other iron catalysts, such as FeCl₃, FeBr₃, FeF₃, Fe(acac)₃, Fe₂(SO₄)₃, and Fe₂O₃. In the borylation of toluene and anisole, the ortho-borylated products were obtained as major regioisomers.

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