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Nano-Fe_2O_3 Catalyzed Direct Borylation of Arenes
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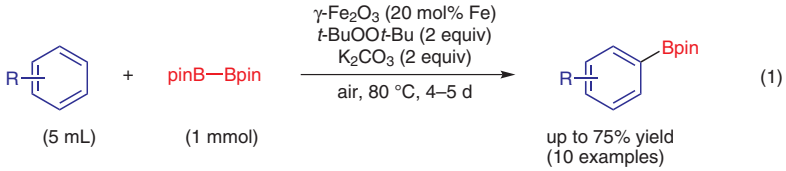
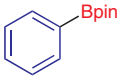
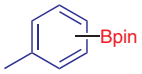
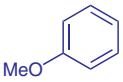
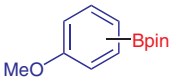
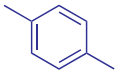
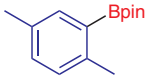
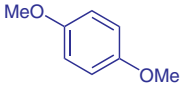
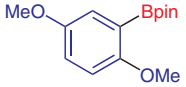
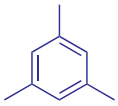
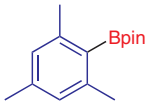
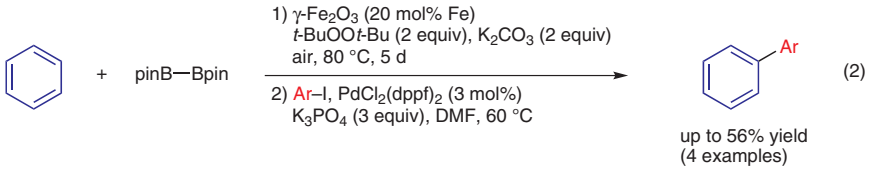
Direct Borylation of Arenes Catalyzed by γ-Fe_2O_3



Typical results:

Substrate	Product	Yield (%)	Substrate	Product	Yield (%)
		75		 (*o*/*m*/*p* = 71:20:9)	63
	 (*o*/*m*/*p* = 61:29:1)	70			67
		32			41



Ar = 4-$O_2NC_6H_4$, 4-$MeOC_6H_4$, 4-ClC_6H_4, 4-$MeC(O)C_6H_4$

Significance: γ-Fe_2O_3 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-Fe_2O_3-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-Fe_2O_3 was superior to that of the other iron catalysts, such as $FeCl_3$, $FeBr_3$, FeF_3, $Fe(acac)_3$, $Fe_2(SO_4)_3$, and Fe_2O_3. In the borylation of toluene and anisole, the *ortho*-borylated products were obtained as major regioisomers.

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Category
Polymer-Supported Synthesis

Key words
maghemite
direct borylation
arenes
bis(pinacolato)-diborane