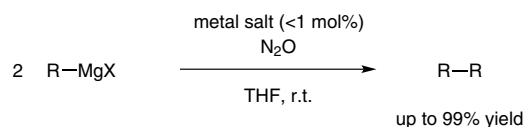


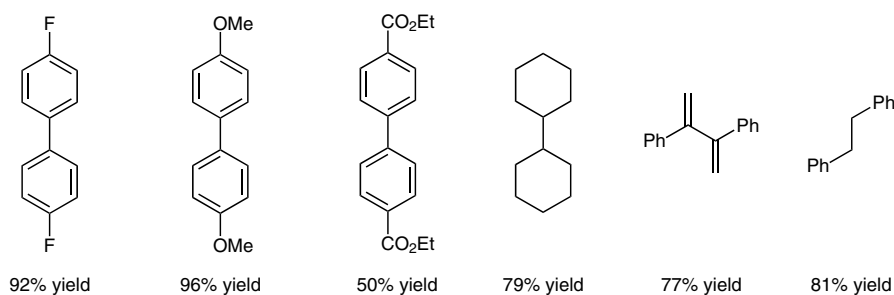
Fe-, Co- and Cu-Catalyzed Coupling Reactions Using N₂O

Oxidative homo-coupling of aryl, alkenyl and alkyl Grignard reagents:

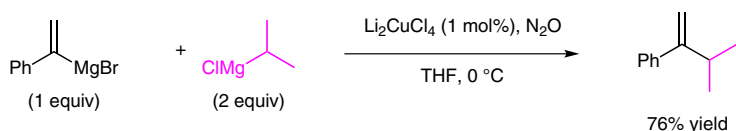


R = aryl, alkenyl and alkyl groups
metal salt = for aryl and alkenyl coupling partners: Fe(acac)₃ or CoCl₂
for alkyl coupling partners: Li₂CuCl₄
X = Cl, Br

Selected examples:



Example for the oxidative cross-coupling of Grignard reagents:



Significance: For the first time, N₂O ('laughing gas') is reported to undergo oxidative homo-coupling reactions of Grignard reagents in the presence of metal catalysts under mild reaction conditions. Whereas less than 1 mol% of Fe(acac)₃ and CoCl₂ showed to be superior in the homo-coupling reactions of arylmagnesium reagents, also alkyl Grignard reagents undergo oxidative homo-coupling reactions in the presence of Li₂CuCl₄.

Comment: The authors applied this new protocol also to oxidative cross-coupling reactions between sp²- and sp³-hybridized Grignard reagents. Therefore, PhMgCl and various primary and secondary alkyl Grignard reagents furnish the desired aryl-alkyl cross-coupling products in 59–83% yield.