pi-Acidic Ligands in the Iron-Catalyzed Cross-Coupling of N-Aryl Chlorides and Secondary Alkyl Grignard Reagents

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The use of simple iron salts in the cross-coupling of aryl chlorides with alkyl Grignard reagents has been reported. The reactions worked well for electron poor aryl chlorides as long as primary alkyl Grignard reagents were used. The use of secondary alkyl Grignard reagents failed to give favorable results using the simple iron salts, and [Fe(salen)Cl] gave only moderate yields. It has been suggested that the active catalyst in these systems contains an iron with a formal -2 oxidation state, and one plausible explanation for the poor reactivity of the secondary alkyl Grignard reagents is that the active catalyst decomposes at a rate greater than the cross-coupling. If this is indeed the case, then the use of p-acidic ligands might reduce the rate of catalyst decomposition enough for the cross coupling of aryl chlorides and secondary alkyl Grignard reagents to take place. This talk will focus on the use of isonitrile and N-heterocyclic carbene ligands in the iron-catalyzed cross-coupling of aryl chlorides with secondary alkyl Grignard reagents.

Y = H, CF₃, CH₃, OCH₃, CO₂CH₃

DMPI = 2,6-dimethylphenylisocyanide

References: