SYNLETT
Spotlight

Iron Phthalocyanine
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Introduction
Iron phthalocyanine (FePc) complexes are structurally related to porphyrin complexes; phthalocyanines have been used as alternative catalysts because they are cheaper and more stable to degradation. FePc is widely used in a variety of catalytic transformations, including N-alkylation, C–H amination, C–C bond formation, preparation of esters and oximes, reduction, oxidation, and radical reactions. Although FePc is particularly studied as a catalyst for organic reactions, this particular reagent is also described in many other applications. For example, FePc complexes are efficient catalyst for the charge/discharge process in lithium–oxygen large-capacity batteries. The following literature data indicate that FePc displays a strong bibliographic background in a wide variety of reactions and is currently considering as an active and ‘hot’ research topic. An overview of typical iron phthalocyanine syntheses is shown in Scheme 1.

Abstracts

(A) FePc has been reported as an efficient and versatile catalyst for the N-alkylation of amine-substituted heterocycles with alcohols. The one-pot syntheses of ortho-amino-substituted benzimidazoles, benzothiazoles, and benzoxazoles are achieved by using FePc in combination with a base. The best reaction conditions were found to be t-BuONa in toluene.

(B) Intramolecular C–H amination is catalyzed by FePc in the presence of AgSbF6 under mild reaction conditions. Allylic C–H amination is preferred over aziridination. Interestingly, this very selective amination is due to the difference in reactivity, closely paralleling C–H bond dissociation energies (allylic > benzylic > ethereal > tertiary > secondary C–H bonds). C–H aminations are particularly important reactions because many biologically active molecules are amines.
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References