

Green Chemistry Seminar (CCVC) (Open to public)

Prof. Michael G. Organ

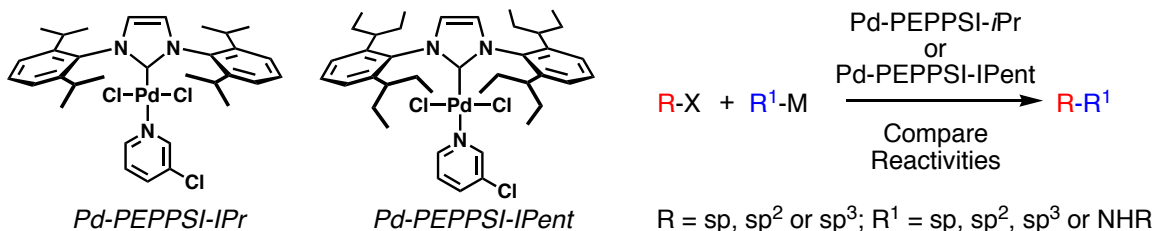
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Title: "Pd N-Heterocyclic Carbene Catalysts: How Much Bigger is Better?"

Thursday, March 4, 4:00PM

Location: Otto Maass Chemistry Building (McGill University), RM 10

The Pd N-Heterocyclic carbene (NHC)-based pre-catalyst based on bis N,N-(2,6-diisopropylphenyl) imidazolium (Pd PEPPSI-*i*Pr) has shown to be highly reactive in a wide variety of cross-coupling procedures. The catalyst has been examined in Suzuki-Miyaura, Negishi, Kumada-Tamao-Corriu, Sonagashira, and Hiyama couplings, in addition to enolate arylation and Buchwald-Hartwig-Yagupol'skii amination. PEPPSI-*i*Pr shows great reactivity in every case, in particular for the synthesis of complex, heteroatom-containing molecules (e.g., heterocycles) of biological interest; the coupling of intensely hindered oxidative addition and organometallic centres is routinely obtained. Within all of these families of reactions, couplings involving sp , sp^2 and sp^3 centers have been examined and all possible combinations yield good to excellent conversions.



In an attempt to gain understanding on the reactivity of NHC-based catalysts, an aggressive mechanistic study has been undertaken comprised of NMR spectroscopy, computational methods, and rate studies. Clearly the size of the groups on the flanking N-phenyl substituents plays a key role in the reactivity of the Pd-NHC complex. Attempts have been made to construct a catalytic cycle for Pd-NHC complexes and to subsequently dissect it to see where sterics plays its biggest part. This physical and structural analysis has led to the creation of second generation NHC catalyst, bis N,N-(2,6-di(3-pentyl)phenyl) imidazolium (Pd PEPPSI-*i*Pent), whose activity has surpassed all previously reported N-phenyl imidazolium-based Pd catalysts.