

Pd(II)-Promoted Addition of Organometallic Reagents to Olefins: Pd-Catalyzed C–C Bond-Forming Reactions

Category

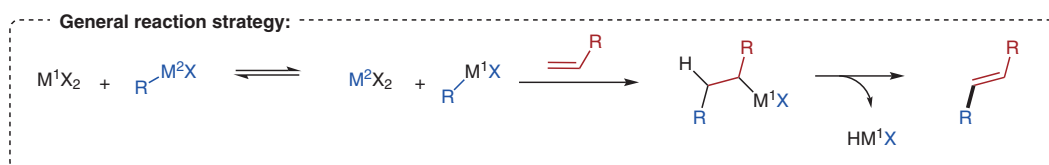
Metals in Synthesis

Key words

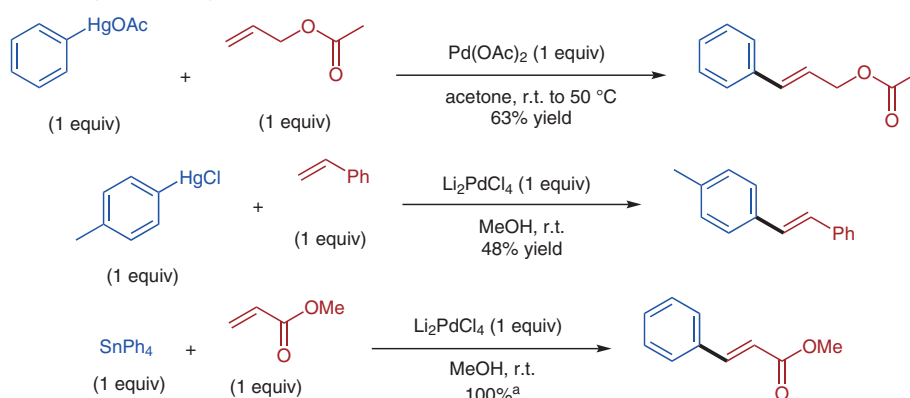
Heck reaction

palladium catalysis

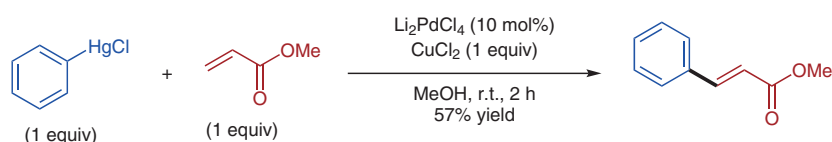
C–C bond formation

Selected examples - stoichiometric palladium:

^a yield determined by gas chromatography

Selected examples - catalytic in palladium:



Significance: Controllable and predictable C–C bond formation in organic chemistry is of paramount importance. The early work by Heck on the addition of organometallic (organomercury, organotin) compounds to olefins catalyzed by palladium(II) salts revolutionized how retrosynthetic disconnections could be made. These results, along with additional reports by Mizoroki and others, paved the way for the development of future transition metal C–C bond forming reactions.

Comment: The author notes that palladium(II) salts exhibit the greatest performance when compared to rhodium, ruthenium, nickel or iron salts. Additionally, more substituents on the alkene coupling partner led to a decrease in the reactivity. It was reported that electron donating substituents on the organometallic reagent decreased the yields, with strongly coordinating amino groups completely inhibiting reactivity. This outcome may be due to the formation of catalytically inactive complexes with the palladium. When unsymmetrical alkenes are used, the addition of the organometallic species occurs on the less substituted carbon atom.