Palladium mediated synthesis of N-heterocycles by iminoannulation of allenes.

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1.1 Synthesis of heterocycles by palladation of alkenes

Palladium has proven to be an excellent auxiliary element in the synthesis of a wide variety of heterocycles and carbocycles [1]. The tolerance of palladium towards many functional groups, such as carbonyl and hydroxyl groups, has greatly contributed to the utility of this transition metal. Palladium-catalyzed reactions can be carried out without protection of these functional groups. Divalent palladium complexes are able to coordinate to alkenes with formation of α-complexes. As a result of the electron-donating character of the palladium center, the electron density of the coordinated alkene is decreased and it stereoselectively adds with various nucleophiles [1]. The attack of nucleophiles with formation of a Pd-N bond is called the palladation reaction (Scheme 1). These palladium-nucleophile complexes may react with a variety of nucleophiles to give either the ligand substitution or nucleophilic addition (Scheme 1) depending on the reagents and conditions. Typical nucleophiles are water, alcohols, carboxylic acids, amines, thioesters, thioureas, and thioimidazoles and more nucleophiles, exemplified in Table 1. The intramolecular version of this reaction is a useful way to obtain substituted cyclopentanes.