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Multicomponent reactions and palladium catalysis

Multicomponent reactions (MCR) are reactions in which three or more substrates react together to form a product. These types of reactions are highly recommendable because MCR's are atom economic, ideal and eco-friendly reactions. Transition metals are widely used as catalysts in MCR due to its exceptional efficiency in the formation of C-C and C-heteroatom bond. Palladium (Pd) has showed a remarkable potential to catalyze such reactions owing to its ability to transform the substrates in to corresponding products through easy ways or else it is difficult to attain. This review gives an overview on Pd-catalyzed MCR for the synthesis of acyclic, carbocyclic, heterocyclic and other relevant compounds.

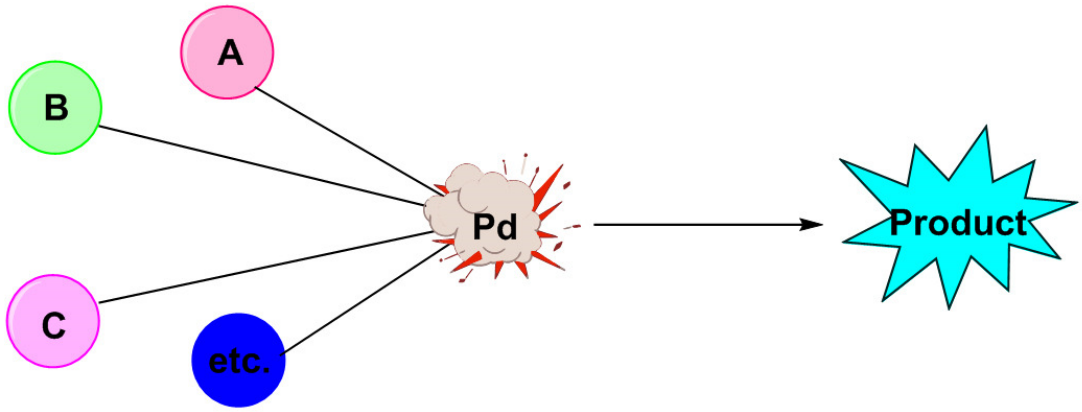

Fig. 1. Schematic representation of palladium-catalyzed MCR.

A wide range of palladium complexes and salts were employed in this type of reactions. Among these, palladium-phosphine complexes and palladium acetate are the most efficient catalysts. The MCR for acylic compounds involves the synthesis of α,β-unsaturated ketones with complex carbon moieties, trisubstituted *Z*-alkenes, carbonylative reaction for carbonyl compounds, β-C–H arylated carboxide derivatives, acyl carbamates, carbonylative Suzuki coupling for aryl ketones, α-amino ketones, enaminones, β-nitroamine derivatives, *O,O*-acetals, di- and tri-substituted thiophenes etc.

Carbocyclic compounds like 5,6-disubstituted 7-oxabenzonorbornene, unsymmetrical biaryls having thiosugars etc. were successfully synthesized under Pd-MCR protocol.

The Pd-catalyzed MCR also paved the way towards the synthesis of five membered heterocycles like biarylsubstituted pyrazoles, imidazolones, imidazoles, functionalized oxazolidinones etc. and six membered heterocycles like pyridines, steroidal A-, D-ring fused 5,6-disubstituted pyridines and nonsteroidal substituted pyridines. 3-Methylene-2,3-dihydro-1H-quinolin-4-ones, 3,3-diphenyl-2,4-quinolinedione, 4(3H)-quinazolinones, 2,3-dihydroquinazolin-4(1H)-ones. Other than these, various fused five membered heterocycles, quinolones, isoquinolines and so on were also synthesized using Pd catalysis.

Since this field provides access to a range of important scaffolds, it will surely become a promising field and also will continue to inspire researchers to realize useful outputs.

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