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New catalytic process using palladium nanoparticles for the construction of potentially bioactive heterocycles

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Allenes are a class of compounds with two cumulative carbon-carbon double bonds, which are versatile synthetic intermediates in organic synthesis. These substrates have allowed chemists to prepare a variety of compounds of chemical and biological interest. The abundance of nitrogen-containing heterocycles in biologically active molecules has occasioned many efforts for their synthesis and functionalization. In particular, the oxacycles is important because they are present in a wide range of natural products. On the other hand, in the design of eco-friendly processes, catalysts and solvents play a key factor from both an economic and environmental point of view. In the development of new chemical processes the reactions conditions should fulfill specific criteria: i) renewable feedstocks, ii) low VOC emission, iii) low flammability and iv) functional group compatibility. In our continuing efforts on the construction of potentially bioactive heterocycles, we have developed a new catalytic process using metal nanoparticles because of; NPs tend to be more reactive than their particulate metal counterparts as a result of increasing surface area with decreasing particle size. Palladium nanoparticles are one of the most used and efficient catalyst in the formation of C-C bond and other chemical transformations such as carbon-hetero atom bond formation. Herein, we described the use, for the first time, of a novel ligand-free catalytic system for obtaining the cyclization of allenols towards the preparation of dihydrofurans and carbazoles. The prepared nanomaterial (PdNPs) displayed good activity on the construction of potentially bioactive heterocycles in aqueous media, providing good to excellent yields. The recyclability of the nanocatalyst has also been established (up to four cycles) giving rise to good isolated yields in successive runs.

Biography

Amparo Luna received her Bachelor´s degree in Chemical Engineering, Instituto Tecnológico de Veracruz in 1996 and PhD degree in the Organic Chemistry Program in 2002 from the Universidad de Oviedo, Spain, under the supervision of Prof. Vicente Gotor and Dr. Covadonga Astorga. In 2003, she joined the research group of Prof. Roland Furstoss at Faculté des Sciences de Luminy (Lab. Associé au CNRS, in Marseille (France) as a Post-doctoral fellow. In 2004, she moved to the research group of Prof. Benito Alcaide (UCM, Madrid) where, in 2006, she was appointed as Assistant Professor and in 2015 she assumed a position of Associate Professor. Her research interests are focused on beta-lactam and allene chemistry, and metal-catalyzed coupling reactions.

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