

# PALLADIUM/PHENANTHROLINE CATALYZED REDUCTIVE SYNTHESIS OF N-HETEROCYCLES FROM NITRO COMPOUNDS

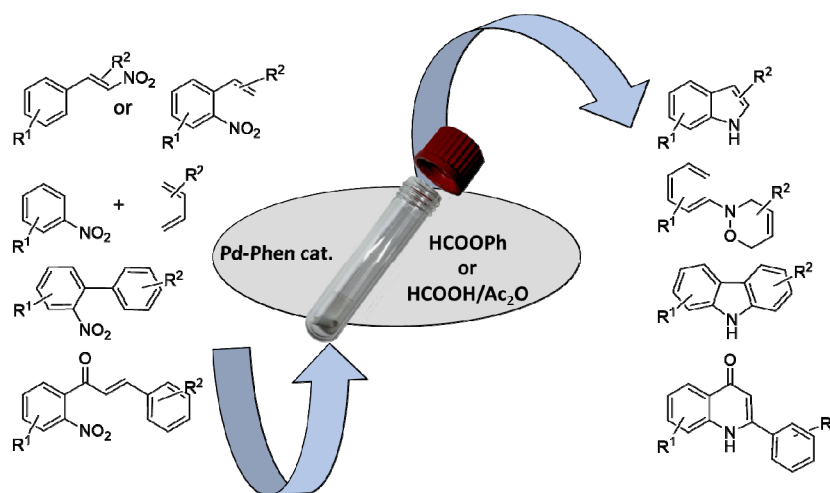
Francesco Ferretti<sup>a</sup>, Manar Ahmed Fouad<sup>a,b</sup>, Doaa R. Ramadan<sup>a,b</sup>, Simone Galiè<sup>a</sup>,  
Cecilia Abbo<sup>a</sup> and Fabio Ragaini<sup>a</sup>

<sup>a</sup> Dipartimento di Chimica, Università di Milano, Milano, Italy  
francesco.ferretti@unimi.it

<sup>b</sup> Chemistry Department, Faculty of Science, Alexandria University, Alexandria, Egypt

Transition metal catalyzed reductive cyclization reactions of suitably substituted nitroarenes to yield heterocycles using pressurized carbon monoxide as a reductant are efficient reactions [1]. In recent years, we developed novel methods based on the use of phenyl formate [2] and formic acid [3] as cheap, affordable, efficient and safe in-situ CO surrogates thus allowing the same reactions to be performed in a single glass pressure tube. In most cases, the isolated yield of the desired heterocycle was higher than those previously obtained for the same reaction when gaseous CO had been employed, which indicates that the use of these surrogates should not necessarily be considered a second choice when the use of CO gas is not possible. Owing to the lack of high-pressure equipment, the high yields and the easy synthesis of the starting materials, the reaction might become of general use for the synthetic chemist; however, little is known about the mechanism of these reactions.

A mechanistic study has been started to shed some light on the reaction pathway.



[1] F. Ferretti, D. R. Ramadan, F. Ragaini, *ChemCatChem* **2019**, *11*, 4450.

[2] F. Ragaini, F. Ferretti, M. A. Fouad, *Catalysts* **2023**, *13*, 224.

[3] Fouad, M. A.; Ferretti, F.; Ragaini, F., *J. Org. Chem.* **2023**, *88*, 5108.