



24th Iranian Seminar of Organic Chemistry

24-26 Aug. 2016

Azərbaycan Şahid Madani University



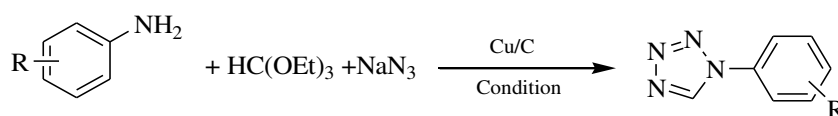
Synthesis of 1*H*-Tetrazole Derivatives from Amine Compounds in the Presence of Copper Nanoparticles on Charcoal (Cu/C) as a Heterogeneous Catalyst

Reza Khalifeh*, Monireh Noori

Department of Chemistry, Shiraz University of Technology, 71555-313, Shiraz, Iran
Khalifeh@sutech.ac.ir

Tetrazoles are a class of nitrogen-rich heterocycles. They have received considerable attention due to their wide range of application such as HIV inhibitors, anti-bacterial, anti-fungal, anti-inflammatory and explosive agents. They can also be used as isosteric replacements in drug design[1]. Due to such interesting properties, improving of known methods for their synthesis is needed. The general method for the synthesis of 1-substituted 1*H*-tetrazole is via cyclization reaction of primary amine, triethylorthoformate and sodium azide in the presence of a catalyst. Some common catalysts which were used are Ytterbium triflate, Cobalt-Yttrium, CuFe₂O₄, acidic ionic liquid and acetic acid[2]. Unfortunately, these methods have one or more drawbacks, for instance, using expensive metal catalysts, utilization of toxic organic solvents and harsh reaction conditions[3]. Thus, using an inexpensive, benign catalyst and mild reaction condition is an important challenge that must be solved. For a greener process, it is preferable to choose a catalyst with reusability.

An efficient and straightforward synthesis of 1*H*-tetrazoles is achieved from primary amines, triethylorthoformate and sodium azide, through consecutive condensation, C–N and N–N bond formations that catalyzed by a novel heterogeneous Cu/C catalyst with reusability. Interestingly, the Cu/C exhibited good catalytic activity for various amines derivatives.



R= X(Hallogen), Alkyl

Figure 1. Scheme of the reaction.

References

- [1] Wittenberger s., "Recent developments in tetrazole chemistry", Org. prep. Proced. Int. 26(1994) 499.
- [2] Naeimi H., Kiani F., Moradian M., "Facile and mild synthesis of 1-substituted-1*H*-1,2,3,4-tetrazoles catalyzed by methanesulfonic acid under solvent-free conditions", Iran. J.Catal. 3 (2013) 243.
- [3] 3Darvish F., Khazraee S., "FeCl₃ Catalyzed One Pot Synthesis of 1-Substituted 1*H*-1,2,3,4-Tetrazoles under Solvent-Free Conditions", Int. J. Org. Chem. 5 (2015) 75.