

Abstract:

In this research project, natural clinoptilolite pores were modified by ZnO and Bi₂O₃ nanoparticles and the application of the as-prepared nanocomposite catalysts in the synthesis of 5-aryl-1*H*-tetrazoles was studied. The morphology and chemical structure of the as-prepared catalyst was characterized by XRD, SEM, TEM, FTIR and EDX analyses. The catalysts were applied in the direct synthesis of 5-aryl-1*H*-tetrazoles through [3+2] cycloaddition reaction of benzonitrile derivatives with sodium azide and the three component ZnO/Bi₂O₃/Zeolite nanocomposite was found as the best and optimum catalyst. The optimum reaction conditions including solvent, temperature and catalyst loading were studied. The tetrazole derivatives were then synthesized through using various nitriles as starting materials. Then, the synthesis of tetrazoles from benzaldehydes as the starting material through a three-component reaction was also examined under optimum reaction conditions in the presence of optimum catalyst. All of the products were obtained with high purity and good to excellent yields. Appropriate reaction times, simple work-up and catalyst reusability were among the advantages of the present protocol.



University of Zabol

Graduate School

Faculty of Science

Department of Chemistry

The Thesis Submitted for the Degree of Master of Science

(In the Field of Organic Chemistry)

**Novel green synthesis of tetrazole derivatives using nitriles and
aldehydes as starting materials**

Supervisors:

Dr. Reza Aryan

Dr. Hamid Beyzaei

Advisor:

Dr. Noshin Mir

Dr. Ashraf Moradi

By:

Halimeh Mohammadi-Asl

January 2017