**CHEMISTRY**

ZrO2-β-Cyclodextrin (CD) catalyzed synthesis of 2,4,5-trisubstituted imidazoles and

1,2-disubstituted benzimidazoles under solvent free conditions and evaluation of their

antibacterial activity. KUNTEBOMMANAHALLI N. THIMMAIAH\*, MARK MONTGOMERY, J. L. SYLVESTER, T. PADMA, ASHISH PAGARE, PAUL GRISHAM, RAY COX, LINDSAY MASSIE, and P. ADRIS, Northwest Mississippi Community College, Desoto Center, Southaven, MS 38671.

Imidazoles play a vital role in the synthesis of biologically active molecules. These compounds are known to possess diverse biological applications. Benzimidazole derivatives have drawn considerable attention due to their widespread biological applications such as antitumor,antimicrobial, anti-inflammatory, and antihelminthicactivities. Various catalysts under different reaction conditions have been employed for the synthesis of these molecules. Most of the reported methods suffer from one or more serious drawbacks such as high reaction temperature, long duration, use of toxic and expensive chemicals as starting materials, use of moisture-sensitive catalysts, and formation of byproducts. In recent years, ZrO2 nanoparticles have gained much attention in catalysis due to their specific amphoteric properties, excellent mechanical strength and stiffness, high thermal stability and dielectric properties. In the present study, we have described the synthesis of imidazoles and 1,2-disubstituted benzimidazoles from readily available benzyl, 1,2-phenylenediamine, aldehydes and ammonium acetate under solvent free conditions using ZrO2-β-CD as an environment friendly and reusable heterogeneous catalyst. The products have been characterized by spectral methods. It is note-worthy to mention that, ZrO2-supported β-cyclodextrin nanoparticles have never been used in the field of synthetic organic chemistry. The nanoparticles (ZrO2-β-CD) prepared by a simple one-pot-coprecipitation method, were characterized by PXRD, SEM, and TEM techniques. The nano (ZrO2-β-CD) particles were found to be an effective heterogeneous reusable catalysts for the synthesis of imidazoles and benzimidazoles under solvent free conditions. Further, the synthesized molecules were evaluated for their antibacterial activity against six bacterial strains. Since the biological results seem promising, further experiments have been designed to understand their mechanism of action.