

24th Global Organic & Inorganic Chemistry Conference

July 18-19, 2018 | Atlanta, USA

Stereoinversion of R-configured secondary alcohols using a single enzymatic approach

Musa Mohammed Musa

King Fahd University of Petroleum and Minerals, Saudi Arabia

Controlling enantioselectivity of alcohol dehydrogenase-catalyzed transformations using site-directed mutagenesis enabled their use in stereoinversion of enantiomerically pure alcohols. We developed a single-enzymatic approach for stereoinversion of (*R*)-configured alcohols to the opposite enantiomer in high percent conversion and high enantioselectivity. A single mutant of *Thermoanaerobacter ethanolicus* secondary alcohol dehydrogenase (TeSADH) was used in this approach. Oxidation under conditions that allows selectivity mistakes to take place enabled the depletion of (*R*)-alcohol to the corresponding ketone, which is then reduced under stereoselective conditions to produce the corresponding (*S*)-configured alcohols without isolating the ketone intermediate. Controlling the stereoselectivity of the oxidation and reduction reactions by varying the amounts of acetone and 2-propanol, respectively, is the key for this stereoinversion process. This stereoinversion approach, which utilizes a single enzyme in two steps in one pot, presents a biocatalytic alternative to Mitsunobu inversion reaction.

Biography

Musa Mohammed Musa has completed his PhD at the age of 30 years from University of Georgia and postdoctoral studies from University of Minnesota. In 2009, he joined King Fahd University of Petroleum and Minerals (KFUPM) as Assistant Professor. He is currently an Associate Professor of Chemistry at KFUPM. His research interests include employing enzymes in organic synthesis. More specifically, he is interested in enzyme-catalyzed racemization, deracemization, and dynamic kinetic resolution of alcohols. He has published more than 30 papers in reputable journals.

musam@kfupm.edu.sa

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