

Environmentally Benign Molecular Transformations of Phenols Utilizing Organoiodine Oxidants

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Recently, hypervalent iodine reagents have been used in organic synthesis, and a variety of available reactions for natural product syntheses have been developed utilizing both iodine(III) and iodine(V) compounds. Over past 20 years, we have focused on utility of the low toxic, safe and readily available these organoiodine compounds in organic synthesis, especially using trivalent iodine compounds such as phenyliodine(III) diacetate (PIDA) and phenyliodine bis(trifluoroacetate) (PIFA). In the phenolic oxidations, we have particularly established several effective transformations by using PIDA and PIFA for the synthesis of quinones, spirodienones and biaryls, which are important structural components of various natural products, bioactive compounds, and pharmaceutical intermediates.

These methods are now widely recognized as useful and environmentally benign alternatives to the related conventional transformations using highly toxic heavy-metal oxidants such as mercury (Hg^{II}), lead (Pb^{IV}), thallium (Tl^{III}), etc. Thus, hypervalent iodine reagents are quite useful; however, they are typically used as stoichiometric oxidants and would release a large amount of corresponding iodoarene co-products after the reactions, which make their practical utilization for large-scale syntheses difficult. In our presentation of the symposium, we would like to introduce our recent research results on environmentally benign molecular transformations of phenols, based on development of new organoiodine(III) reagents and construction of hypervalent iodine(III)-involved new catalytic systems.