# SUMMARY OF Ph.D. DISSERTATION

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Title

Preparation and application of hypervalent iodine reagents generated by anodic oxidation


Abstract

Hypervalent iodine oxidants are indispensable reagents in modern organic chemistry, because of their high reactivity and availability. However, these oxidants are comparatively expensive reagents and require careful attention to use for their explosive property. Additionally, since peroxidative agents must be used, preparation of these reagents is dangerous.

On the other hand, no requirement of dangerous and hazardous chemicals makes electrochemical methodology quite safe and reasonable oxidation and reduction method. Without hazardous wastes, these reagents are evaluated as one of the environmentally friendly synthetic methods, from the viewpoint of green sustainable chemistry. In our laboratory, this methodology is utilized as a key step of various synthetic studies on bioactive natural products.

In this study, preparation and utilization of the hypervalent iodine species generated by means of electrochemical methodology were attempted. If it is possible to prepare these oxidants safely from reasonable substrate, this oxidation will be more applicable than conventional ones. From various inspections, anodic oxidation of cheap and stable iodobenzene, produced the hypervalent iodine oxidant good oxidative property comparable to commercial available ones.

Subsequently, Preparation of these oxidants from various iodobenzene derivatives was attempted. Consequently, the oxidants were produced from most of iodobenzenes. In particular, 1-iodo-4-nitrobenzene provided a good oxidant as precipitate.

With this oxidation, an efficient synthesis of quinolinone skeleton, one of the basic skeletons of bioactive natural products, was established. During the course of this study, interesting and unexpected rearrangement reaction of functional groups in aromatic ring was discovered. This might be a good method to introduce halogens and *O*-functional groups at C-8 position of quinolinone compounds.