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Book review

Hypervalent Iodine Chemistry: Preparation, Structure and Synthetic Applications of Polyvalent Iodine, V.V. Zhdankin. John Wiley & Sons, Chichester, UK (2013). ISBN: 978-1-118-34103-2.

Starting with the seminal literature reports of polyvalent organoiodine derivatives in the late 19th century by Willgerodt et al., the area of hypervalent iodine chemistry remained in a relative stasis for about 70 years, only to experience a strong and sustained resurgence in 1980s and 1990s. In the 21st century, hypervalent iodine (III) and (V) compounds became quintessential reagents for a multitude of chemical transformations. These include a wide variety of oxidative processes, as well as a number of useful transformations including aziridinations, amidations and electrophilic trifluoromethylations to name a few. Recent reports of hypervalent iodine catalysis and development of recyclable polyvalent iodine reagents underscore their promising eco-friendly, green attributes, which are particularly instructive and relevant for *Resource-Efficient Technologies* journal readership. Thus, the organic chemistry audience is eager for a monograph covering all aspects of organoiodine compounds, and the book *Hypervalent Iodine Chemistry* by the highly reputable organoiodine expert Prof. Viktor Zhdankin serves this very purpose.

The body of the book of 468 pages is divided into seven chapters and deals extensively and thoroughly with every aspect of polyvalent iodine compounds. Chapter 1 serves as an introductory chapter and provides a historical background on hypervalent iodine reagents, followed by classification, nomenclature, general structural features and principles of reactivity of hypervalent iodine reagents. This chapter is particularly important since it provides fundamental concepts and sets up the reader for a further in-depth discussion. Chapter 2 is concerned with general approaches for the preparation of hypervalent iodine reagents, as well as their structural aspects and physico-chemical properties. The chapter covers cyclic and acyclic iodine (III), (V) and (VII) compounds and contains more than 500 analogs in a highly structured, coherent and fully comprehensive report. Chapter 3 is devoted to applications of hypervalent iodine reagents in organic synthesis, providing an in-depth treatment for an exhaustive number of chemical transformations affected by organoiodine reagents. This chapter was particularly appealing to my own background, and I truly enjoyed a vast array of reactivity described, a lot of times unexpectedly unusual and certainly elegant. I believe that this chapter may serve as an inspiration to many industrial chemists by offering new synthetic disconnections and providing an opportunity to pressure-test these modern synthetic methodologies toward complex, biologically active targets.

Compelling examples of hypervalent iodine catalysis, *e.g.* oxidative functionalization of carbonyl compounds, alkenes, ankynes and arenes, are detailed in Chapter 4. The distinct similarity between transition metal organic complexes and hypervalent iodine compounds exists, and it is therefore possible to replace toxic and environmentally harmful transition metals like lead, osmium and chromium with catalytic organoiodine reagents. The catalytic set-up is also ideal for green, resource-efficient and sustainable chemical processes, and this chapter undoubtedly will be of great interest to the *Resource-Efficient Technologies* journal audience. The next chapter deals with recyclable polymer-supported iodine (III) and (V) reagents and would be of equal importance to both green chemistry-inclined researches and to readers interested in combichem/automated synthesis. The author very insightfully creates a transition from polymer-supported reagents in Chapter 5 to polyvalent iodine reactions in green solvents and under solvent-free conditions in Chapter 6. In my opinion, Chapters 4–6 provide a realistic impression of iodine reagents situated at the cutting edge of "greener" chemical syntheses. Finally, in Chapter 7 the author dwells on practical applications of hypervalent iodine reagents in industry and medicine. The chapter focuses mainly on applications as polymerization initiators and in [^{18}F]-fluoridations to access PET tracers, but lacks deeper analysis of industrial, process chemistry aspects of hypervalent iodine reagents, which may invite some minor criticism. Nevertheless, the author accomplishes a task of providing an informative synopsis – both advantages and limitations of reagents are highlighted, which is crucial for balanced coverage. I also enjoyed a short segment on biological activities of organoiodine compounds, which concludes the chapter.

In summary, the book is of great value to "newcomers" to the field, as well as seasoned experts in organic synthesis. The book is well-written, attractively produced with clean, informative graphics, and provides a comprehensive, coherent and structured account of every aspect of hypervalent iodine chemistry. Strong emphasis on "greener" aspects in Chapters 4–6 is an indisputable advantage of the monograph. I strongly recommend this book for a broader synthetic chemistry audience interested in iodine compounds, both in academic and industrial settings.

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