Book Reviews

Advances in Gas Phase Ion Chemistry, Volume 3. Edited by Nigel G. Adams and Lucia M. Babcock (University of Georgia). JAI Press: Greenwich, CT. 1998. x + 365 pp. ISBN 0-7623-0204-6.

Structured as the two previous volumes of the series, this book has for a general goal to illustrate in depth recent advances in gas-phase ion chemistry, selected for their fundamental relevance and/or for their impact on other research areas. The editors are to be congratulated on the balance between basic and applicative aspects, achieved by a careful choice of the topics treated and a thoughtful organization of the volume, aimed at bringing out the close, if not always obvious, interplay between fundamental advances in gas-phase ion chemistry and its significant applications in a variety of research fields, from space chemistry to biomedical research.

The book is structured in 8 chapters, whose length, ranging from 27 to 70 pages, is in any case adequate to provide a satisfactory coverage of the topic treated. A detailed subject index and the current and numerous literature references in the text are very valuable features.

The first article, of interest to a readership well outside the specialized area of gas-phase ion chemistry, addresses the role of ionic reactions in the synthesis of the *ca.* 115 molecules, containing up to 13 atoms, so far identified in dense (up to 10^5 cm^{-3}) and cold (10−50 K) interstellar clouds. This outstanding contribution by F. Herbst is bound to be both influential and stimulating, in that it reviews both the successes and the problems of current models in space chemistry.

The second article, by R. Johnsen and B. A. Mitchell, deals with the mechanism of the ion−electron recombination process, and introduces a new model involving the intermediacy of long-lived ion−electron complexes. The topic is of interest to plasma and radiation chemistry as well as to space chemistry, since dissociative recombination is believed to be the final step of molecular synthesis in dense clouds.

The next article, by N. G. Adams and N. D. Fisher, examines recent experimental advances in reactive probing of the potential energy surface (PES) of isomeric ions. In this clear and concise review the authors achieve the difficult goal of making the topic attractive and accessible to the novices as well as to the specialists of the field. The species considered are very simple, containing only up to 10 atoms, which makes the article more appealing to space chemists than, say, to physical organic chemists. Although its stated purpose is to review *experimental* advances, the article actually demonstrates the need for an integrated approach whereby *theoretical* methods play an important, often predominant role.

Chapter 4 by W. L. Hasc, H. Wang, and G. H. Peshiherbe deals with the dynamics of gas-phase S_N2 reactions, a topic of unabated interest since the pioneering work of J. Brauman and his group. The article reviews the advances in the theoretical computation of PES, compares the results of statistical-theory calculations with experiment, and illustrates classical trajectory studies. The authors have done a superb job in discussing recent advances toward the full understanding of the microscopic dynamics of model S_N2 reactions, and their article is also of interest to physical organic chemists who study the same processes in solution.

Article 5 by E. C. Richards, K.-T. Lu, R. A. Walker, and J. C. Weisshaar examines the influence of methyl and silyl rotors on electronic excitation and ionization of substituted toluenes. The topic is rather specialized, but the article is of methodological interest, demonstrating the powers of advanced techniques such as ZEKE-PFI (zero kinetic energy threshold ionization spectroscopy with pulsed-field ionization detection).

Chapter 6 treats a problem of fundamental interest to many areas of chemical research, namely, the influence of solvation on reaction dynamics. A. W. Castleman, Jr., a leading authority in the field, gives an outstanding account of the advances in cluster chemistry, which bridges our understanding of phenomena in the gas phase and in condensed phases. Following a description of the experimental and theoretical tools of cluster chemistry, the article illustrates significant applications to structural, thermochemical, and especially kinetic problems, stressing the role of controlled solvation by a known and variable number of neutral molecules. The interest of the topic to many areas of organic and inorganic chemistry and the clarity and depth of the presentation make the article attractive to a wide readership.

The title of Article 7, Thermochemistry of singly and multiply charged ions produced by electrospray, falls short of doing justice to its contents. Actually, the authors (J. S. Klassen, Y. Ha, A. C. Blades, and P. Kebarle) also give a systematic, complete, and timely account of the theory, the mechanism, and the operating parameters of electrospray ionization, which *per se* is sufficient to qualify the chapter as most interesting, in view of the explosively expanding number of applications of electrospray ionization. At the same time, the apparatuses, methods, and applications of the experimental approaches for measuring the thermochemical properties of ions produced by electrospray techniques are of great interest to the specialists.

Finally, Chapter 8 by P. W. Harland and C. Vallance critically reviews the experimental and theoretical methods for the evaluation of electron-impact ionization cross sections, a topic of great fundamental interest, most relevant to many branches of mass spectrometry.

Overall, this book is required reading for the scientists active in the specialized field of gas-phase ion chemistry. Given the impact of the latter on many areas of research, from space and atmospheric chemistry to plasma, flame, and radiation chemistry, physical organic chemistry, analytical mass spectrometry, etc., the book is recommended for all chemical libraries.

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Organic Electroluminescent Materials and Devices. Edited by Siezo Miyata (Tokyo University of Agriculture & Technology) and Hari Singh Nalwa (Hitachi Research Laboratory). Gordon and Breach: Amsterdam. 1997. x + 497 pp. ISBN 2-919875-10-8.

Organic electroluminescence (EL) has become a topic of intense interest over the past 10−15 years. Work has become so voluminous that it has become difficult to gain a broad familiarity with the background work, recent advances, and remaining obstacles that are important in the area. In my opinion, this book is an excellent and timely reference to give broad topical familiarity to an organic EL researcher. There is a good blend of theoretical and experimental work. Sufficient depth is given in some of the chapters that an expert will find those to be good sources for references of reasonably current work. But, there are also chapters that strive to give more basic understanding of material for those who are less expert in the particular area of expertise of the chapter author. It was particularly refreshing and useful to read chapters describing in a fair amount of detail some of the experimental problems and fixes being employed to deal with the pernicious lifetime problems that have been found for organic EL devices. Such useful practical information is not always distributed so liberally in compendium books, so both editors and contributing authors should be complimented on its presence in this volume.

A very nice feature of the book is a set of color plates at the end of the book, clearly referenced relative to the black-and-white originals in the main chapters. The color plates are intended to give the reader the best possible idea of the actual appearance of colored and white emission from devices described in the chapters. This is very helpful for a book describing luminescent devices, however much one may worry about misleading effects from the magic of modern photography.

The index of the book is not voluminous, but is reasonably adequate. Most of the chapters are very readable, with occasional grammatical inelegancy in a few sections. These are minor quibbles about an excellently edited book containing a number of very useful monographs by the contributing authors. The researcher in the EL field will find the book not only a useful reference for background material and original literature, but useful also for identifying specific experimental techniques. This book is highly recommended for those seriously interested in organic EL device research.

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