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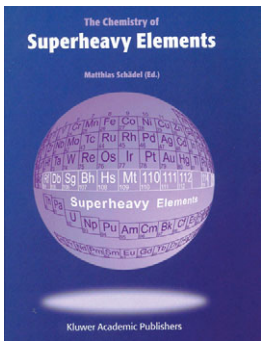
Atomic, Electronic

*Greg Choppin**



The Chemistry of Superheavy Elements

Edited by
Matthias Schädel
Kluwer 2003, 300 pp.
ISBN 1-4020-1250-0
Hardcover, €138.00

It is noted in the preface that this book is intended for students in this field as well as for active scientists. It is also intended to be of interest to other teachers and other chemists and physicists who are not experts in the field. As a result there is somewhat a mixture of rather detailed descriptions of experiments and data analysis combined with quite qualitative reviews of various aspects in the superheavy element (SHE) field. In general the chapters are well written both in sections that provide detailed information as well as in more general sections.

Chapter 1 provides discussion of the nuclear aspects of the SHEs with a good historical overview. After a brief discussion on experimental techniques, there is an interesting discussion on the 'Cold-Fusion and the Hot-Fusion' reactions. This would also be of interest to non-experts who have some knowledge of nuclear reactions. Chapter 2 discusses the electronic structure of the SHEs and perturbations in these structures due to relativistic effects. Included is a calculation of the estimates of covalency in various types of bonds of the SHEs as well as various factors expected to be involved in the aqueous chemistry of these elements.

The focus in Chapter 3 is on fundamental aspects of single atom behaviour. An interesting discussion covers macro versus micro single-atom effects and how estimates for chemical properties can be made both for the dynamics and kinetics of such systems. Chapter 4 covers experimental techniques. This chapter would be of less interest to general scientists but of considerable interest to SHE experts.

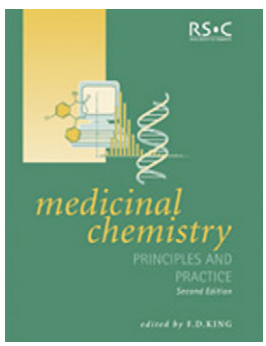
Chapter 5 is basically a review of liquid-phase chemical studies of the first two transactinide elements. The detailed discussion of the experiments on these two elements reflects the difficulties in single atom experiments and addresses the instances where erroneous conclusions were made in regard to interpretation of the chemistry. The degree of detailed descriptions of the experiments in this chapter is greater than in the other chapters and would be of interest only to experts working in these systems. By contrast, Chapter 6 on basic principles of the gas-phase studies of the SHEs serves as a good introduction to Chapter 7 which provides detailed descriptions of the experiments.

The final chapter, 7, is entitled, 'Historical Reminiscences'. For the non-expert, this is perhaps the most interesting chapter of the book as it is an excellent review of the attempts to make the superheavy elements of atomic number $Z \geq 118$. It would be of interest to teachers of nuclear science who would wish to discuss the superheavy elements and the frustrated attempts to reach the 'island of stability'.

In summary this is an interesting book and a useful addition to the literature. It meets its goal of providing sections of detailed interest to researchers in the field of the SHEs as well as of providing less detailed but interesting reviews for the more general scientific readers.

**Greg Choppin was a researcher in Glenn T. Seaborg's new element group at Berkeley (1953–1956) during which he was a codiscoverer of element 101 'mendelevium' and had begun initial work on element 102 'nobelium'. He then joined the faculty at the Department of Chemistry and Biochemistry, Florida State University, where he has remained. His career, producing more than 400 research papers, has concentrated on the nuclear and chemical aspects of the actinide elements.*

*Mark von Itzstein**



Medicinal Chemistry: Principles and Practice

Edited by F. D. King
Royal Society of Chemistry
2002, 450 pp.
ISBN 0-85404-631-3
Softcover, £39.00

This is a timely release of the second edition of an outstanding work that is very well structured, easy-to-read, and will serve the medicinal sciences for quite some time. Not unlike the impact of the first edition, the second edition will be a 'must-have' for those engaged in drug discovery. In my view this is one of the best texts that gives an excellent sense of the entire drug discovery process. This is particularly the case because the contributing authors are well-experienced, highly credible scientists from both academia as well as industry.

I am most impressed with the contributions from the industry-based authors, as they have really provided a real-world feel for what the drug discovery process is all about as well as the pitfalls within the various stages of the process.

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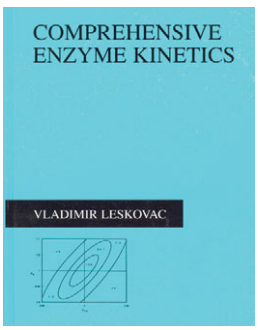
Apart from the case studies presented in various chapters for example the identification of Saquinavir (Chapter 18) and the discovery of Rofecoxib (Chapter 19) both contributed by the book's editor (King), I find that the discussion concerning the biological evaluation of novel compounds (Chapter 5, by Price, Riley, and Middlemiss), chemical development (Chapter 9, by Smith), and strategy and tactics in drug discovery (by King) provide an excellent insight to the those aspects of the drug discovery process that are not particularly well covered in many other comparable works.

I should particularly like to mention the contribution by Tyrrell (Chapter 13) that addresses those ever-important questions about patents and the patent process. So much has changed over the years in this particular field and I believe that Tyrrell has really distilled the most key issues down to a level that is readable and understandable.

Generally the referencing in the chapters is good although, inappropriately in my view, some unpublished literature, for example student theses, is cited. The overall coverage is good and includes references from the 2001 literature. Also, I would have preferred to see a more complete referencing style than that used in the text. I have no doubt that this contribution will have great appeal to not only students but also to practicing medicinal scientists in both industry and academia.

* *Mark von Itzstein is Executive Director and Federation Fellow at Griffith University's Institute for Glycomics. His research interests are in the chemistry and biology of carbohydrates and the application of glycoscience in the drug discovery process.*

*Craig A. Hutton**



Comprehensive Enzyme Kinetics

by Vladimir Leskovac
Kluwer Academic/
Plenum Publishers,
Dordrecht. 2003, 442 pp.
ISBN 0-306-46712-7,
Hardcover, €118.00

Like most books on enzyme kinetics, Leskovac's treatise starts with an introduction to protein structure and basic chemical kinetics and catalysis, which leads into the derivation of the Michaelis–Menten equation. You could say it follows the same old formula! But where *Comprehensive Enzyme Kinetics* excels over similar publications is in its outstanding depth of treatment of the subject, while retaining a simplicity of argument that novices to the world of enzyme kinetics can follow. That's not to say it's not heavy-going at times—vast equations containing dozens of numerator and denominator terms (that make the reader wish they'd paid more attention in high school algebra and calculus class) are regularly derived. But such complex kinetic analysis is regularly accompanied by simple diagrams and graphical treatment, outlining the important slope and intercept values than can be determined and how these relate to the mechanism of an enzymatic reaction.

Following Michaelian treatment of monosubstrate reactions, the King–Altman method of deriving rate equations is explained from first principles, something many other monographs take for granted. Chapter 5 then describes the common types of enzyme inhibition, before more complex nonlinear examples are outlined in Chapter 6. The use of Cleland's rules, terminology, and shorthand notation is emphasized throughout the book, though less-commonly used alternatives are mentioned briefly.

In Chapters 8 through 12 the kinetics of bisubstrate and trisubstrate reactions are discussed in detail. Throughout the book the author tries to describe all possible variations of enzyme mechanisms and inhibition types, providing fully-derived rate equations and graphical analysis. Ordered or random; UniBi or BiBi; Theorell–Chance or ping-pong; even the 'partial rapid equilibrium ping pong bi bi' mechanism—they are all there. In these chapters the treatment gets detailed and the algebra-phobic may baulk, but perusal of the pages for summary graphs, tables, and diagrams will yield the required information for those who just want the answers without deriving them in full. The complex analysis, while perhaps requiring several passes by non-specialists, is such that experienced enzymologists searching for rigorous treatment of a specific mechanism will be pleased to find all the information they require, and more.

Allosteric and cooperative effects and the effects of temperature and pH on enzyme catalysis are discussed in Chapters 13–15, followed by chapters on isotope exchange and kinetic isotope effects. The book concludes with a section on the all-too-often neglected statistical analysis of data, outlining deficiencies with the various graphical representations of rate data, and describing methods that allow for model discrimination, including numerous programs for computer analysis of data.

Comprehensive Enzyme Kinetics certainly provides a comprehensive discussion of the kinetics of reversible enzyme mechanisms and inhibition. One omission from a truly complete treatment of the field, though, is that of irreversible inhibition, which is not mentioned at all. Hard-core enzyme kineticists with a penchant for rigorous mathematical interpretation of enzymatic reactions will find this book very much to their liking. The part-time enzymologist just looking to determine a few K_M and K_i values will also find—after sifting through various detailed explanations—exactly what they need, and while doing so may just procure a greater understanding of the processes they are investigating. In summary, I would recommend it to experts and novices alike.

* *Craig Hutton is a senior lecturer in the School of Chemistry at the University of Melbourne. His research interests include the enzymology of lysine biosynthesis and the synthesis of complex amino acids and peptides.*