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Book review

Microwaves in organic and medicinal chemistry. C. Oliver Kappe, Alexander Stadler. Volume 25 in Methods and Principles in Medicinal Chemistry, Series Editors: R. Mannhold, H. Kubinyi, G. Folkers, Wiley-VCH, Weinheim, Germany. 2005. (II+409 pp. Hardcover, ISBN: 3-527-31210-2)

Comparing different points of view provides substantive judgments: from an expert organic chemist to a fresh medicinal chemist.

Since 1986—the year in which the microwaves irradiation, as a non-conventional energy source—was employed, for the first time, in organic synthesis, there has been a large number of publications that deals with this topic. However, it was only in the last decade that the number of publications increased significantly. There were three main reasons for this increase: availability of commercial microwave equipment suitably built for synthetic organic chemists; the development of the solvent-free technique, which has improved the safety aspects; and determining, at the same time, the shortening of reaction times. Moreover, both the short reaction times and the expanded reaction range that the microwave-assisted organic synthesis (MAOS) offers are suited to the increased demands in pharmaceutical industry where there is a requirement for a large number of novel chemical entities to be produced.

Due to the great interest evoked by this technique, it is natural that books published on this topic would be highly specialized and dedicated. Although the two major books published on this topic (Microwaves in Organic Synthesis, by Loupy, A. and Microwave Synthesis: Chemistry at the Speed of Light, by Hayes, B.L.) were published in 2002, they are inadequate as they are based mainly on literature on reactions conducted essentially in domestic microwave ovens. Therefore, the publication of this new book, Microwaves in Organic and Medicinal Chemistry, is received with pleasure.

The book can be subdivided into three parts. The first part consists of three chapters that provide a brief historical introduction to the use of the microwaves in organic synthesis (Chapter 1), followed by a concise and clear exposition of the microwave theory conceived, of course, for a non-specialized reader, i.e. the organic chemist. On the other hand, there are sufficient references to study the topic in depth. The third chapter reviewed all of today's commercially available dedicated microwave reactors for organic and medicinal syntheses (with the exception of the Emrys Biotage's platforms, that were dismissed since 2004) dealing with both monomode and multimode philosophies.

The second part of the book, consisting of two chapters, is dedicated to microwave processing techniques (Chapter 4) such as solvent-free reaction, phase-transfer catalysis, reactions using solvents, with a comparison of open vessel versus closed vessel conditions and the utilization of non-classical solvents as water and ionic liquids. The chapter closes with two subjects strictly related to medicinal synthesis: the parallel processing and the scale-up in batch and continuous-flow. Chapter 5, entitled "Starting with Microwaves Chemistry", is a short but well-written guide on how-to perform and optimize a classic microwave reaction: choice of solvent, temperature and time, catalyst selection, limitations and safety aspects. These two chapters are of greater interest for inexperienced user that will find concise and functional work-up procedures to a rapid start-up.

Finally, the third part, that is the bulk of the book (approximately 3/4th of the text), consists of two chapters focusing on literature survey that cover, for the most part, the years 2002–2004. Chapter 6 concerns the general organic synthesis and encloses a large amount of reaction to cover almost all of organic chemistry: transition metal-catalyzed carbon–carbon and carbon–heteroatom bond formations, rearrangement reactions, Diels–Alder cycloadditions, glycosylation and ring-opening reactions, four-, five- and six-member heterocycles synthesis and so on. Chapter 7 accounts for multiphase reaction chemistry as solid phase and supporting reagents' reactions or fluorous phase and ionic liquid reactions to synthesize libraries of compounds, particularly useful for medicinal chemists.

The book ends with a three-page chapter that assesses the outlook for microwaves in organic synthesis.

This is a clear, well-written text useful to both inexperienced and experienced users that can find in it all the material for a rapid approach to any organic and medicinal synthesis involving the microwave approach. Since the three parts are completely independent of one another, they can be read in any order making this book more enjoyable. It's noteworthy to mention that the website http://www.uni-graz.at/~kappeco/maos/index.html, created in 2000 by one of the authors (Kappe), is nowadays one of the best web resource guides for scientists working in the broad area of microwave chemistry.

Moreover, Oliver Kappe and Alexander Stadler have contribute to another new book on this topic, entitled "Microwave Assisted Organic Synthesis" and edited by J.P. Tierney and P. Lidstrom, with a chapter on microwave-assisted solid-phase synthesis.

I certainly recommend this book and I hope to see it soon on the shelves of organic chemists' workrooms in academic as well as industrial libraries (A. Rescifina).

"Microwaves in Organic and Medicinal Chemistry" offers a large view on a relatively new field in organic chemistry that allows more rapid synthesis and screening of chemical substances to identify compounds with functional qualities. The book explains with clarity a microwaves-assisted heating under controlled conditions that can be a good tool in medicinal chemistry, since it often dramatically reduces reaction times. With this heating, it is possible to skip a number of conventional heating steps and the reaction becomes faster and easier. "Microwaves in Organic and Medicinal Chemistry" also emphasizes the possibility to build compound libraries throughout mw technology and to discover novel reaction pathways.

The "philosophy" of the book can be summarized by the phrase: "while failure could cost a few minutes, success would gain many hours or even days", which underlines the utility and advantages of mw.

After the introductory chapter, a useful and simple discussion of microwave (mw) theory and mw effects is presented, so as to give also to beginners a basic knowledge of the underlining principles of mw-matter interactions.

The third chapter widely describes the currently available instrumentation for performing MAOS, highlighting the features of every mw reactor type.

From the point of view of a beginner, perhaps it would have been better to proceed with the "instructions" to start with mw chemistry (Chapter 5), first discussing the choice of vessels, solvent, temperature, time and safety aspects. This would have made knowing about mw processing techniques more useful (Chapter 4).

The final chapters are dedicated to several recent applications of controlled mw heating technology in organic synthesis and in combinatorial chemistry and high-throughput organic synthesis. This collection of examples can become a good point of reference for chemists who use mw technology (L. Giurato).

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The Art of Scientific Writing. From Student Reports to Professional Publications in Chemistry and Related Fields. Hans F. Ebel, Claus Bliefert, William E. Russey. Second, Completely Revised Edition, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany, 2004 (ISBN: 3-527-29829)

The advices the three authors provide in this book are essential for young scientists, as well as for the experienced scientists who need to improve their communication skills. Each chapter is a concise overview of an important professional skill. I appreciate that the authors devoted more space to electronic publishing, and how the scientific literature is being transformed by the Internet. In the first years of their careers young scientists can certainly get a very big advantage from this book. The book makes the presentation of the results more friendly giving it the character of a tool to be exploited at best to have better chances in the spreading of their findings as communications and/or papers. Young people are highly motivated instead of getting frightened. Overall the judgment of a nowadays Ph.D. student (*see below*) reflects the one of mine during my Ph.D. course for the previous version dated 1987.

The book systematically discusses many of the important professional skills and could also be used in a professional skills course for graduate students or even in a senior seminar for undergraduates (Salvatore Guccione).

"The Art of Scientific Writing" is a very detailed book which could serve as a guide both for students and teachers. It is written in a clear and simple language, and it is divided in two parts, the first (chapters 1–4) is on "Goals and Forms in Scientific Writing", the second (chapters 5–9), "Materials, Tools and Methods in Scientific Writing", is more technical.

The first chapter is about writing a report, correctly defined by the three authors as "a 'personal representative' of its author". Here the authors underline the importance of the references and suggest to write periodic reports so that you will have an accurate record of what you did and why. In a similar way, it should be written a "laboratory notebook" for every research project: in truth, this kind of "experimental scientist's diary" is spontaneously kept by each "orderly" researcher, even by one who is learning the ropes!

The dissertations usefulness and characteristics are dealt in the second chapter, in which are also listed and described all elements of theirs (title page, abstract, etc.). Some of the most interesting suggestions regard: the title length, which has to be concise and might contain at most 10 words; the appropriate use of "decimal classification", so that there would be to the more three hierarchical levels, "to ensure that section numbers are easily scanned, readily interpreted, and conveniently articulated"; the obligation to read every literature source with a significant bearing on your own project; few literature citations are required in the dissertation "Result Section". Finally, a nice suggestion is given to start writing a dissertation: the use of "idea cards", which every good mentor is usual to suggest to his/her students (but if you do not have such a good guide, or you are not a teacher, you have necessarily to read this book!).