chemists who want to be informed about the history of their scientific field. It demonstrates also that Wurtz was a true European scientist and that a European research approach already existed in the 19th century. This book is also appropriate for politicians. Its reading would help to avoid many mistakes being made. Although the text contains some repetitions, it is nevertheless an extraordinary interesting book. It is highly recommendable for every chemist who wishes to improve his historical knowledge in this field.

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Free Energy Calculations in Rational Drug Design. Edited by *M. Rami Reddy* and *Mark D. Erion*. Kluwer Academic/Plenum Publishers, New York 2001. 385 pp., hardcover € 127.00.—ISBN 0-306-46676-7

This monograph is concerned with the methodology of free energy calculations (or free energy perturbation methods, FEP), which are based on molecular dynamics or Monte Carlo simulations, and in particular with their applications to structure-based drug design in pharmaceutical research. The authors of the contributions include many of the key figures working in this field, and therefore the book contains a comprehensive and mainly very up-to-date presentation of the subject from various viewpoints.

The first FEP calculations on biomolecules, carried out in the mid-1980s, aroused great hopes that it would soon become possible, for practically any ligand, to calculate its binding affinities to important protein targets, thus eliminating the need for much expensive and time-consuming experimental work. Unfortunately this optimism turned out to be premature, and it became clear that many years of work on gradually improving the FEP method would be needed before its advantages and limitations could be properly evaluated. Consequently, because of these uncertainties and the heavy demands on computing time for performing the simulations, the method has not so far gained wide acceptance in pharmaceutical research. The editors of this book head one of the few research groups in the industry who have been successfully using FEP calculations for the last ten years. Their book is the first one to be devoted entirely to the subject, and much of it is concerned with applications.

In the short introduction (6 pp.) J. Andrew McCammon gives a very competent historical survey of the topic, including the initial euphoria and the subsequent decline of early hopes, and concludes by outlining the present state of research. This is followed by two excellent chapters on the methodology of FEP calculations and the calculation of binding affinities, contributed David Pearlman and Johan Åqvist, both well-known experts in the field. These two chapters, together with the introduction, can be recommended for the newcomer to get a good grasp of the characteristics of the FEP method. It is definitely not a method that can be treated as a "black box". Some of the remaining chapters of the book describe new variants of the method, such as the MM/PBSA method described by Kuhn, Kollman, and co-authors, and the λ-dynamics method of C. Brooks and colleagues, also including applications to important protein targets and describing their interaction with inhibitors. The inclusion of these chapters reporting practical examples in drug research makes the book an essential resource for pharmaceutical firms and research groups working in this area. Some of the examples are highly topical, up-to-date, and important, such as the report by Kollman and co-authors on thymidylate synthase, and that by Jorgenson and co-authors dealing with examples of applications to COX-2, the SRC/SH2 area, HIV reverse transcriptase, and thrombin.

However, some weaknesses of the book are apparent in the choice of certain chapters for inclusion. For example, although McCammon and Pearlman mention in the book that many of the studies in the 1980s gave results that were almost meaningless because of the unavoidably short computer simulation times, some of these are included in the book as individual chapters, without explaining the problems of interpreting the results that subsequently became known. Without wishing to detract from the important role of these early studies, it has to be said that some of the results are only of historical significance. Also, of course, repetitions appear as a common characteristic of multi-author books. For example, at least half the chapters introduce the reader to the principle of thermodynamic cycles. Two additional introductory chapters are devoted to the MM3 force field and by implication to solvent models (C. Cramer and D. Truhlar). Also, although the need to normalize absolute free enthalpies of bonds to standard conditions is mentioned in several places (see the 1997 publications by M. K. Gilson and J. Hermans), it would perhaps have been useful to discuss this in a separate chapter. That point is of particular importance if (as one hopes) the FEP method will be generally adopted in drug research in the future.

The book will enable not only those engaged in drug modeling in pharmaceutical firms, but also post-graduates in university research groups, to learn about the FEP method and its future potential within a fairly short time. It is intended for a specialist readership, and is likely to remain the only available work on this subject for some years to come, and for that reason alone it is a highly valuable addition to the literature.

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Organic Synthesis Engineering. By *L. K. Doraiswamy*. Oxford University Press, Oxford 2001. xviii + 918 pp., hardcover £ 150.00.—ISBN 0-19-509689-4

In this book L. K. Doraiswamy has set out to give a comprehensive treatment of both chemical process engineering and the catalysis of organic reactions, and to connect the two together. Thus, the unique feature of this work is that, unlike conventional textbooks on process engineering, it contains some good and substantial chapters on catalysis. However, that has not been allowed to limit the treatment of process engineering, which is where the book's main

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emphasis lies. That approach has resulted in a relatively bulky textbook of over 900 pages.

The contents are arranged in five sections, process engineering being treated in the usual way in Sections 1, 3, and 4. The only aspect not covered as thoroughly as one might wish is that of residence times in reactors. The thermodynamically nonideal behavior of reaction mixtures (which unfortunately many authors fail to cover adequately) is treated in detail here. It is also pleasing to find that special aspects of reaction technology such as semibatch operation and nonstationary states are covered. Section 2 provides an excellent description of the principles of heterogeneous and homogeneous catalysis, including many practical examples which add to the reader's interest in the subject. Section 5 is the part that especially marks this out as a modern book. Here, in a way that one does not find in conventional textbooks, the author describes and discusses in detail some new concepts in process engineering that lead to improvements in selectivity and reaction rates. Examples of the topics discussed include multiphase liquid reactors, biochemical and electrochemical syntheses, reactors using ultrasonic or microwave energy, membrane reactors, and multifunctional reactors, as well as syntheses under supercritical conditions.

Doraiswamy intends the book to be used by both chemists and process engineers, as is emphasized by the fact that he often addresses comments directly to each of these groups. He succeeds in this dual aim largely by keeping the chemical reaction, which is at the heart of reactor design, in the foreground as the starting point of the concept of the reactor, rather than treating it in general terms or giving only a few examples. Thus, the proportion of material of a purely chemical nature is unusually large for a book on process technology. However, in our view the treatment of process engineering aspects is too detailed for chemists, going far beyond the basic knowledge that is sufficient for those readers. On the other hand, the process engineer will benefit from an interesting survey of the main chemical aspects, and will also find answers to detailed questions on reaction technology.

The contents are too detailed and extensive for a student textbook, unless the student is prepared to accept that some of the material is too advanced to assimilate. Moreover, our first impression was of a manuscript bound in a hard cover rather than of a modern textbook. In particular the diagrams and figures are not up to modern standards. Because the visual impression affects one's reading and learning, and may also influence the decision whether or not to buy the book, both the internal and external appearance need to be modernized; otherwise they spoil the impression made by the book, despite the excellent quality of its contents.

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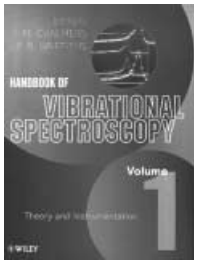
Handbook of Vibrational Spectroscopy. Vols. 1–5. Edited by *John M. Chalmers* and *Peter R. Griffiths*. John Wiley & Sons, New York 2002. 3862 pp., hardcover £ 1345.00.—ISBN 0-471-98847-2

Scientific progress is generally reported in original papers, reviews, and monographs. Their role is to present the latest facts and research results, and these are then evaluated within the narrow scientific circle to which the work belongs. This process seldom includes connections with other areas of work and related disciplines, and indeed, because of the constant flood of new scientific publications, those interdisciplinary aspects do not receive the amount of attention that would often be desirable. Thus, for areas of research that have undergone rapid development, or have such a wide-ranging potential that their applications have expanded into new fields not originally envisaged, it is all the more important that from time to time there should be an overall review of the state of progress, in which experimental results and theoretical models are evaluated and put into some order. At a more mundane level, such a review can also look for new technological applications. This need is especially great for such a fundamentally important method as vibrational spectroscopy, which can look back on many years of technical development, and has also given rise to a wide variety of modern applications. The editors of this *Handbook of Vibrational Spectroscopy* have aimed to provide a comprehensive overview of the kind described above, covering methods, instruments, technical developments, and applications. They have achieved that in a 5-volume work of some 4000 pages containing 239 individual articles.



The contents are arranged clearly and systematically. Volume 1, with nearly 900 pages, contains detailed descriptions of the theory of light absorption, of infrared spectroscopy, and of the Raman effect, followed by articles describing a wide variety of instrumental methods and techniques. The aspects covered include the different types of detectors, monochromators, and interferometers, the many variants of the principle of nonlinear Raman spectroscopy, the various SERS (stimulated emission Raman spectroscopy) techniques, methods based on circular dichroism, and the latest laser spectroscopy instruments using frequency mixing. Volume 1 ends with an important chapter on wavelength calibration and photometric quantities.

Volume 2 begins with discussions of a conventional sample preparation, but soon moves on to thin film techniques, techniques of infrared and Raman spectroscopy, and microspectroscopic methods, to name only a few of the topics. This volume too ends with an important chapter, describing anomalies, artefacts, and errors which can arise, both of a general kind and those relating to special techniques.

Volume 3 begins with chapters containing detailed descriptions of the group frequencies of organic, inorganic, and polymeric compounds, with many tables of data. These are followed by chapters on normal coordinates analysis and the calculation of predicted vibrational frequencies. The second part of this volume contains articles on signal processing and spectrum analysis.

The last two volumes are devoted to applications. Articles in Volume 4 de-

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