48 volumes altogether, which are to be published by 2007. Nine volumes will appear in the period 2000 – 2001. Those that already exist are Volume 9 (*Fully Unsaturated Small Ring Heterocycles and Monocyclic Five-Membered Hetarenes with One Heteroatom*) and the present Volume 10 (*Fused Five-Membered Hetarenes with One Heteroatom*). Volume 10 uses the familiar hierarchical Houben – Weyl system of arranging the contents. The highest level of subdivision is the compound class; for example, 10.1 covers benzofurans, and 10.13 covers indoles. The next level is defined by the method of synthesis. Thus we have 10.13.1, indoles synthesized by ring closure, followed by 10.13.2, indoles synthesized by ring transformations; 10.13.3 … by aromatization; 10.13.4 … by substitution of existing substituents; 10. 13.5 … by substituent modification. The next levels comprise the individual methods and their variants, extending down to a ninth level. For example, 10.13.1.1.1.1.1.1 is the Fischer method for synthesizing indoles, and 10.13.1.1.1.1.1.1.1 is variant number 1 of that (Granberg's tryptamine synthesis).

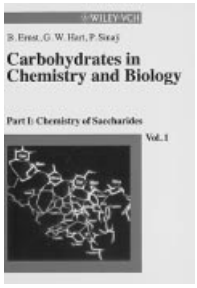
As a test of how quickly the desired information can be found, I chose to search for a method to synthesize 4-bromoindole, regioselectively if possible. The compound is not listed in the index, so I had no alternative but to scan through the text to find it. Of the four main routes 10.13.1 to 10.13.4, I chose 10.13.1 because more possibilities were given there than elsewhere. Fischer indole syntheses and their variants were rejected because of insufficient regioselectivity, so the only possibility was more leafing through pages and reading. Just as I was about to give up exhausted, quite by chance I came across the desired structural formula on page 424, under "Leimgruber – Batcho Synthesis" (with a 1986 literature reference). If I had spent the same amount of time with the PC using *Beilstein Crossfire* or *Scifinder*, it would certainly have yielded many recent literature references, with also much more information concerning derivatives. Therefore, if *Science of Synthesis* is to offer rapid access to information about synthetic routes, the publishers need to choose a completely different system for arranging the material based on specific substitution patterns (e.g., for indoles, 3-monosubstitution, 2,4-disubstitution, etc.) as the highest level of subdivision, listing under these the best methods of synthesis. In the present form the process of searching is far from straightforward. Nevertheless, the work is a superb, and in many respects exhaustive, compilation of synthetic methods for specific heterocyclic compound classes. The laboratory procedures that were such a highly valued and praised feature of the old Houben – Weyl have been retained, so that one gains an immediate impression of the amount of work involved in each suggested method and its practicability.

So what is new here compared with the old Houben – Weyl, and what has been improved? Certainly the subject and author indexes are an innovation and an improvement, even though the former is not as useful as it might be. The work remains unrivaled in the high quality of the contents and the standard of production.

Johann Mulzer
Institut für Organische Chemie
Universität Wien, Vienna (Austria)

Carbohydrates in Chemistry and Biology. Vol. 1 – 4. By *Beat Ernst, Gerald W. Hart* and *Pierre Sinaÿ*. Wiley-VCH, Weinheim 2000. 2340 pp., 949 figs., 111 tabs., hardcover € 849.00.—ISBN 3-527-29511-9

Volumes 1 and 2 cover the chemical synthesis of glycosides and glycomimetics, the enzymatic synthesis of glycosides, and the investigation of carbohydrate-receptor interactions by biophysical techniques. By recruiting leading scientists in the field, the editors succeed in covering the latest developments in the fields of carbohydrate synthesis and the area of investigations of carbohydrate-receptor interactions by biophysical methods. For instance, the contribution of Schmidt and Jung about trichloroacetimidates will be a valuable tool not only for the specialist but also for every synthetic chemist who wishes to enter the field of carbohydrate synthesis. Also, the first volume contains contributions that have a high educational value and are suitable for students entering the field. For example, the chapter written by Mallet and Sinaÿ entitled: "Classics and Total Synthesis of Oligosaccharides and Glycoconjugates" gives a rather compact overview and a genuine understanding of important strategies that have been employed in the past decades to synthesize biologically active oligosaccharides and glycoconjugates. The second volume addresses in depth the enzymatic synthesis of glycosides. Basically, all important strategies for making saccharides by using glycosyltransferases are covered. The second volume concludes with an extended contribution covering the most important biophysical techniques to investigate carbohydrates and their interaction with protein receptors. The main tools to analyze carbohydrate structures, NMR, MALDI-TOF, and surface plasmon resonance (Biacore) are discussed by several authors, all experts in their fields. The corresponding chapters contain valuable references to further specialize on a distinct topic. To summarize, these two volumes are a valuable addition to each laboratory's book shelf.



Volumes 3 covers the current knowledge of glycosyltransferases and glycosidases of mammalian cells, plants, yeasts, and microbes as well as the biosynthesis of precursors and nucleotide-sugars and represents a valuable handbook for both chemists and biologists in the glycoscience area. The editors have invited numerous outstanding scientists to provide a comprehensive overview of recent advances in glycoscience. The collection of articles in volume 4 reviews the functional significance of free saccharides and protein- or lipid-linked saccharides in cell-cell interaction in development and disease and covers in depth the current state of knowledge of oligosacharide interaction with lectins and other carbohydrate binding receptors.

Volumes 3 and 4 of "Carbohydrates in Chemistry and Biology " address a broad readership who requires solid background and therefore these volumes are not suited for teaching glycoscience to readers outside the field. For nonexperts it is difficult to use the index, and

  1433-7851/01/4022-4294 $ 17.50+.50/0

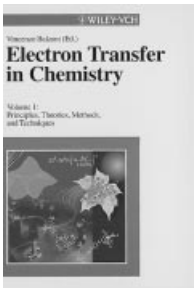
it is not easy to locate the same headwords if they are discussed in several different chapters. Many chapters are very dense in the numbers of facts given (vol. 3, chapters 1-15). Some other chapters have been already published by the same authors in review form elsewhere during the past four years and thus represent an updated overview. A few of the reviews do not cover the field a reader could expect from the title (e.g. vol. 4, Glycobiology of the Immune System). However, such a criticism can often be raised with such multi-author books or series aiming at a complete overview of the entire field. This however, is only achievable by consulting the mostly adequate and updated references at the end of each chapter.

The four volumes provide a very useful collection of mostly excellent overviews in glycoscience disciplines and can be recommended to anyone wishing to aquire a more detailed knowledge of the state-of-the-art in glycochemistry and in the rapidly developing field of glycobiology.

Harald S. Conradt
German Research Center
for Biology (GBF)
Braunschweig (Germany)

Electron Transfer in Chemistry. Vol. 1-5. Edited by *Vincenzo Balzani.* Wiley-VCH, Weinheim 2001. 3992 pp., hardcover € 1599.00—ISBN 3-527-29912-2

Electron transfer plays a central role in life science as well as in the synthesis of several interesting intermediates. Therefore, the investigation of electron transfer is of particular interest.



V. Balzani organized numerous well-known scientists in their respective fields to write contributions for this interdisciplinary book series consisting of five volumes. Every individual book contains 42 pages of contents but only the last volume includes the carefully made index. The topics covered by this monograph extend from theoretical aspects of electron transfer to the application of supramolecular devices for molecular circuits. The book deals particularly with single-electron transfers. Processes involving multiple-electron transfers, to which most oxidation and reduction reactions belong, are not covered, but will be found in the cited literature.

Volume I: Principles, Theories, Methods, and Techniques
Volume II: Organic, Organometallic, and Inorganic Molecules
Volume II: Biological and Artificial Supramolecular Systems
Volume IV: Catalysis of Electron Transfer, Heterogeneous and Gas-phase Systems
Volume V: Molecular-level Electronics, Imaging and Information, Energy and Environment

The editors emphasize throughout the entire book series the theoretical basis. Although a solid theoretical foundation is built by the first volume, the reader will find small theoretical summaries which will help quickly clarify this field for nonspecialists or those requiring more background information. The quality and consistency of the graphics contained in individual chapters varies. The number of errors in the written part and in the schemes is at a tolerable level.

M.D. Newton's introduction to basic theory opens the first volume. Starting with the transition-state theory, the treatment of electron transfer in computational chemistry is discussed. This chapter cannot be recommended as an introduction to readers who are not familiar with quantum chemical and physical terminology and models. However, the abundance and topicality of the references make this part a rich source of information. H. Sumi extends the description of electron transfer to the adiabatic and diabatic limit as well as to intermediate cases. Current topics, for example, the role of solvent relaxation after electron transfer, are also discussed here. The short third chapter by S. S. Skourtis and D. N. Beraton bridges the gap to biomolecules: intramolecular electron-transfer processes over large distances demand an expansion of the simplified donor-bridge-acceptor model described in the first two chapters, thus the concept of multistate electron transfer is introduced. D. Vanmaekelbergh's text deals with electrodes and reactions on surfaces. The author puts much effort in an introduction to the electronic structure of solids, followed by the presentation of the classical work of Gerischer. Even readers with no prior knowledge of the subject will profit from this discussion of processes on metal and semiconductor surfaces. The coupling of electron transfer to proton transfer in biological and chemical redox systems is treated with valence-bond approaches by S. Hammes-Schiffer in chapter 5. P. Piotrowniak draws parallels between electron transfer and the singlet and triplet energy transfer of excited states, in both of which energy transfer over large distances (50-100 Å) is possible. The seventh chapter (J. F. Endicott) focuses on transition metal complexes. Charge-transfer properties of these can often be correlated with their redox behavior. A particularly modern (and inspiring) topic is presented by M. A. Fox in chapter 8: photocatalysis by semiconductors. Irradiation with ultraviolet light can initiate electron transfer on their surfaces. The subsequent reactions of the adsorbates are even exploited in commercial processes, for example, the fission of water and organic transformations. The recombination of an anion with a cation may form an electronically excited product after charge transfer. A. Andersson and R. H. Schmehl give both a basic introduction and examples (luminol reaction) in their chapter about electroluminescence. S. F. Nelson's dense but very informative overview of electron-transfer reactions in organic reactions is well-structured and reviews synthetic and mechanistic works. Nevertheless, the chapter (10) is misplaced, as it discusses works of Schmittel, Roth, Bauld, and Gao, who are authors in Volume II. The second part of Volume I is smaller than the first one and deals with electrochemical techniques which can be used instead of classical kinetics. The first two chapters may be read as an introducing overview and include modern trends (ultramicroelectrodes). Two chapters describing the interaction of molecules and condensed phases with highly energetic radiation conclude this volume: radiation ionizes

  1433-7851/01/4022-4295 $ 17.50+.50/0