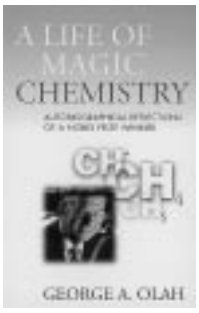
Chemical Wizardry

A Life of Magic Chemistry. Autobiographical Reflections of a Nobel Prize Winner. By *George A. Olah.* John Wiley & Sons Ltd., Chichester 2001. 277 pp., hardback. £ 25.50.—ISBN 0-471-157430-0

A sign of a good book is that it can be read on several levels: the story itself, the political/historical, the biographical, essaylike, etc.—it is this multifaceted quality that excites the reader and is often the reason that a book is read and reread, and that with each reading new facets are discovered. The same is true for autobiographical works, with the prerequisite that the life described is also multifaceted and varied, and that the author can present it well.



With this in mind then no scientific autobiography should be as worth reading currently as this from George Olah, the winner of the 1984 Nobel Prize in Chemistry. The book exceeds expectations on every single front. It can be read as a brief history of organic chemistry, that concentrates on the development of the valence concept for carbon from the time of Kekulé to the hypervalent organic compounds with five and more coordinate carbon atoms, an area in which Olah made fundamental contributions. In addition, the book is a (partial) history of physical organic chemistry that follows the development of carbocation chemistry, from the days of Meerwein, over the notorious controversy about nonclassical ions between Brown, Winstein, Schleyer (and many more) up to Olah's (genuine) carbonium ions, with $(CH_5)^+$ as the central unit. One can describe the chapters and sections in which the author introduces petrochemistry as the basis for a significant part of chemical production as a summary of industrial organic chemistry. In particular this section of the book should be highly instructional for nonchemists, as here, in plain English, the almost total dependence of our technical civilization on oil is explained. This chapter is supplemented by considerations about the future development of industrial hydrocarbon chemistry and the ecological challenges that are bound to it.

What holds this immense amount of material and thematic variation together? It is—and one can not put it any other way—the fascinating life of George Olah. Although born in Budapest in 1927, after the Austria-Hungarian empire had perished, his school life followed the classical Austro-German Gymnasium system. Following the bloody defeat of the uprising of 1956 he left Hungary as a young political refugee and, via England and Canada were he worked very successfully in the chemical industry, landed in America and began his academic career at the Western Reserve University in Cleveland. He moved to the University of Southern California in 1979 which until then was more renowned as the center of American university sports than as an academic institution, where with the Loker Hydrocarbon Research Institute he was able to build one of the most respected chemical research centers in the world. This story alone, of how through the commitment of a few people, patronage, less bureaucracy, and interference from the state—America you really do have it better!—an institute of the Max-Planck type developed, is hopefully one which will be widely read.

To come from such a turbulent background and to live such a productive life is no easy thing, and on the final page of his book the author reveals one of the forces that has helped him to achieve this: "I have always tried to keep a healthy sense of humor, much needed in our present time. I have managed not to take myself too seriously, only my science, about which I am quite passionate".

Living and learning—in both, the reader is richly rewarded by the lessons in *A Life of Magic Chemistry.*

Henning Hopf
Institut für Organische Chemie
Universtät Braunschweig

Main Group Chemistry. 2nd Edition. By *Alan G. Massey.* John Wiley & Sons Ltd., Chichester 2000. 534 pp., hardcover £ 75.00.—ISBN 0-471-49037-7

Chemie der Nichtmetalle. 2nd Edition. By *Ralf Steudel.* Walter de Gruyter, Berlin 1998. 575 pp., paperback DM 88.00.—ISBN 3-11-012322-3

In many universities, students majoring in chemistry are usually offered, in addition to the more narrowly focussed special lecture courses, a second course of lectures ranging over inorganic chemistry, to give a more thorough understanding of the subject. Some typical themes for such courses are the molecular chemistry of the Main Group elements, transition metal chemistry/coordination chemistry, organometallic chemistry, and solid-state chemistry.

This section contains book reviews and a list of new books received by the editor. Book reviews are written by invitation from the editor. Suggestions for books to be reviewed and for book reviewers are welcome. Publishers should send brochures or (better) books to the Redaktion Angewandte Chemie, Postfach 101161, 69451 Weinheim, Germany. The editor reserves the right of selecting which books will be reviewed. Uninvited books not chosen for reviews will not be returned.

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Lecture courses on these subjects have given rise to a number of textbooks for students to use alongside them, a recent example of which is *Moderne Anorganische Chemie*, a multiauthor book edited by E. Riedel. Students seeking an up-to-date survey of the molecular chemistry of the Main Group elements can now choose between the nonmetals chapter of *Moderne Anorganische Chemie*, written by T. M. Klapötke, the related book *Nichtmetallchemie*, by T. M. Klapötke and I. C. Tornieporth-Oetting, and the two books reviewed here, which have recently appeared in their revised second editions: R. Steudel's *Chemie der Nichtmetalle* and A. G. Massey's *Main Group Chemistry*.

The textbook by Steudel, like that by Klapötke and Tornieporth-Oetting, is based on the lecture series on the nonmetallic elements that has been offered at the Technical University of Berlin since the early 1970s. It consists of two parts: Part I (176 pp.) on atomic structure and chemical bonding and Part II (386 pp.) on the chemistry of the nonmetallic elements. Compared with the original 1974 version, this second edition has been greatly improved by being brought up to date, especially in the description of bonding concepts. The chapter on chemical bonding, now freed from the burden of the VB method, impresses one especially by the clear way in which, starting from the Bohr model of the atom, it explains the use of qualitative MO arguments based on symmetry considerations to describe small molecules, weak intermolecular interactions, and "bonding properties". It is not until Part II (the chemistry of the nonmetallic elements) that we come to the treatment of important molecules and ions with more than five atoms, such as SF_6 and $[SeCl_6]^{2-}$, in the chapter on sulfur, selenium, tellurium, and polonium, under the heading "hypervalent compounds". Regrettably, the question of 3c–4e bonding (HF_2^-, I_3^-, XeF_2, PF_5) and its relevance to intermolecular $n-\sigma^*$ interactions (mentioned, for example, on p. 322 concerning layer structures and iodine, and on p. 337 under charge transfer complexes) is not treated comprehensively here, nor is the topic of $\pi^*-\pi^*$ interactions, which have been suggested as relevant to molecules such as dimeric ClO_2.

This already well-proven work by R. Steudel has been very effectively updated in the chapters dealing with specific elements, so that it now reflects the most important modern developments in the chemistry of the nonmetallic elements in an exemplary way.

A. G. Massey's book *Main Group Chemistry* covers a much wider range of subject matter, including all the elements of the s and p blocks together with Group 12 (Zn, Cd, Hg). General aspects of bonding (e.g., π bonding in the heavier elements, planar nitrogen, 3c–4e orbital overlapping) are presented concisely and in a very readable style in the chapter entitled "The Periodic Table" (40 pp.). The treatment assumes that the reader already has a basic knowledge of general chemistry. This is followed by chapters dealing with individual elements or groups. Thus, for example, metallic bonding and topics such as the bonding in tetrameric methyllithium are treated in the chapter "The Alkali Metals", and another chapter discusses band models for semiconductors such as silicon/germanium and selenium. The book also covers many aspects of coordination chemistry, such as therapy using chelates, cone angles, crown ethers, cryptands, and a survey of metal carbonyl complexes. The book has many features that whet the reader's appetite to go on, such as the many examples from real situations to illustrate the use of instrumental methods of analysis, the additional comments scattered throughout the text, for example comparing pairs of elements such as Cu/K, Li/Mg, and Mg/Mn, and a chapter on steric effects. The appendix contains data on AX and AX_2 crystal lattice structures, a comparison between main group metals and transition metals, a short summary of key points, and over a hundred exercise problems.

Thus, Massey's book is a very reader-friendly aid to gaining a comprehensive understanding of the chemistry of the s- and p-block elements, without having to work through a formidable amount of detailed material. Unfortunately, however, limiting the subject matter in that way has meant that some important advances achieved during the 1990s are not mentioned in this second edition. Thus, it does not include new results on the biological importance of nitrogen monoxide, on the structure of monomeric P_2Se_5, on the dimeric structure of solid ClO_2, and on "nonclassical" polytellurides and polyselenides (which can be found in the 1995 edition of the "Hollemann–Wiberg" textbook). A few errors have crept into this edition: for example, all the organo-dihalogen compounds R_3MX_2 (M = P, As, Sb, Bi) are shown as having a trigonal-bipyramidal structure.

To summarize, *Main Group Chemistry* and *Chemie der Nichtmetalle* are both excellent modern student texts with the main emphasis on molecular inorganic chemistry, and can be recommended as valuable additional resources to be used alongside the more comprehensive textbooks, but not as alternatives to them.

Wolf-Walther du Mont
Institut für Anorganische
und Analytische Chemie
Technische Universität Braunschweig
(Germany)

Principles of Analytical Chemistry. A Textbook. By *Miguel Valcárcel.* Springer Verlag, Heidelberg 2000. xi + 371 pp., 132 figs., hardcover DM 76.00.—ISBN 3-540-64007-X

With his book *Principles of Analytical Chemistry—A Textbook*, Miguel Valcárcel presents a new concept for introducing analytical chemistry. This concept has already been applied successfully for several years at the University of Córdoba, Spain. In contrast to the common textbooks of analytical chemistry, instead of a systematic description of a large number of analytical methods, the book presents a discussion of the general basic principles of analytical chemistry as an independent scientific discipline.

The book is divided into eight chapters. An introduction to general aspects of modern analytical chemistry (Chapter 1) is followed by chapters on important definitions in analytical chemistry

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