

BOOK REVIEWS

Smiljko Ašperger

Chemical Kinetics and Inorganic Reaction Mechanisms

Second Edition

Kluwer Academic/Plenum Press

New York, 2002, pp. 361

ISBN 0-306-47747-5 (hard cover)

This monograph is a translation of the Croatian edition entitled *Kemijska kinetika i anorganski reakcijski mehanizmi* (published in 1999 by the Croatian Academy of Sciences and Arts). The Croatian edition was reviewed by Professor Vladimir Simeon in this journal (*Croat. Chem. Acta* **73** (2002) A5-A6). In a very detailed analysis of the Croatian edition by Dr Sonja Nikolić and myself (see *Acta Pharm.* **49** (1999) 308-310), we stated near the end of our review »The author should be congratulated on having written the book in Croatian (though I hope he will prepare an English edition, which will certainly widen the circle of his readers)«. Our hope came true – three years later the English translation of the book is available.

Professor Ašperger translated the monograph himself. This was rather fortunate because the English edition is not just the translation of the Croatian text, but also a thoroughly revised version of the original text. Since there is a three-year interval between the two versions of the book, the English rendition is more like a book newly written from scratch because the author aimed to make the English edition up-to-date.

The original version had 13 chapters whilst the English version has 15 chapters and an Epilogue. New chapters are *Metal complexes with short memory* (7 pages) and an especially interesting chapter entitled *Some recent publications in the scientific spotlight* (16 pages), in which 11 publications that appeared during the writing of the book are listed and briefly discussed. The selection of publications was arbitrary but it reflects Professor Ašperger's research interests.

All chapters in the English edition of the book were updated and some were extended, whilst the first chapter *Chemical kinetics and reaction mechanisms* (101 pages) was raised to a higher level. To this chapter the author also added, among other things, a description of the laser technique for observing the motion of atoms and molecules during chemical changes. Ahmed Zewail was awarded the Nobel Prize for Chemistry in 1999 for developing this novel laser technique that allowed femto-second kinetic studies. Each chapter is supplemented by short biographical notes on important chemists (and in some instances also on important physicists) – these notes being more extensive when the work of the past and present leaders in the field is presented. The original Croatian text was supported by 718 references and bibliographical sources whilst the English text is supported by 862 information sources: the increase being 20 % in favor of the English text.

The *Foreword* was written by James H. Espenson, professor of chemistry at the Iowa State University in Ames. The English edition was praised by the leading inorganic chemists of our time: Harry B. Gray (Arnold O. Beckman Professor of Chemistry, Caltech, Pasadena, California, USA), Henrique E. Toma (Professor of Chemistry, University of Sao Paulo, Sao Paulo, Brazil), Ralph G. Pearson (Professor Emeritus, University of California, Santa Barbara, California, USA) and Fred Basolo (Professor of Chemistry, Northwestern University, Evanston, Illinois, USA).

Professor Simeon stated near the end of his review: »...this book is certainly an important contribution to the Croatian chemical literature.« To end my review I wish to expand these words by stating: The English version of Ašperger's book is certainly an important contribution to the Croatian chemical literature, but also to the world's chemical literature and especially to the chemical literature concerned with chemical kinetics and inorganic reactions mechanisms. I believe that whoever starts reading this book will certainly proceed to the end and will enjoy her/his reading.

Nenad Trinajstić

M. Kaštelan-Macan

Chemical Analysis in the Quality System

Školska knjiga

Zagreb 2003, 337 pages

Chemistry is an exact natural science that deals with the composition of substances, and the transformations that they undergo. Therefore, analytical chemistry is the basis for all fields of chemical investigation and practice because it is incorporated in the ubiquitous information-obtaining chain. Even in chemical synthesis one should analyse either the starting or intermediate reagents, or, even more frequently, the final product. Today, in the era of profit making, quality control is the only means of assuring that we use and consume healthy and ecologically safe products. The globalisation of economies (whether we like it or not!) and information revolution are a must for all the countries and the same standards should be set and used worldwide. In this context, inter- and multidisciplinary approach in analytical chemistry, as well as in any other field, is necessary to tackle our everyday problems. The author, a distinguished professor of analytical chemistry in the Department of Analytical Chemistry of the Faculty of Chemical Engineering and Technology, University of Zagreb, should be praised for writing an analytical textbook on modern analytical chemistry with quality control in mind. This textbook is unique in several aspects. Firstly, at long last it has been written by a Croatian author. Secondly, there are not many titles in the world literature so clearly showing that analytical chemistry does not rely only on the classical qualitative, quantitative and instrumental analyses. Analytical chemistry has evolved into a problem solving system integrating chemometrics, physical chemistry, classical analytical chemistry, information science, philosophy in one mighty system based on an expert and ethical approach. As the author quoted in the

introduction the comment of an older academician when she explained the subject of this textbook »but all this is the basis of home education«, and I will add of career education, as well. Therefore, appending to each chapter a tribute to our Croatian university professors is most welcome, because the moral and professional virtues of each of us who have had the privilege to be their students are in the heart of the »quality system«. The author showed with abundant examples that analytical data processing, planning the experiments or sampling are at least equally important as the measurement or knowledge and understanding of chemical and physical principles used in instrumental and classical analysis. The book is written in Croatian but it deserves to be published in English as well, because it provides a pleasant refreshment in the field of analytical chemistry. It is intended for the students of chemical and biochemical engineering and technologies, but everyone working in industry might use it in order to optimise his own quality system.

The content is divided into twelve chapters: 1. *System approach to chemical analysis*, 2. *Errors in the analytical system*, 3. *Statistical data evaluation and estimation*, 4. *Quality system*, 5. *Project management*, 6. *Sample and sampling*, 7. *Sample preparation*, 8. *Analyte separation and isolation*, 9. *Calibration procedures*, 10. *Performance characteristics of the chemical measurement process*, 11. *Determination methods*, and 12. *Standards and standardisation*. There are two appendices: I. *Safety in laboratory work*, and II. *Index of terms and acronyms*.

The book is written in a popular way and it is easily readable, so the reader can comprehend the almost unperceivable system and philosophy behind the complex and strict principles of quality control and assurance. Humorous illustrations contributed by Darko Macan are nicely incorporated and make the text reader friendly. I recommend this textbook to all the university libraries, students and chemical engineers and technologists.

Božidar Grabarić

*Chemistry and Mathematics:
Two Scientific Languages
of the 21st Century*

Nova Acta Leopoldina Neue Folge,
Volume 88, Nr. 330, pages 160
Deutsche Akademie der Naturforscher Leopoldina
Halle (Saale) 2003

This book is based on the eight lectures delivered at the Leopoldina Symposium of the same title organized by Deutsche Akademie der Naturforscher Leopoldina (Halle) with the participation of the Göttinger Akademie der Wissenschaften (Göttingen) and the Académie des Sciences (Paris). The Symposium was held in Göttingen from October 11th to October 13th, 2001. The aim of the Symposium was to improve the dialogue between mathematics and chemistry.

The amusing *Introduction* (3 pages) to the book is written by Herbert W. Roesky (Universität Göttingen). Among quotations he is citing in his article, there is one by the famous New York Yankees baseball player Yogi Berra, which I heard many years ago in New York and have since often used: »It's tough to make predictions, especially about the future.«

The first chapter entitled *Chemistry as an Ideographic Language* (8 pages), written by Guy Ourisson (Centre de Neurochimie, Strasbourg), is about the rich information content of chemical drawings. The second chapter entitled *Transition Metal-Based Machines and Motors at the Molecular Level* (20 pages), written by Jean-Paul Collin, Christine Dietrich-Buchecker, Pablo Gavina, Maria Consuelo Jimenez-Molero and Jean-Paul Sauvage (Université Louis Pasteur, Strasbourg), summarizes the authors' efforts to prepare transition-metal containing rotaxanes that behave like linear motors at the molecular level under the action of an electrochemical or photochemical signal. The third chapter entitled *Virtual Crystallography* (11 pages), written by Olaf Delgado-Friedrichs (Wilhelm-Schickard-Institut für Informatik, Tübingen), gives a survey of the author's recent work in crystallography, in which he combined tools from the tiling theory and discrete mathematics with computer science. The author calls this kind of crystallography virtual crystallography.

The fourth chapter entitled *A Comparison of Related Concepts in Computational Chemistry and Mathematics*

(16 pages), written by Peter Deuffhard (Freie Universität, Berlin), studies the relation between mathematical and chemical languages *via* three selected examples from reaction kinetics, polymer chemistry and drug design. The fifth chapter entitled *The Essence of Chemical Thinking Beyond Mathematical Equations* (14 pages), is written by Jerzy Haber (Polish Academy of Sciences, Krakow). The author uses the process of understanding the mechanism of catalytic oxidation of hydrocarbons to illustrate the thesis that chemistry is based on an interplay of experiment, theory (comprising phenomenological inductive laws and deductive theory) and chemical intuition. The sixth chapter entitled *Analysis of Chemical Reaction Systems – What Are Mathematics Able to Do, How Far Has Chemistry to Help?* (28 pages), written by Jürgen Warnatz (Ruprecht-Karls-Universität, Heidelberg), presents the advantages of the method based on the combination of computer simulation and reliable reaction kinetics data for studying complex reaction systems and reactive flow processes.

The seventh chapter entitled *Poetic Suggestion in Chemical Science* (31 page), written by Sir John Meurig Thomas (Royal Institution of Great Britain, London and University of Cambridge), is to my liking. The author pointed out and exemplified how certain aspects of chemical research may arouse poetic feelings, awe and even mystery just as arts and mathematics. The eighth and the last chapter entitled *Combustion: From Mathematical Models to Practical Devices* (20 pages), written by Jürgen Wolfrum (Ruprecht-Karls-Universität, Heidelberg), describes the application of mathematical modeling and quantitative laser spectroscopy to several combustion processes, such as engine combustion and municipal waste incinerators.

This book (like the Symposium) represents an interesting attempt to bridge the gap between the two important sciences: chemistry and mathematics. They are indeed important sciences because no life is possible without chemistry, and mathematics provides the universal language of nature. I wish I had known about the symposium *Chemistry and Mathematics: Two Scientific Languages of the 21st Century* because I would have loved to attend this symposium and argue that perhaps mathematical chemistry may provide a common language understandable to both sciences, since at present there is still a vast difference between their languages.

Nenad Trinajstić