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Jednopierwiastkowe Struktury Chemiczne (Homonuclear Chemical Structures)

by **Z. Gontarz** and **A. Górski**, Wydawnictwa Naukowo-Techniczne, Warszawa 1998

(413 pp.) (in Polish)

The contents of this book can be divided into two parts. In Part I a new classification of elements is proposed. The classification is based on the number of shells in the atomic core, the charge of the core and the number of valence subshells. The result is that instead of the generally accepted s, p, d and f blocks the authors distinguish s, sp, dsp, and fdsp blocks. Any new classification should have some advantages over the old one. The advantages may consist in either facilitating to find new correlations or in presenting known facts in a more consistent way. In my opinion, however, neither is the case with the proposed classification. That the new classification has practically no advantages the authors admit indirectly in the second part of the book by presenting the properties of individual elements mostly under the old classification. Thus, almost everything comes safely back to the good old Periodic Table. However, there are two notable exceptions. The first consists in placing H and He into the same block and in discussing the two elements jointly, which is justified neither by their atomic nor chemical properties. With respect to electron configuration, ionization energy and radius of the atom, helium is the first element in Group 2 (it fits well the pattern presented by each first element in each Group of the Periodic Table) and has nothing in common with hydrogen. However, since helium has practically no conventional chemistry, it is much more convenient to place it together with other "non-chemical" elements such as Ne and Ar. The second exception, which results from the authors classification, consists in locating Zn, Cd and Hg together with Be and Mg in the same group of their sp block. That neglects immense differences between Be and Mg on the one hand and Group 12 elements on the other. The only justification for the joint treatment seems to be the zigzag variation in the authors core electronegativity, which is the same in the Be – Hg series as in Groups 13 and 14 (Fig.143). This variation is an example of the so-called secondary periodicity, which is exhibited by orbital energies, ionization potentials and atomic radii of p block elements. However, one should notice that exactly the same secondary periodicity can be found in the Li, Na, Cu, Ag, Au series of elements. On this ground and following strictly the proposed rules of classification, the properties of Li, Na and Cu, Ag, Au should also be discussed jointly.

In Part I authors also introduce a classification of homonuclear species, based on the number of atomic cores and the number of valence electrons around each core in a molecule. The merits of this classification consist in building bridges between condensed phases, clusters and catena-forms of elements. Of particular importance is the presumed correlation between the electron deficit in a homonuclear molecule (neutral or charged) and the number of atoms in the molecule.

In Part II the properties of elements are reviewed from the view point of homonuclear structures. The basic structures formed by each element are divided into 3 groups: 1 – homonuclear uncharged structures; 2 – homonuclear anions and 3 – homonuclear cations. Each of these groups comprises both mono- and polyatomic structures. The structures are frameworks for formation of compounds by binding atoms or counter-ions of other elements. That approach is of quite general character and has many advantages. One of the impressing features of Part II is the abundance of data on clusters and polyatomic homomolecules formed by p block elements. Owing to that, the reader may get a better understanding of the role played by polyatomic homonuclear species in the structure of inorganic chemistry.

There is no point in enumerating few mistakes and errors, because they are not of particular importance. I want only to draw attention to some false interpretations. For example, higher values of ionization potentials for Hg than for Cd are not a result of higher core polarizability (p. 49) but are

manifestation of the primary relativistic effect. Also the lack of $p\pi - p\pi$ bonds in compounds formed by heavier p block elements (p. 95) does not result from more effective screening but from greater radii of the heavier atoms.

To sum up, I would hesitate to recommend this book to chemistry students as a basic textbook in inorganic chemistry. The main reason is that the proposed classifications and some definitions (*e.g.* that of electronegativity) are completely at variance with those commonly used and have apparently no advantages, while can create unnecessary confusion. On the other hand, more experienced reader may find this book interesting, inspiring and full of data not easy to find in other, even more comprehensive textbooks.

S. Siekierski

Stephen J. Lippard, Jeremy M. Berg “Principles of Bioinorganic Chemistry” (in Polish)
Polish edition: “Podstawy Chemii Bionieorganicznej”, Wydawnictwo Naukowe PWN SA,
Warszawa, 1998, 364 stron

For last four years I have been using the book of Steve Lippard and Jeremy Berg for my lectures on bioinorganic chemistry. It is certainly one of the best (if not the best) books to introduce the problems of bioinorganic chemistry for students of chemistry, biology and medicine. I was very pleased to learn that “Introduction to Bioinorganic Chemistry” of Lippard and Berg was translated into Polish. My students were even more happy than me.

Both Authors are experienced lecturers in the field, teaching at excellent Universities, so the content as well as the presentation of the book is very satisfactory. The book is widely used over the world and most lecturers of bioinorganic chemistry, I know, are satisfied with the Lippard and Berg offer to teach about the metals in biology and medicine.

First four chapters present basic definitions, the specific properties of bioinorganic systems, their relations to classical co-ordination chemistry and general description of physical methods applicable in bioinorganic systems.

Chapter 5 concerns bioavailability, choice, uptake and assembly of metal species in biological systems. This chapter nicely shows, how Nature applies chemical rules to support life. Closely related chapter 6 describes control mechanisms and utilisation of metal ion species concentration inside the cell.

Metal ions bound to a biomolecule may have an essential impact on its structure biomolecule and this binding is strictly controlled by thermodynamics, kinetics and bioavailability principles (chapters 7 and 8). In proteins, a metal centre can act as an electron transfer (iron-sulfur proteins, blue copper proteins, cytochromes). General rules of electron transfer mechanisms are presented very elegantly in chapter 9. Non-redox enzymes are collected in chapter 10. Authors selected well known enzymes, like carboxypeptidase A or carbonic anhydrase etc. and in a very simple way explained how enzymes act so, that it becomes clear, why they are so specific, compared to the simple metal species.

Atom and group-transfer chemistry is described in chapter 11. It is mostly based on oxygen biology, but major features of the subject are very clearly presented.

Very useful is chapter 12, in which the effect of a protein on metal ion properties is discussed. In most cases protein affects considerably the chemistry of the bound metal ion and the understanding of this problem is critical for a chemist. Even if an enzymatic reaction proceeds basically on a metal ion centre, the protein is critical for the reaction specificity and kinetics.

The book ends with the presentation of frontiers of bioinorganic chemistry. Summarising, in the book Lippard and Berg explain their approach to bioinorganic problems and their ideas about the current state of the art of this field. The Polish edition is well done and I can only recommend it to read by everybody who needs it.

H. Kozłowski

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The *Polish Journal of Chemistry* publishes **review articles, original papers, communications and book reviews**. Contributions are published in English. Submission of a manuscript to the Journal implies that the work reported therein has not received prior publication and is not under consideration for publication elsewhere. All papers are submitted to Referees, but **Authors must accept full responsibility for the factual accuracy of their data and their views**. Referees' remarks are forwarded to Authors for consideration. Galley proofs will be sent to Authors for correction; it is requested that Authors read their proofs and return them to the Editor within 48 hours of receipt. It is stressed that **the Author alone is responsible for the correction of the proofs**.

2. Preparation of Manuscripts

The Authors should first examine a current issue of the *Polish Journal of Chemistry* for guidance with respect to format, style and presentation of the manuscript.

Two copies of the manuscript should be submitted directly to the Editor-in-Chief in Warsaw (*Institute of Physical Chemistry, Polish Academy of Sciences, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland*). Manuscripts should be typewritten (or reproduced on a high-quality printer) double spaced, preferably on A4 paper, on one side only. All pages of the manuscript should be numbered consecutively, including references and notes, figure captions, and tables, which should be grouped in the sequence following the text. The original manuscript should include the original graphs, drawings of apparatus, and structural formulas; these should be placed at the end, but Authors should indicate in the typescript where they are to be inserted. All figures submitted, including chemical schemes, must be of a high standard for direct reproduction after about 50% reduction of size. Submission of contributions in a machine readable form manuscript, prepared using word processors and graphic software is encouraged.

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*Complete instruction appeared in the January issue and can be found on Journal's Home Page <http://malina.ichf.edu.pl/pjch>

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