higher organisms is shrouded in mystery. J. M. Henson devotes special attention to the biosynthesis of dihydroxynaphthalene (DHN) and eumelanin (DOPA), and explains that one of the most important functions of melanins is protection from photochemical degradation.

Humic substances are some of the most widely distributed organic natural products in soil and aquatic media, and they are covered in appropriate detail in Chapters 9–13 (135 pp. altogether). In Chapter 9, "Soil Humic Substances", N. Senesi and E. Loffredo describe the lignin–protein, sugar–amine, and polyphenol theories that have been proposed to explain the formation of these substances in soil. The structural formulas presented give a good impression of the very complex nature of humus in soil (although the authors could well have omitted the explanations about determining the molecular masses of the macromolecules involved). This chapter and Chapter 10 ("Aquatic Humic Substances", by F. Frimmel) will be very useful for biologists, botanists, agricultural scientists, environmental chemists, and others who need an introduction to this area. These are followed by excellent chapters concerned with methods: Chapter 11, "Methods to Reveal the Structure of Humic Substances", by A. Amlés; Chapter 12, "Biodegradation of Humic Substances", by M. Kästner and M. Hofrichter; Chapter 13, "Medical Aspects and Application of Humic Substances", by K. Klöcking and B. Helbig. If you have ever wanted to know about the functions of a mud-bath or a Fango pack, you should read Chapter 13. This remarkable book ends with three short but very informative chapters about coal: Chapter 14, "Microbial Degradation and Modification of Coal", by M. Hofrichter and R. M. Fakoussa; Chapter 15, "Desulfurization of Coal", by B. Bogenschneider, F. G. Jung, and J. Klein; Chapter 16, "Biotechnological Conversion of Coals into Upgraded Products", by M. Meyrahn and A. Steinbüchel. These chapters too provide what their titles promise. They are well illustrated, and the literature references are up-to-date.

Of the widely different classes of substances described in this book, some (lignins, humic substances) present great difficulties with regard to research and applications, whereas others (coal) are almost fully worked out as research topics. Although many authors have contributed to the book, the arrangement of the subject matter and the style of presentation has been kept fairly consistent. The contents fulfill the promise of the series subtitle "Biology, Chemistry, Biotechnology, Applications", as each of these aspects is given appropriate attention. One of the features deserving special praise is the glossary of abbreviations provided at the beginning of each chapter. The text has evidently been carefully checked. The volume will be mainly of value to scientists and students whose interests cover the broad field of biopolymers, but specialists too will benefit from the clear presentation of their particular area of expertise.

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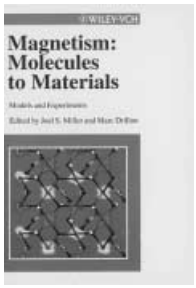
Magnetism: Molecules to Materials. Edited by *Joel S. Miller* and *Marc Drillon.* Wiley-VCH, Weinheim 2001.
Volume I: Models and Experiments, 437 pp., hardcover, € 139.00.—ISBN 3-527-29772-2
Volume II: Molecule-Based Materials, 489 pp., hardcover, € 159.00.—ISBN 3-527-30301-4
Volume III: Nanosized Magnetic Materials, 288 pp., hardcover, € 139.00.—ISBN 3-527-30302-2

This new book series picks up magnetism as a theme which accompanied the entire scientific development of our civilization and had a lasting impression. This extends from the discovery of magnetic iron by the ancient Greeks to its scientific historical significance as a subject of the first experimental scientific monograph—which dates back to Pièrre de Maricourt, better known as the crusader Petrus Peregrinus, written in a field camp outside of Lucera, Italy in the year 1269—upto its roles in the framework of our modern technology and information societies. Therefore, it is not surprising that this subject was intensively investigated, which has led to a comprehensive understanding of corresponding physical properties. In the last few years new discoveries have shown that magnetism—despite its already advancing age—still constitutes a very energetic research area. I therefore agree with the publishers when they write: "In the past few years our understanding of magnetic materials, thought to be mature, has enjoyed a renaissance as it has been expanded by contributions from many diverse areas of science and engineering."



The strong interdisciplinary orientation of magnetism as a modern research area is reflected in the selection of articles in the current first three volumes of this series which contain a very broad spectrum of research areas in chemistry, physics, and materials science. At the same time the concise subtitle "Molecules to Materials" not only reflects the extensive program of this series, but also describes the modern concept in chemistry en route to new magnetic materials.

The first volume, with the title: "Models and Experiments", contains in total 12 articles which describe recent developments in the physical characterization of magnetic materials as well as concepts and their practical realization. This includes reviews of one-dimensional magnetism and Spin–Peierls materials as well as a description of the so-called "Haldane Quantum Spin Chains", the special case of a one-dimensional Heisenberg antiferromagnet. An increased availability of relevant radiation sources (X-ray Circular Dichroism (XMCD), Muon-Spin Rotation (MSR), Neutron Scattering) particularly came in useful as physical methods for the investigation of magnetic materials. However, a chapter in the first volume is also dedicated to classical NMR spectroscopy as a modern method for investigating spin densities. The first volume is rounded off with three chapters on topical aspects from the areas of photomagnetic properties, colossal magneto resistance, and mixed-valent systems.

  1433-7851/02/4111-1964 $ 20.00+.50/0

The second volume, with the title "Molecule-Based Materials", is as expected strongly oriented towards synthetic aspects, and describes in 14 articles how organic and inorganic molecular units can be used to build the corresponding magnetic materials. Here an important role is played by organic radicals—aminoxy, triarylmethyl, and amine radicals—which can be used independently, as well as ligands in coordination compounds for the construction of magnetic materials. In addition, two organic systems—1) organic Kagome antiferromagnets based on aminoxyl radicals and 2) ferromagnetic charge-transfer salts based on fullerenes—which are interesting on conceptual grounds are described in concise articles. Further emphasis is placed in this volume on coordination-chemistry concepts for building magnetic materials of various dimensions: 1) high-spin molecules based on metal complexes and 2) one-, two-, or three-dimensional networks using azido or oxalato bridging ligands. A third focus deals with the so-called organic–inorganic hybrid materials, and particularly those systems based on metal hydroxides, metal phosphorus trisulfides, and metal phosphonates are described. In addition a chapter is also found on magnetic Langmuir–Blodgett films, which gives details particularly on the building of the corresponding hybrid materials. This volume would not be complete without an article on the theme of molecular bistability—valence tautomerism of dioxylene cobalt complexes—not least because this feature is of particular interest because of the possible applications of these types of materials for data storage. This volume is rounded off with a detailed article on the theory of the electronic structure of polynuclear compounds of transition metals and their magnetic properties. Here, after a good introduction to the basics, single case studies are given to illustrate what modern quantum chemistry can achieve in the calculation of magnetic properties.

In contrast to the first two volumes, the third volume with the title "Nanosized Magnetic Materials" has an introductory chapter of the same name that gives a very good overview of this theme and presents a rich source of references from the primary literature. The further chapters of this volume are essentially dedicated to two main focuses, both of which when taken alone reflect a great deal of the fascination and opportunities of modern magnetism. The first of these milestones is the discovery that single molecules in a layer can behave as individual magnets at low temperatures. The second milestone, which has already found practical applications, the development of metallic multilayer systems, is directly linked with themes such as spin electronics and colossal magneto resistance. In a further chapter the magnetic properties of metallic clusters and island structures on metal surfaces are described. In addition, this volume also contains a chapter somewhat outside the framework which describes the magnetic properties of transition metal Zintl phases.

Pleasingly each article is preceeded by a short introduction, which usually also facilitates entry of the nonexpert to the different topics. For this one must occassionally go back to the—however, extensively cited throughout—original literature, although a somewhat clearer or more detailed description would have been sufficient in many cases. I don't want this critical tone to be misunderstood, for while this book series was certainly not conceived as a lecture accommpaniment, it can in some cases offer advanced students a good entry to respective specialist areas. In any case, this book series is an excellent reference work for everyone working in the area of magnetism and as such should be available in the appropriate libraries.

This open book series sets its goal in presenting the newest results from all the areas of magnetism. The creation of this kind of forum for an interdisciplinary overview of the research area of magnetism was long overdue. These three volumes are a successful beginning.

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Understanding Chemistry. By *C. N. R. Rao*. University Press, Bangalore 2001. 298 pp., softcover Rs 190.00.—ISBN 81-7371-250-6

Professor C. N. R. Rao is a distinguished Indian chemist, a former president of the Indian Academy of Sciences and of the International Union of Pure and Applied Chemistry (IUPAC), currently president of the Third World Academy of Sciences, and a member of many other prestigious national and international academies. With all these duties in addition to his own research in solid-state and materials chemistry, his time and energy must be more than fully occupied, and it is therefore most commendable that he has managed to find time to write this little book for nonspecialists, intended "for high school students and others interested in an appreciation of chemistry". His purpose is clearly educative: to describe and explain the elements of chemistry in an introductory fashion and to show the relevance of chemistry to many current and future problems of our planet, particularly those of India.

The book consists of seven sections: 1. "Chemistry in a Capsule"—basic facts and concepts (atoms, molecules, states of matter, classification of substances, etc.); 2. "Elements and the Periodic Table"; 3. "The Chemical Bond"; 4. "Structures and Shapes of Molecules"; 5. "Chemical Energy"; 6. "Chemical Reactions"; 7. "Two Chemists"—biographical sketches of Michael Faraday and Linus Pauling, the two chemists who stand highest in Rao's scientific pantheon. In such a program, the choice of topics and the level of treatment must represent compromises and, of course, they mirror Rao's own interests. There are descriptions of several industrial processes, such as the production of metals from their ores and the Haber process. I learned that in Delhi there is an iron pillar that is free of rust after more than 1500 years. Of the two main trends in current chemistry, towards the biosciences or towards materials science, Rao's interests lie more in the latter direction, but he does not neglect bio-topics, particularly those connected with health and nutrition, and he includes simple, sober discussions of environmental problems, such as the greenhouse effect. On the

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