

Computer Software Reviews

Intelem 1.1. X-Pert Engineering Software: 68 Birr St., Rochester, NY 14613. List price \$250.00 with an introductory discount of 50% and a 15-day trial period before billing.

Intelem is an interactive periodic table and element data-base system. It displays element properties or creates lists of elements with properties in selected ranges. Lists can be combined by union, intersection, or difference. Resultant lists can be named, displayed, printed, or stored. It covers 18 commonly used atomic and bulk physical and chemical properties, with no option for addition of new properties or alteration of values. The data-base ignores allotropes and polymorphs.

FEATURES: The program, on one 5¹/₄ in. floppy, runs on an IBM-PC XT, AT, or compatible microcomputer with MS-DOS 2.2 (or high-

er), EGA or CGA or Hercules graphics, at least 512K RAM, and a single floppy drive. A printer is optional. The disk is not copy protected. The program is easy to start and moderately easy to learn and to run. Control is by function key, typed command, or pop-up menu selection. There is no indication of the algorithms or implementation language. The user interface is poorly designed, with inconsistent conventions, inadequate prompts, no error messages, and several minor bugs. None of these faults prevent use of the program. The package appears to be of some value to materials scientists, engineers, and metallurgists concerned with applied materials design.

K. W. Loach, *State University of New York,
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Book Reviews*

Mechanisms of Inorganic and Organometallic Reactions. Volume 5. Edited by M. V. Twigg (Imperial Chemical Industries P.L.C.). Plenum: New York. 1988. XVII + 466 pp. \$85.00. ISBN 0-306-42841-5.

This book provides a review of work published during 1985 and 1986 concerning the mechanistic aspects of inorganic and organometallic reactions in solution. This volume consists of 15 chapters grouped into 4 parts, written by 19 prominent organometallic chemists from the U.S.A., United Kingdom, Federal Republic of Germany, New Zealand, and Australia.

The first Part (Chapters 1-3) covers electron-transfer reactions. R. D. Cannon reviews in the first chapter the general aspects of electron transfer. Chapter 2, by A. G. Lippin, introduces the redox reactions between two metal complexes. Metal-ligand redox reactions are covered by A. Bakac and J. H. Espenson in Chapter 3.

Part two (Chapters 4-9) covers substitution and related reactions. N. Winterton discusses in Chapter 4 the reactions of compounds of the nonmetallic elements B, C, Si, Ge, N, P, As, Sb, O, S, Se, Te and halogens. The fifth chapter, by R. J. Cross, deals with substitution reactions of inert-metal complexes containing coordination numbers 4 and 5, whereas Chapters 6, 7, and 8, by D. House, R. W. Hay, and J. Burgess, respectively, review the substitution reactions of inert-metal complexes containing coordination numbers of 6 and above, such as Cr, Co, V, Fe, Ni, Tc, Ru, Rh, Pd, Os, Ir, and Pt. Chapter 9, by S. F. Lincoln, deals with the substitution reactions of labile metal complexes.

The third part (Chapters 10-14) covers the reactions of organometallic compounds. D. J. Darensbourg and D. J. Mangold in Chapter 10 focus on the substitution and insertion reactions. Chapter 11 by D. A. Sweigart and N. J. Stone describes metal-alkyl and metal-hydride bond formation and fission. In addition, this chapter is concerned with oxidative addition and reductive elimination involving two metal centers. The next chapter, by L. A. P. Kane-Maguire, reviews the kinetic and mechanistic studies on the stoichiometric reactions of coordinated hydrocarbons with nucleophiles and electrophiles. Chapter 13, by B. E. Mann, reviews the rearrangements, migrations, intramolecular exchange, and isomerizations of organometallic compounds. D. P. Riley and S. J. Tremont, in Chapter 14, focus in detail on the homogeneous catalysis of many organic reactions by complexes of metal ions, such as the reactions involving carbon monoxide, hydrogenations, oxidations, isomerization reactions, oligomerizations of olefins and alkynes, carbon-carbon bond forming reactions, hydrosilylations, and hydrocyanation reactions.

The final part of this book (Chapter 15), by R. Von Eldik, compiles the activation and reaction volume data for inorganic and organometallic reactions.

In addition, this book lists all the references for every single chapter at the end of the book. The total number exceeds 2700 references. Also, this book contains 14 pages of subject index.

In summary, the editor has done a good job of planning and organization of different subjects in this volume. Overall, this book should be of interest to those chemists presently working in the field of organometallic chemistry.

Sultan T. Abu-Orabi, *Yarmouk University*

Solubility Data Series (IUPAC). Volume 30. Alkali Metal Halates, Ammonium Iodate and Iodic Acid. Edited by H. Miyamoto and M. Salomon. Pergamon: Oxford and Elmsford. 1987. xxiv + 510 pp. \$120.00. ISBN 0-08-029210-0.

The solubilities of the chlorates, bromates, and iodates of lithium, sodium, potassium, rubidium, and cesium, plus ammonium iodate and iodic acid, are reported in the detailed, consistent, and critically evaluated form characteristic of this series. The solvents are in most cases water or aqueous solutions of electrolytes, but some other solvents, such as sulfolane and dimethylformamide, are included. The usual indexes of authors, compounds, and CAS Registry Numbers complete the book.

Solubility Data Series (IUPAC). Volume 32. Hydrogen Sulfide, Deuterium Sulfide, and Hydrogen Selenide. Edited by P. G. T. Fogg and C. L. Young. Pergamon: Oxford and Elmsford. 1988. xvi + 352 pp. \$120.00. ISBN 0-08-0324819.

Nearly half of this book is devoted to the solubility of hydrogen sulfide in aqueous systems (water, solutions of weak electrolytes, solutions of strong electrolytes, solutions of ammonia, or "alkanolamines"). Solubility in nonaqueous solvents, from hydrocarbons through various functional types to phosphorus compounds, occupies almost as much space. The customary critical evaluation and uniform presentation characterize this work, which reports data published through 1986. The usual indexes of authors, compounds and CAS Registry Numbers are included.

Solubility Data Series (IUPAC). Volume 33. Molten Alkali Metal Alkanoates. Edited by Paolo Franzosini. Pergamon: Oxford and Elmsford. 1988. xxiv + 348 pp. \$120.00. ISBN 0-08-032522X.

The alkali metal salts of alkanecarboxylic acids are characterized by polymorphism, and the phase diagrams for their mixtures with water and other substances are inclined to be complex. These facts are given a thorough discussion in the preface. The bulk of the book is devoted to the usual detailed, critical presentation of reported data, most of which is for formates and acetates in water and solutions of other electrolytes.

The indexes of authors, CAS Registry Numbers, and compounds are included, but the last, which should be the most helpful, is in fact less so than it might be, owing to the lack of cross-referencing. It is alphabetic by inverted name ("acetic acid, sodium salt") and uses only Chemical Abstracts Index names. The entries in the text, however, use different names. For example, what is listed in the index as "butanoic acid, 2-methyl, sodium salt" is identified in the heading of the data entry as "sodium iso.pentanoate (sodium isovalerate)". The first of these is a hybrid name unacceptable by any system, and the second name corresponds to sodium 3-methylbutanoate, not the 2-methyl isomer entered in the index. It is not possible to resolve the ambiguity without going to the original literature, for the editorial policy is to give only empirical formulas ("Na-*i*-C₅H₈O₂") rather than definitive structural formulas. This is a serious flaw in an otherwise admirable work and detracts from its usefulness and reliability. In the simpler cases of acetates and formates, the index names them as such ("acetic acid, sodium salt"), exactly as does Chemical Abstracts and as preferred in the IUPAC Blue Book,

*Unsigned book reviews are by the Book Review Editor.

but the text entries give pride of place to "methanoate" and "ethanoate", which are understandable, but not preferred by IUPAC, not used in Chemical Abstracts collective indexes, and not in general use by chemists. Such pedantic names would be reasonable cross-references in the index, but in the interests of avoiding unnecessary multiplicity, the names preferred by IUPAC and CAS should surely be given first place in the text headings.

Shaping Space: A Polyhedral Approach. Edited by M. Senechal and G. Fleck (Smith College). Birkhäuser: Boston. 1988. xx + 304 pp. \$49.95. ISBN 0-8176-3351-0.

This five-part book is an edited collection of workshops and oral presentations given at a Conference held at Smith College in 1984. It is phase two of a three-part project that includes (1) the Conference, (2) the published book, and (3) the development of a High School course on the topic of "Polyhedra".

This book addresses designers, artists, architects, engineers, chemists, mathematicians, bio-scientists, crystallographers, and earth scientists and is thus aimed at all scholars and educators interested in two- and three-dimensional structures and patterns. The small book has a high picture-to-word ratio (over 350 figures, photographs, line drawings, and reproductions). It claims not to be a mere transcript of the conference proceedings or an editorial collection of workshops and oral presentations but an adaptation and modification of these original contributions.

It comprises 19 Chapters in five parts, with sections by H. S. M. Coxeter, A. L. Loeb, M. Senechal, and I. and M. Hargittai, to name a few contributors. Some chapters are devoted, in part, to the analyses of several famous paintings from artists such as Dürer, Dali, Picasso, Escher, and Matisse. Architectural features such as the Pentagon, and U.S. pavilion at the 1967 Exposition, the Pyramids of Egypt, A-frame houses, and the Coca Cola Building are all mentioned along with the works of Buckminster Fuller. Geodesic domes and jungle gyms are well represented.

An interesting historical development of polyhedra, from 1890 B.C. to the present, is presented by J. Malkevitch in his "Milestone in the History of Polyhedra". Various mathematical concepts and theories are described throughout the book, some being basic while others are much more advanced.

Direct reference to chemistry and chemists is made in several chapters. These include "Polyhedra and Crystal Structures" by C. Chieh, "Polyhedral Molecular Geometries" by I. and M. Hargittai, and "Form, Function, and Functioning" by G. Fleck. References in these chapters are made to Pauling, LeBel, van't Hoff, Werner, and G. N. Lewis, to mention a few chemists. These chemical contributions refer to atomic and molecular structure as well as to important theoretical concepts such as the Valence Shell Electron Pair Repulsion Model developed by Sidgwick and Gillespie. As expected, Point Group Symmetry plays a major role in discussing shapes and polyhedra.

Anyone interested in this aspect of "art" or "science" would find this book to be of great interest, for it assembles in one place the various ways in which the artists (or the scientists) represent symmetry and shapes.

B. L. Chamberland, *University of Connecticut*

Ions in Solution: Basic Principles of Chemical Interactions. By John Burgess (University of Leicester). Ellis Horwood Limited: Chichester, West Sussex, PO19 1EB, England. 1988. 191 pp. \$39.95. ISBN 0-74558-0172-2. Distributed by Halstead Press: John Wiley & Sons: New York. ISBN 0-470-21059-1.

The author states in his preface that this book is an outgrowth of an earlier book *Metal Ions in Solution* used in teaching undergraduate inorganic chemistry with accompanying workbooks in the form of cassettes; after considerable revision and rewriting the present volume has emerged. It is a highly successful survey of modern inorganic chemistry at the upperclass and graduate level. It is an excellent place for an elderly chemist, away from his academic training for some time and only dimly aware of the tremendous advances made during the last few decades in inorganic chemistry, to make himself fully aware of the present status of the field. The successive chapters present excellent surveys of various aspects of inorganic chemistry as it is currently being practiced.

The book begins with a "List of Symbols and Abbreviations" (three pages) and ends with a "Glossary" (seven pages) and a "Further Reading" (five pages). These themselves are first class reading; each entry in the glossary, for example, is a full paragraph long, some a half-page long; each is a perceptive survey of a branch of inorganic chemistry. An older chemist, judging by this reviewer anyway, shouts with delight at learning what progress has been made.

There is a long-held belief among analytical chemists that all modern industrial inorganic chemical processes originated as analytical chemical processes; the literature is replete with examples, the most prominent being the ether extraction of uranium used to isolate the uranium for the atomic bomb. And certainly *o*-phenanthroline, 2,2'-bipyridine, the *o*-

dioximes, the dihydroxyazobenzenes, the EDTA reagents, and the perchlorate chemistry were developed by the analysts actually making use of them. But lest the analytical chemists try to claim all the credit, we must admit the biochemists in the breweries and the medical schools were responsible for the pH concept, for the theory of the neutralization process, and for the basic material on oxidation-reduction. My, how all these fields have grown and have become the working tools of those who now call themselves *bio-inorganic chemists*. And what an amazing array of new tools they have drawn into their armamentarium: NMR spectroscopy, ion movement methods, X-ray diffraction by solution, ultraviolet, infrared, and Raman spectroscopy, thermochemistry, polymerization, kinetics. And all this is coupled with an ever expanding and more comprehensive theory.

Here is a book for bedside reading, more exciting to a dedicated chemist than detective fiction, and guaranteed to find application to his own field. John Burgess has produced a great book and Ellis Horwood Limited have done an excellent job of editing and book making.

Harvey Diehl, *Iowa State University*

The Chemistry and Biology of Benz[a]anthracenes. By M. S. Newman (Ohio State University), B. Tierney (Cambridge Science Park), and S. Veeraghavan (Chemsyn Science Laboratories). Cambridge University Press: Cambridge and New York. 1988. xiv + 228 pp. \$69.50. ISBN 0-521-30544-6.

There are two separate sections to this monograph. The first, authored by Newman and Veeraghavan, concerns the chemistry of benz[a]-anthracenes. The emphasis is on synthesis, and literature from the mid-1930's to the end of 1984 is covered. Syntheses of parent hydrocarbons are covered, and little attention is given to benz[a]anthracene metabolite syntheses, which have been reviewed elsewhere. The literature coverage is thorough (there are 372 references in the 81 pages devoted to this section), and there are numerous useful comments concerning the syntheses that reflect the vast experience and contributions of the Newman research group to this area of chemistry.

The second section of the book, by Tierney, examines the biological properties of benz[a]anthracenes, including their metabolism, interactions with cellular macromolecules, mutagenicity, and carcinogenicity. The literature is reviewed through 1985. The discussion of the biology is thorough and the literature is covered effectively (there are more than 400 references in the 127 pages in this section). There is extensive presentation of tabular and graphical data to support the discussion in the text.

The benz[a]anthracenes have been studied for more than 50 years, and this monograph does a fine job of reviewing the vast chemical and biological information that is available. The biological section, in particular, will enable readers quickly to become familiar through the mid-1980's with a formidable range of recent results and developments. This book will be of particular value to researchers still attempting to understand the underlying basis for the considerable variation in biological activity of substituted benz[a]anthracenes. It can also be recommended to readers wanting insight into the approaches that are being currently used to probe the basis for polycyclic aromatic hydrocarbon carcinogenesis in general.

Roland E. Lehr, *University of Oklahoma*

Volumes of Proceedings

Chemical Reactivity in Liquids. Fundamental Aspects. Edited by Michel Moreau and Pierre Turq (Pierre and Marie Curie University). Plenum: New York and London. 1988. x + 631 pp. \$115.00. ISBN 0-306-42922-5.

The large number of typescript papers in this volume are from the Forty-Second International Meeting of the Division de Chimie Physique de la Société Française de Chimie, held in Paris in 1987. The newest methods for investigating and understanding chemical equilibria and reaction rates were treated from both experimental and theoretical viewpoints. Diffusion phenomena, hydrodynamics, and phenomena far from equilibrium figured prominently in the sessions. Transcripts of the discussions that followed each paper are included (sometimes a question in French with an answer in English, or vice versa!). A subject index of five pages is included.

Molecular Structure: Chemical Reactivity and Biological Activity. IUCr. Crystallographic Symposia 2. Edited by John J. Stezowski (Universität Stuttgart), Jin-Ling Huang (Fuzhou University), and Mei-Cheng Shao (Beijing University). Oxford: Oxford and New York. 1988. xxvi + 612 pp. \$75.00. ISBN 0-19-855279-3.

This volume of 59 typescript papers originated from a symposium held in Beijing in 1986. The content touches on chemistry, mineralogy, biology, physics, etc. Some papers are reviews or historical reflections, and

others are reports of recent research. There is a subject index of 2.5 pages.

Adhesives, Sealants, and Coatings for Space and Harsh Environments. Polymer Science and Technology. Volume 37. Edited by Lieng-Huang Lee (Xerox Corporation). Plenum: New York and London. 1988. x + 540 pp. \$95.00. ISBN 0-306-42989-6.

An international symposium was held in Denver in 1987 to consider the problems emerging from the demands arising from new technologies for materials that will resist destruction by very high or low temperatures, radiation, abrasion, or prolonged exposure to water. Problems are encountered in connection with solar and geothermal energy, optical fibers, microelectronics, and extraterrestrial exploration. The papers are divided among six categories, each of which includes a plenary lecture: "Environmental Exposure", "Stress and Interface", "Adhesives for Space and Harsh Environments", "Sealants for Space and Harsh Environments", "Coatings for Corrosive Elements", and "Coatings for Electronic and Optical Environments". The inclusion of a 12-page subject index is exemplary!

Chromatography '87. Symposia Biologica Hungarica. Volume 37. Edited by Huba Kalász (Semmelweis University) and Leslie S. Ettre (Perkin-Elmer). Akadémiai Kiadó: Budapest. 1988. xi + 539 pp. \$54.00. ISBN 963-05-4988-3.

This volume is the combined proceedings of a conference on advances in liquid chromatography, held in 1986, and the Budapest Chromatography Conference, held in 1987. These were billed as American-Eastern European conferences. There are 43 typescript papers and a 5-page subject index that is somewhat poorly composed (for example, there are entries "measured capacity factor" and "calculated capacity factor" but no entry for "capacity factor" under C).

From Chemical to Biological Organization. Edited by Mario Markus and Stefan C. Müller (Max-Planck-Institut für Ernährungsphysiologie) and Grégoire Nicolis (Université Libre de Bruxelles). Springer-Verlag: Berlin and New York. 1988. ix + 358 pp. \$62.20. ISBN 3-540-19264-6.

Two symposia were held in Dortmund in 1987 in the general area of nonlinear phenomena in chemistry and biology. The typescript papers from these events, combined with some other invited contributions, make up this volume. The symposia were multidisciplinary and brought together chemists, biologists, ecologists, physicists, mathematicians, and physicians. The papers are grouped under six headings: "General Concepts", "Chemical Organization", "Biochemical Organization", "Cellular and Intercellular Organization", "From Complex Cellular Networks to the Brain", and "Ecological, Epidemiological and Economical Organization". Not indexed.

The Mesocorticolimbic Dopamine System. Annals of the New York Academy of Sciences. Volume 537. Edited by Peter W. Kalivas

(Washington State University) and Charles B. Nemeroff (Duke University). New York Academy of Sciences: New York. 1988. xii + 540 pp. \$125.00. ISBN 0-89766-471-X.

This softbound book is Volume 357 of the Annals of the New York Academy of Sciences. It records the proceedings of a conference held by the Academy in Miami in 1987, the purpose of which was to bring together clinical and pre-clinical investigations concerned with brain physiology and dopamine. The conference was divided into the following sections: "Anatomy and Electrophysiology", "Neurochemical Properties", "Behavioral Properties", "Clinical Medicine", and "Co-localization and Interactions". There is an index only of contributors.

Trends in Colloid and Interface Science II. Progress in Colloid & Polymer Science. Volume 76 (1988). Edited by Vittorio Degiorgio (Università de Pavia). Steinkopff Verlag: Darmstadt. Springer-Verlag: New York and Berlin. 1988. ix + 317 pp. \$96.00. ISBN 0-387-91335-1.

At the meeting of the European Colloid and Interface Society held in 1987 in Como, about 100 papers were presented. Nearly half of these papers are presented in full in this volume, and the remainder are presented as abstracts. This volume is offered as Volume 76 of the periodical Progress in Colloid and Polymer Science. There is a 2-page subject index and a 3-page table of contents.

High-Temperature Superconducting Materials. Preparations, Properties, and Processing. Edited by William E. Hatfield and John H. Miller, Jr. (University of North Carolina). Marcel Dekker: New York and Basel. 1988. xvi + 389 pp. \$99.75. ISBN 0-8247-7995-9.

The discovery of "high-temperature" superconductors in 1986, which led to a Nobel Prize for Müller and Bednorz in 1987, started an explosion of activity, a part of which was a symposium held in North Carolina at an unspecified date in 1987 or 1988. This volume consists of 28 typescript papers from it, divided between tutorial reviews and reports of recent research. The index of 23 pages is commendably thorough.

Successful Design of Catalysts. Future Requirements and Development. Studies in Surface Science and Catalysis. 44. Edited by Tomoyuki Inui (Kyoto University). Elsevier: Amsterdam and New York. 1989. xii + 356 pp. \$131.75. ISBN 0-444-87146-2.

In a novel arrangement, the 30th Anniversary of the Catalysis Society of Japan was celebrated in 1988 with a group of four seminars: USA-Japan, France-Japan, Italy-Japan, and Germany-Japan. Each was composed of 9 or 10 papers, a mix of plenary lectures, and invited presentations. The main focus was C₁ chemistry: the chemistry and technology of converting raw C₁ materials, such as methane and methanol, into larger compounds, especially fuels. The emphasis was on the preparation, properties, and performance of heterogeneous catalysts. Not indexed.