

Very unfortunately, there is neither an author nor a subject index. However, the table of contents gives the names of co-authors and the full title of each paper. Also, after the experimental section of each article, there are the literature references which were given in the original paper. In an extensive work of this kind, one would expect, and here finds, some misprints and occasional awkward translation expressions. The book provides a splendid means of acquiring a broad picture of the extensive studies carried out over a period of 30 years by one who has contributed so much to Soviet chemistry and education, and also to organic chemistry generally. It is a compliment to Professor Nesmeyanov that he has carried on such a comprehensive research program in addition to meeting so well the other great demands on his time and energy. In particular, we refer to his directorship of the Institute of Element-Organic Chemistry where he has assembled a highly competent and productive staff to effectively extend organometallic chemistry in varied directions.

The price of the book is such that few individual purchasers can afford it. It should, however, find a useful place in reference libraries.

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HENRY GILMAN

Crystallization of Polymers. By LEO MANDELKERN, Professor of Chemistry, Florida State University. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y. 1964. 359 pp. 16 × 24 cm. Price, \$13.50.

In this book the structural requirements for polymer crystallization are analyzed with competence as well as certain aspects of the thermodynamic and kinetic processes associated with fusion. Professor Mandelkern discusses in great detail previous work on the fusion of homopolymers, copolymers, and also cross-linked polymers. In addition, the crystallization of oriented polymers and diluent compositions are described in individual chapters devoted entirely to these systems.

The relatively recent discoveries of stereospecific synthesis and polymer single crystals have completely changed our understanding of crystallization phenomena in polymers. Owing to these exciting developments, a considerable amount of research is currently being conducted to test many new concepts which have emerged. As a result, the chapter on polymer morphology is very incomplete and important structural data have been omitted. In particular, the occurrence of regular chain folding in both single crystals and bulk polymer is not given sufficient emphasis.

Unfortunately, like other recent books in polymer science, the author emphasizes certain areas of crystallization phenomena with which he is most familiar. Subsequently, the entire manuscript development is based on a single point of view. Throughout most of the theoretical treatment, fundamental structural models are used which as a result of recent research have questionable validity.

Nevertheless, "Crystallization of Polymers" is recommended to individuals who are doing work in this field of polymer science. Despite the complexity of the subject matter, the manuscript is well written. There are numerous references at the end of each chapter and also many tables containing valuable data.

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ERIC BAER

International Series of Monographs on Analytical Chemistry.
Volume 16. **Analytical Chemistry of Niobium and Tantalum.**
By ROSS W. MOSHIER, Aerospace Research Laboratories, Wright-Patterson Air Force Base, Ohio. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1964. v + 278 pp. 16 × 23.5 cm. Price \$12.75.

Roughly one-fourth of this reference book is devoted to the general chemical and physical properties of niobium and tantalum and their compounds, and their detection and identification as well as the classical methods of dissolution of materials and the gravimetric determination of the elements after separations. The older classical methods of Schoeller and Powell and others are supplemented by methods based upon the newer complexing agents and the more recently available organic chelating agents.

In the remainder of the treatise, there are separate chapters on separations by solvent extraction, separations by ion exchange and chromatography, and separations by chlorination and distillation.

Detailed coverage is given on colorimetric determinations (four chapters), reduction and titration, polarography, X-ray methods, both diffraction and fluorescence, neutron activation and radioactive tracer methods, spectrographic methods, and the determination of impurities in purified niobium or tantalum, their alloys, etc.

The treatise gives a very broad coverage of the methods. At times the treatment impresses one as rather noncritical and as presenting all likely methods that have been published. A broad basis is provided for the reader and research worker for selection of methods for various purposes.

There are useful Author and Subject Indexes.

Few misprints or typographical errors were noted. On p. 12 niobium is written as "nobium" in the second paragraph.

DEPARTMENT OF CHEMISTRY
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Physical and Chemical Methods of Separation. By EUGENE W. BERG, Coates Chemical Laboratories, Louisiana State University, Baton Rouge, La. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. 1963. xiv + 366 pp. 15.5 × 23.5 cm. Price, \$12.50.

The chemical analyst, the research chemist, and the process developer—be he chemist or chemical engineer—depend heavily in the discharge of their tasks on the ability to separate phases and components of mixtures. The required separations, whether partial or quantitative, must be under the rigid control of one who would exploit them effectively. Chemical engineers are trained specifically in the principles and techniques of separations—physical separations, at least—and are prepared to deal with them in their earliest postbaccalaureate days. Not so chemists emerging from most colleges and universities, at whatever degree level. They will have had a hit-or-miss encounter with separations, according to Professor Berg, who deplores such deficiency in the chemist's academic experience, has set about correcting it at his institution, and has written himself a textbook for his course.

The resulting book is probably unique, and it fairly achieves the author's aim "to present a concise and informative survey of separation techniques." The separations described are fractional distillation, extraction, chromatography (gas-solid, gas-liquid, and paper), electrochromatography, ring-oven concentration, zone melting, ion exchange, ion exclusion, dialysis and electroanalysis, precipitation and related phenomena, froth flotation, and biological methods. Included also is a chapter on sequestration—sometimes a reasonable substitute for separation—by Philip W. West. The chapter on gas-liquid chromatography is by Buddhadev Sen.

The experienced reader will recognize at once that many separation methods are missing. This reviewer constructed a list that contained as many ignored as treated by the author. Admittedly half of these were mechanical phase separations, whereas Berg has tacitly but almost completely confined his attention to component separations; admittedly also many were less important than most of Berg's. No doubt an author who intends not to produce an encyclopedic work, like Weissberger's "Techniques of Organic Chemistry," must draw an arbitrary line somewhere. Yet one wishes that this book might contain chapters or sections on gas absorption and desorption, selective dissolving, perhaps electrolysis, and such enormously valuable but often subtle mechanical separations as sedimentation, filtration, and precipitate washing.

By and large, the subjects included are presented adequately if sometimes inelegantly. The weakest treatments are so because of their portions on theory (*e.g.*, Chapter 5, "Gas Chromatography"). Too often there are derivations that give the impression of being pointlessly long and uncomfortably unauthoritative. For a book of this magnitude, a better practice might be to offer whatever theory-based relationships are useful with only reference to published sources of the supporting derivations. On the other hand, the inclusion in each chapter of sections on applications and restrictions, the detailed documentation of the text, and the presentation of extensive bibliographies are features of excellent strength. And the collection between

covers of information about several methods, any one of which is difficult to find summarized in a single place (*e.g.*, the chapter on sequestering agents), makes the book a desirable reference volume.

In summary, this is a book not without its faults, some of them almost inescapably associated with the small volume that attempts the large survey. It is also, however, a book of very considerable merit. It should be helpful to practicing chemists and chemical engineers as well as students in these fields. It represents a very good idea, one of which the author can be properly proud and for which some of the rest of us must be appreciative and gently envious.

DEPARTMENT OF CHEMICAL ENGINEERING SHELBY A. MILLER
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Theory and Structure of Complex Compounds. Papers presented at the Symposium held in Wrocław, Poland, June 15-19, 1962. Edited by B. JEZOWSKA-TRZEBIATOWSKA, Professor at the University of Wrocław. Pergamon Press, The Macmillan Co., 60 Fifth Ave., New York, N. Y. 1964. xii + 707 pp. 17.5 × 25 cm. Price, \$17.50.

This book is a collection of papers presented at the Symposium on The Theory and Structure of Complex Compounds held in June, 1962, in Poland. The collection consists of about 87 papers, 57 of them in English, 18 in German, 6 in French, and 6 in Russian, although all the abstracts are given in English. The topics cover all the aspects of the modern coordination chemistry. Thus, roughly, there are about 7 papers on theoretical studies, 12 on electronic spectra and magnetism, 5 on vibrational spectra, 4 on crystal structures, 18 on reaction kinetics and mechanism including photochemistry, 9 on preparative chemistry, 12 on stability and thermodynamics, and the remaining 20 on such miscellaneous topics as polarography, rotary dispersion, Mossbauer effect, solvent extraction, ion exchange and paper ionophoresis, thermogravimetric analysis, complex formation in molten salts, and spectrophotometric observations. Transition elements on which the above studies were made not only include the 3d series but the 4d, 5d, 4f, and 5f series also (there are about 5 papers devoted entirely to uranyl ion). In addition, a few papers deal with the chemistry of the compounds of the non-transition elements, *e.g.*, structure of fluoroarsenates, tellurium complexes, extraction studies on GeCl₄, degradation of polyphosphates, and charge-transfer studies of iodine-halogen-benzene complexes.

As is to be expected in a collection of independent submissions, there is a wide range in both technical and editorial quality. Some papers are reasonably detailed and self-contained. Others are mere summaries or abstracts containing sweeping and unsubstantiated statements of conclusion; their function in this collection is little more than to let the reader know that certain types of work are in progress at stated laboratories. Some represent work undertaken from a narrowly parochial point of view almost uncolored by awareness of the world literature. In brief the collection is very uneven. Another point to be noted is the possible alternate interpretations and deductions of the results in some of the articles. Here, the reviewer would like to warn particularly the novices in coordination chemistry not to take all the interpretations for granted, as these represent only the ideas of the authors of the corresponding papers. Some of the conclusions have to be tested and verified before they can be confirmed. As an example, one which is of personal interest to the reviewer is the work of Jakób, *et al.*, on "The Properties of Solid

Photoproducts of Octacyanides of Mo(IV) and of W(IV)." It may be interesting to point out that the reviewer in collaboration with Adamson has reached somewhat different conclusions for the kinetics and mechanism and for the formulas of the intermediate and product species in the photolysis of octacyanomolybdate(IV) complex anion.¹

There are many interesting papers in the book. To name a few, a novel and an elegant approach toward the application of symmetry principles in chemistry has been presented in an article by A. D. Liehr² on "Confirmational Instability of Non-Cubosymmetric Inorganic Compounds in Degenerate Electronic States"; a convincing demonstration of dynamic Jahn-Teller effect in the case of CsTi(III)(SO₄)₂·12H₂O by eliminating the possible removal of orbital degeneracy by lower fields has been shown by H. L. Schläfer; resolution of the racemic mixture of chromium tricarbonyl derivative of *m*-methoxybenzoic acid (one of the very few reports in literature on the separation of enantiomers of an arene chromium tricarbonyl derivative) has been carried out by A. Mandelbaum, *et al.*; and some interesting empirical correlations regarding the instability constants of halogen complex compounds *vs.* the component electronegativities (A. Lodzinska) and oxidation-reduction potentials (E. Danilczuk) have been pointed out.

The book has a pleasing appearance and in general contains relatively few errors, typographical or otherwise. Among those noted by this reviewer are: the numbers 4, 3 should read 6, 4 on the diagram (Fig. 2) on p. 52; $\overset{\cdot}{\underset{\cdot}{\text{M}}}-\overset{\cdot}{\underset{\cdot}{\text{O}}}-\text{COR}$ instead of $\text{M}-\overset{\cdot}{\underset{\cdot}{\text{O}}}-\overset{\cdot}{\underset{\cdot}{\text{C}}}$ COR on p. 73 (line 14); Eq. 35 on p. 110 should read

$$\vec{S}_{ka} = \sum \cos \frac{2kJ\pi}{n} \hat{R}_j - \sin \frac{2kJ\pi}{n} \hat{Y}_j = \alpha t S_k$$

$$\vec{S}_{kb} = \sum \sin \frac{2kJ\pi}{n} \hat{R}_j + \cos \frac{2kJ\pi}{n} \hat{Y}_j = \beta m S_k$$

and on p. 191, $f(R) = (1 - R)^2/2R$ instead of $1 - R^2/2R$. Also to be noted is that the book lacks review articles, the presence of which has become customary for all conference publications, and importantly an author index.

The book not only covers all the aspects of modern coordination chemistry, but the important point is that many of the articles were presented by the schools from Central European countries which usually publish their work in journals which may not be available at all libraries. Thus, this book makes an important source of recent information in the fields of research studied in that part of the world. This makes it almost a necessity for everyone to own the book.

Although the bulk and material of the book is in keeping with its high cost, it may be somewhat difficult for students in coordination chemistry to own it. But, on the other hand, it should find a place in libraries, and on the bookshelves of researchers and teachers not only in the field of inorganic, but in the fields of analytical, biochemical, physical, and theoretical chemistry as well.

(1) J. R. Perumareddi, "The Photochemistry and Ligand Field Theory of Some Transition Metal Complexes," Dissertation, University of Southern California, 1962, 202 pp.

(2) An extension of such treatment could be found in a complete article titled "Symmetry and Chemistry," a course of eight lectures given at the Conference on Applications of Group Theory to Chemistry, Ohio Wesleyan University, Aug. 21-23, 1963, by the same author. Copies of these are available upon request from A. D. Liehr, Mellon Institute, 4400 Fifth Ave. Pittsburgh, Pa. 15213.

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