

## BOOK REVIEWS

**Rare Earth Alloys. A Critical Review of the Alloy Systems of the Rare Earth, Scandium and Yttrium Metals.** Prepared under the Auspices of the Office of Technical Information, United States Atomic Energy Commission. By DR. KARL A. GSCHNEIDNER, JR., Los Alamos Scientific Laboratory, University of California, Los Alamos, New Mexico. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1961. xiii + 449 pp. 16 × 23.5 cm. Price, \$12.75.

This volume aims to coordinate modern physical-chemical approaches with the metallurgical studies of alloy systems of the rare earths, including scandium and yttrium metals. The first section of the book reviews the physical properties of the pure metals, including considerations of electronic structure, atomic properties, crystal structures, transformations, melting and boiling, heat capacities, magnetic, electrical and electronic properties, engineering and mechanical properties, and so forth.

The main portion of the volume deals with the phase relationships and physical properties of the rare earth alloys *per se*. An introductory chapter on general alloying theory leads on to descriptions of binary alloys between rare earths, alloys of a rare earth metal with a non-rare earth element, ternary alloys containing one or two rare earth components, and quaternary alloys containing one rare earth. A closing section deals with details of crystallographic species.

The author claims 100 phase diagrams, which have been redrawn for the volume, and which often represent amalgamation of data from more than one source. In addition there are some 45 other figures correlating properties with composition, illustrating theory, etc. A great deal of data is condensed into tabular form. The references include over 650 entries, in addition to which there is an alphabetical author index. Binary, ternary and quaternary systems are listed in separate alphabetized indices.

The volume compresses a wealth of information on a currently active field into compact format. It should be useful both to the reader interested in detailed information and to the one interested in theoretical relationships. The author has obviously expended thought and careful effort. In terms of present-day publication, the volume represents good value for the price. One may speculate that in some manner this is linked with its sponsorship by the U. S. Atomic Energy Commission.

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**Infrared Absorption of Inorganic Substances.** By KATHERYN E. LAWSON, Physical Sciences Research Department, Sandia Corporation, Albuquerque, New Mexico. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1961. vi + 200 pp. 16 × 23.5 cm. Price, \$6.75.

This book is intended by the author to be "a compilation and review of empirical data and interpretations of the infrared absorption spectra of inorganic substances" (italics mine). The scope of a work which did successfully compile and interpret the infrared absorption spectra of inorganic substances would be awesome indeed. I submit that there is probably no one alive sufficiently eclectic and omniscient to deal satisfactorily with the staggering amount of fact and theory which would be encompassed by such a project, and few daring enough to try. The chief failing of this book, which has, I am sorry to say, a great many, is that the author has actually attempted, albeit in a very superficial way, to fulfill the prescription given in her preface. The result is a rambling and incoherent conglomeration.

A thirteen page introduction is devoted to methods of sample preparation and a summary of the applications of the infrared spectra of inorganic compounds. This is loosely organized, incomplete and almost totally lacking in any theoretical underpinning.

There follow then sixty-three pages entitled "Spectra-structure correlations" (a phrase quite representative of the kind of jargon with which the book abounds). In this section there is a little bit of everything but the proverbial kitchen sink. With some exceptions the treatment here is dull and lacking in thoroughness and authority. It is a series of smatterings. If this part of the book teaches any lesson clearly, it is surely that a thorough knowledge of inorganic chemistry is necessary equipment in writing a valuable and effective discussion of the significance of the infrared spectra of inorganic compounds and that a discussion written without such knowledge just doesn't gel.

After a nine page glossary—which is a mine of misinformation, including, *inter alia*, incorrect definitions of chelate and lattice, and the astonishing assertion that the bonding in a non-polar molecule is *ipso facto* homopolar (or "atomic," whatever that means)—the book concludes with an approximately one hundred page annotated and indexed bibliography. This is said to be based on a search of "the section of Chemical Abstracts entitled 'Electronic Phenomenon (sic!) and Spectra' for the period January 1952 through December 1958" plus a supplementary list which "represents coverage of material appearing in Chemical Abstracts or elsewhere (?) through April, 1960." Assuming no mistakes or omissions occurred in transcribing this list from CA it would appear to be no less valuable—but no more—than CA itself.

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**Nouveau Traité de Chimie Minérale. Tome XIII, Deuxième Fascicule. Soufre (II), Sélénium, Tellure, Polonium.** Edited by PAUL PASCAL, Membre de l'Institut. Masson et Cie., 120 Boulevard Saint-Germain, Paris 6, France. 1960. pp. 1125-2146. 17.5 × 26 cm. Price, brochés, 310 NF.; cartonnés toile, 330 NF. (two parts).

This is the second part of the volume on the inorganic chemistry of the group VI elements, being concerned with compounds of sulfur, with the elements selenium, tellurium and polonium, and with their compounds. The quality and the amount of information given are truly exceptional, ranging from observations on color changes in reaction to extensive tables of thermodynamic functions. SO<sub>2</sub>, for example, has all the usual and unusual inorganic reactions described and discussed and, in addition, is considered as to virial coefficients, critical constants, compressibility, heats of transition, specific heats, entropy, enthalpy, surface tension, viscosity, parachor, magnetic susceptibility, dielectric properties, conductivity, ionization potential, refractive index, Raman, infrared and ultraviolet spectra, crystallography, bond angle, moments of inertia, fundamental vibration frequencies, etc. Documentation is complete with references to the original literature. The extensive bibliographies are scattered throughout the book, but on each page there is an indication of where the next bibliography is to be found. Cut-off dates, given for each bibliography, are mostly late 1958 but in some cases extend into 1960.

Six well-known authors have contributed: the late Paul Mondain-Monval, 32 pages on compounds of sulfur with the halogens; Robert Pointeau, 413 pages on compounds of sulfur with oxygen; P. Pascal, 69 pages on compounds of sulfur with nitrogen; H. Lumbroso, 261 pages on selenium; J. Hoarau, 127 pages on tellurium; and M. Haïssinsky, 81 pages on polonium. The writing is uniformly good and, in fact, is refreshingly attractive in contrast to the other standard treatises in inorganic chemistry. Unlike the Gmelin work, which tells all, this work is selective, at least in not discussing *all* the references. Even so, it occasionally takes clairvoyance to decide which of two contradictory reports the author favors.

The absence of a formula index is to be regretted, but the alphabetic index and the detailed table of contents are

almost adequate, yielding to this reviewer 9 out of 10 test items with hardly any more ingenious compromise with the French system of nomenclature than is normally required when perusing the German or English treatises.

Two significant questions might be raised about the entire Pascal work: (1) Is it a good reference work? (2) Is it worth buying? The answer on both counts appears to be yes. To this reviewer, the Pascal treatise is much more exhaustive and critical than expected. It is evidently a work of care and devotion, and suffers only from not incorporating more of the modern bonding ideas. It promises to be extremely useful not just to the researcher in inorganic chemistry but also (here is where the Pascal is superior to the Gmelin) to the reader who wishes to study in depth some aspect of inorganic chemistry in a lively but authoritative source. The "New Treatise" deserves a place in every inorganic library.

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**Fermente. Hormone. Vitamine und die Beziehungen Dieser Wirkstoffe Zueinander. Dritte Erweiterte Auflage in Drei Bänden. Band II. Hormone.** Edited by ROBERT AMMON, Homburg/Saar, and WILHELM DIRSCHERL, Bonn/Rhein. Georg Thieme Verlag, Herdweg 63, Stuttgart, Germany. 1960. xxiv + 897 pp. 18.5 × 26.5 cm. Price, Ganzleinen, DM. 148.—(\$35.25); Subskriptionspreis, DM. 125.80 (\$29.95).

In 1938, Ammon and Dirscherl wrote a 400 page volume on enzymes, hormones and vitamins. In the present (third) edition this work has been expanded into 3 volumes and contains contributions by the two editors and by numerous collaborators. The second volume deals with the hormones in the broad sense of the term. For example, there is a chapter on tissue hormones by P. Holtz which discusses not only substances involved in the transmission of neural impulses, etc., but also, e.g., the pharmacological effects of the phosphorylated derivatives of adenine. The hormones of the invertebrates are reviewed by the late G. Koller, and Pohl has written on plant hormones. The main chapters on the hormones of the higher animals were contributed by Dirscherl (insulin, glucagon, estrogens, progestational hormones and androgens), Jost (sex hormone effects on embryos), Ammon (diabetes mellitus, hormones of the gastrointestinal tract, relaxin), Voss (anterior hypophysis and pars intermedia), Nowakowski (posterior hypophysis), Verzár (physiology of the adreno-cortical hormones), Tamm (chemistry and metabolism of adrenal steroids), Abelin (thyroid), F. Holtz and Ponsold (parathyroid), Comsa (thymus), and P. Holtz (adrenal medulla). The coverage of the literature extends into 1958.

The book deals in varying thoroughness with virtually all aspects of this vast field such as structure proofs and laboratory syntheses of the hormones, their physiological and pharmacological effects, correlations of structure with activity, biological and chemical assay methods, hormone metabolism, histology and embryology of the endocrine glands, etc., and even with some clinical considerations. It is obvious that a single volume does not allow comprehensive coverage of these subjects. Anyone familiar with a given area is not likely to find much new in interpretations but may well encounter citations of papers (particularly European ones) which he had not seen previously.

Among the various sections dealing with steroid chemistry, the one written by Tamm undoubtedly will appeal most to the specialist in this field. It is patterned in part on the classical review by Reichstein and Shoppee (*Vitamins and Hormones*, 1, 345 (1943)), and like it gives rather extensive structural correlations between various adrenal steroids. The chapter concludes with a brief but well organized discussion of the metabolism of the corticoids. Although the sections on the chemistry of the steroidal sex hormones are on a rather elementary level, they give many details which can hardly be of interest to a reader with such a background in chemistry. One can't help wondering why the author would choose to discuss such syntheses as the one of progesterone from hydoxycholeic acid if the important routes from the sapogenins to the sex hormones are not being mentioned. The section on the metabolism of these substances is much more comprehensive, but as there is little integra-

tion of the data and little emphasis on the quantitatively important pathways (particularly of the C<sub>19</sub>-steroids) a beginner may well get lost in the maze of details. The adrenogenital syndrome although briefly mentioned in several chapters is not discussed in a manner which would indicate the great contributions which its study has made to the understanding of steroid metabolism.

There are quite a few misstatements in this volume. Some are being pointed out: Contrary to a statement on p. 343, androgenic assays of urine give no information about that fraction of the 17-ketosteroids which is derived from the testis; in the treatment of rheumatoid arthritis by high doses of steroids (which incidentally was discovered by Hench and not by Hechter), fluorohydrocortisone is not a substance of choice (p. 475); the estradiol melting at 178° (formula, p. 190) has the 17 $\beta$ -configuration, compound 27 on p. 280 has a 17 $\alpha$ -hydroxy, compound 15 on p. 331 and on p. 339 has a 6 $\beta$ -hydroxy group, and compound 22 (p. 332) is not "uranedione."

The volume has only a token index (6 pages) but a detailed one will be issued free of charge after the completion of the last volume.

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**Tables of Spectrum Lines.** By A. N. ZAIDEL', V. K. PROKOF'EV and S. M. RAISKII. Pergamon Press Ltd., Headington Hill Hall, Oxford, England. 1961. xliii + 550 pp. 17.5 × 24 cm. Price, \$14.00.

This volume contains lists of the principal lines in atomic spectra which are useful for identification and practical spectral analysis. The lists are less complete than some tabulations which exist, such as the M.I.T. Tables, but they are more complete than less specialized handbooks of physical and chemical data. The volume should be very useful in this intermediate range of completeness, size and cost.

The Introduction states that: "The first part of the volume lists 41,468 spectrum lines of 60 elements" in order of decreasing wave length between 8000 and 2000 Å. The second part "contains 23,392 spectrum lines of 93 elements, arranged by elements." The third part contains eight auxiliary tables of ionization potentials, sensitive lines, most intense lines and other physical data on the chemical elements, which are related to the spectra.

The original edition of these tables was published in the U.S.S.R. in 1952. The present edition has Preface and Introduction in English, German and French, which explain the use of the tables, and give more details on the arrangement and significance of the data.

The volume is substantially bound and it is printed clearly on good quality paper. It appears to be entirely suitable for daily use directly in the spectroscopic laboratory.

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**Silicones.** Edited by S. FORDHAM, Ph. D. Philosophical Library Inc., 15 East Fortieth Street, New York 16, N. Y. 1961. xi + 252 pp. 14.5 × 22 cm. Price, \$10.00.

This British book was written by 13 experts from the Research and Silicones departments of the Nobel Division of ICI at Ardeer, Scotland. It consists of two sections, one on Organosilicon Chemistry and the other on Industrial Manufacture and Applications of Silicones. Readers should not expect a complete treatise on the chemistry of organosiloxanes or an exhaustive technical handbook on their manufacture, but the book is a reasonably good summary of modern belief, fact and practice concerning those silicones which are produced on a commercial scale.

The first section comprises a compact but comprehensive chapter on the Chemistry of Organosilicon Compounds by J. M. C. Thompson, and a discussion of the physical chemistry, structure and special properties of organosiloxanes, presumably by Dr. Thompson and the editor. The second section begins with a chapter on World Production and Market for Silicone Products by J. Stafford. The next chapter concerns the manufacture of chlorosilanes and their