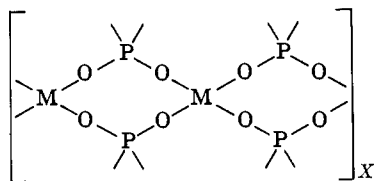


about 0.4 dl./g. The hybrid polymer of cobalt(II) with  $\text{OP}(\text{C}_4\text{H}_9)_2\text{O}^-$  and  $\text{OP}(\text{C}_8\text{H}_{17})_2\text{O}^-$  bridging groups in 1:1 ratio may be fabricated into leathery films that remain flexible down to about  $-60^\circ$ .

Evidence is now accumulating from X-ray studies<sup>2,4</sup> to support the double-bridged structure we originally assigned to the poly(metal phosphinates). On first glance it is hard to reconcile this double-bridged structure, *i.e.*



with the low-temperature flexibility observed for the amorphous specimens reported here. However, an examination of Stuart-Briegleb models<sup>5</sup> of some of these compositions reveals a high order of backbone flexibility since the alkyl side chains provide negligible steric hindrance and the basic eight-membered ring spirane struc-

(4) C. E. Wilkes and R. A. Jacobson, *Inorg. Chem.*, **4**, 99 (1965).

(5) E. Leybold's Nachfolger, Manufacturer.

ture is inherently flexible. In addition, the alkyl side chains tend to shield the polymer from any polar inter-chain attractions present in the metal phosphinates we made earlier. They, furthermore, can create a "flexible sheath around each chain molecule,"<sup>6</sup> thereby reducing the resistance of the surrounding medium to movement of the polymer molecule.

The magnitude of the intrinsic viscosities observed in chloroform for the compositions reported here is well within the range for organic high polymers. It is interesting to note, however, that in agreement with the observations of Crescenzi, *et al.*,<sup>2</sup> the intrinsic viscosity of a sample of  $[\text{Zn}(\text{OP}(\text{C}_4\text{H}_9)_2\text{O})_2]_x$  in benzene is quite low, although the inherent viscosity at 0.5% is 0.25 dl./g.

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(6) A. H. Willbourn, *Trans. Faraday Soc.*, **54**, 717 (1958).

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## Book Reviews

**Traité de Biochimie Générale. Tome II. Les Agents des Synthèses et des Dégradations Biochimiques. Second Fascicule. Les Enzymes.** By M. JAVILLIER, M. POLONOVSKI, M. FLORKIN, P. BOULANGER, M. LEMOIGNE, J. ROCHE, and R. WURMSER. Masson et Cie, 120 Boulevard Saint-Germain, Paris 6, France. 1964. 753 pp. 17 × 25.5 cm. Broché, 140 F.; cartonné toile, 155 F.

A treatise of general biochemistry is presently written by French biochemists and organic chemists, and the book "Les Enzymes," edited by P. Boulanger and J. Polonovski, is the fourth volume to be published in a series of six volumes. The text covers 714 pages, which are divided into 218 pages describing the constitution of enzymes and the nature of enzymatic reactions and 496 pages describing selected enzymes.

Whereas this book fulfills a definite need for French-speaking biochemists, it is doubtful that its usefulness to American readers will override the language barrier. The only book of similar size on the same subject written in English is the one of Dixon and Webb. In both these books the approach is, however, quite different since Dixon and Webb discuss general principles and use specific enzymes as examples, whereas the present work gives an extensive description of many enzymes. The outlook of "Les Enzymes" is more similar to the series "The Enzymes," published in 1959 by Boyer, Lardy, and Myrbäck, but the latter work covers more than 4000 pages. As judged by the only volume which has appeared at the present time, the volumes dealing with enzymes in the treatise "Comprehensive Biochemistry," edited by Florkin and Stotz, may be quite similar to "Les Enzymes," but they will show a far more extensive coverage of most enzymes.

The main criticism to be addressed to "Les Enzymes" is the excessive amount of space used for glycosidases and related enzymes, as compared to the extremely succinct treatment of the oxido-reduction enzymes. A comparison of "Les Enzymes" with "The Enzymes" shows, respectively, for glycosidases 120 pages versus 180 pages, and for phosphorylases 8 pages versus 55 pages,

but for cytochrome 15 pages versus 140 pages, and for catalase 1 page versus 65 pages. This unusual distribution greatly limits the impetus of this book as a general source of information for English-speaking readers.

The author and subject indexes are extensive, and the book is well printed and bound. The choice of references is as broad and selective as can be expected for a work of this nature, and they are well classified. In the list of important discoveries in enzyme chemistry, the reader may, however, be surprised to see the name of Rabaté as discoverer of the transglycosylation reaction, while the names of the Coris are omitted.

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**Mineral Metabolism. An Advanced Treatise. Volume II. Part A. The Elements.** Edited by C. L. COMAR, Cornell University, Ithaca, N. Y., and FELIX BRONNER, Hospital for Special Surgery, Cornell University Medical College, New York, N. Y. Academic Press, Inc., 111 Fifth Ave., New York 3, N. Y. 1964. xiv + 649 pp. 16 × 24 cm. \$22.00.

This is the fourth and final volume of a comprehensive, multi-author work on mineral metabolism. The first 247 pages are devoted to a review of the chemical composition of the body, first of the composition of the body as a whole and then as the composition of the organs and tissues, with a short section on distribution of minerals in the body of man. The chapter as a whole affords an exhaustive compilation of data on the composition of the body, with special reference to its mineral content from fetal to adult life, and is a rich source of information and of interpretation.

The remainder of the book deals with the mineral elements (phosphorus, calcium, magnesium, strontium, and fluoride) with special

attention to the dynamics and function of each element and consideration of disturbances of their metabolism. Strontium, which has received much attention during the past few years, owing to its importance in radioactive fallout, is considered largely in relation to calcium, since the two elements, being closely related chemically, are similarly related in their metabolic behavior.

The authors appearing in this volume, as is true for the work as a whole, have been carefully chosen and are authorities in their respective fields. The editors have produced a work of four volumes that will serve as the standard reference work in all aspects of mineral metabolism for many years. The treatment is dynamic and functional throughout and is designed to serve the interests of research scientists and advanced students in biology, medicine, and agriculture whose interests touch upon the role of minerals in physiology, biochemistry, biophysics, or nutrition. As stated in the subtitle, this is truly an advanced treatise, dealing with every aspect of mineral metabolism, but with emphasis on the mammalian organism, particularly man.

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**Practical Chromatographic Techniques.** By A. H. GORDON, National Institute for Medical Research, London, and J. E. EASTOE, Department of Dental Science, Royal College of Surgeons of England. D. Van Nostrand Co., Inc., 120 Alexander St., Princeton, N. J. 1964. viii + 200 pp. 14.5 × 22.5 cm. \$7.95.

Chromatography has continued to grow at such a pace that each phase of this separation technique warrants its own full volume. Thus, one book which can cover almost all the practical chromatographic techniques is always welcomed, and especially so to the beginner to whom this book is directed.

The book is divided into seven chapters, plus an index, to fill its 200 pages.

The principles of the various chromatographic techniques are discussed rather briefly but quite adequately in Chapter 2. The mechanisms of adsorption, partition, ion exchange, and molecular sieving are outlined. Column and paper chromatography, their development and the problems of packing, tailing, irregular bands, etc. are included. The old (1941) theories of Martin and Synge of chromatographic behavior based on "theoretical plates" are covered in considerable detail; but the references that follow this chapter are not recent, with only 4 of the 16 from the past 10 years.

The following chapter covers especially well the various column configurations, systems for the addition of solvents, and the preparation of gradients. Surprisingly, several pages are devoted to the details of fraction collectors, all of European design and manufacture. Paper chromatography apparatus is especially well covered and should be most helpful to the beginner. However, only the Whatman papers are mentioned.

Chapter 4 covers adsorption chromatography especially well for the beginner. It gives many excellent suggestions, tells what to expect and what to guard against, and has, in addition, the usual list of adsorbents and eluents. Quite noticeable again is the very limited number of references.

In the chapter on paper chromatography, the beginner might be a bit misled by the statement, "the working time . . . is not much more than five minutes" (p. 91). It might best be mentioned that the time referred to represents only spotting the paper and getting it into and out of the developing tank and certainly does not include the time, which must be counted in hours, spent in solvent preparation, equilibration, running time, etc. As wonderful as paper chromatography may be, it is still a time-consuming operation.

However, it is at this point that one finds the first examples and details of practical paper chromatography. Twelve pages are devoted to amino acid analysis. Solvent systems and  $R_f$  values are also given for a number of carbohydrates, purines, and pyrimidines.

The longest chapter is on ion exchange, with the major emphasis again on the practical aspects of the chromatography of amino acids, peptides, and proteins, with the sugars and nucleic acid components getting but very brief coverage.

The final chapter deals with the more recent advances in chromatography. The cellulose and dextran ion exchangers are discussed and their applications, along with a number of good references, are included. The dextran polymer Sephadex, ion-exchange papers, and especially thin layer chromatography are all covered much too

briefly. No mention whatever is made of instrumentation which has made many time-consuming chromatographic techniques into rapid, practical methods of analysis and separation.

In summary, "Practical Chromatographic Techniques" will be most helpful to the beginner whose major interest is in the analysis of amino acids and proteins, for it is in this field that the authors excel.

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**Les alcaloïdes stéroïdiques des Apocynacées.** By ROBERT GOUTAREL, Directeur scientifique AU C.N.R.S., Institute de Chimie des Substances Naturelles DU C.N.R.S., Gif-Sur-Yvette. Hermann, 115 Boulevard Saint-Germain, Paris VI, France. 1964. 289 pp. 17.5 × 24.5 cm. 48 F.

This work is the fifth in a series concerning the chemistry of natural products edited by E. Lederer who has lived up to his promise to have each volume written by an authority in the area to be covered. The title of the monograph, "Les alcaloïdes stéroïdiques des Apocynacées," although correct does not do justice to steroidal alkaloids in general. The bases discussed are those naturally occurring alkaloids with 5- $\alpha$ -pregnane, pregn-5-ene, and conanine skeleta, and there is nowhere in the treatment of either the phytochemistry or the chemistry even an inkling of the true range of structural variation of the steroidal system among alkaloids, since the solanum and veratrum bases were excluded by definition on page 12. Those readers unfamiliar with alkaloid chemistry are simply not told about the relationships, real or theoretical, between the pregnane-derived bases discussed and the excluded groups. It is true that leading references to reviews on solanum and veratrum bases are cited but some of these are hopelessly dated.

The work is divided into four sections, viz. the sources, the chemistry, the conversions into steroidal hormones, and the pharmacology of the 5- $\alpha$ -pregnane, pregn-5-ene, and conanine bases with little or no reference to related topics. Each section is clearly and competently presented but suffers because of the limitations mentioned above which the author himself states are self-imposed. The whole emphasis is on the work of the Paris group with those additions from the rest of the world as were necessary to complete the theme. A particular interesting feature of the presentation is the reproduction of the infrared curves (potassium bromide disk) and the mass spectra (*via* sublimation into the mass spectrometer) of all or nearly all of the bases. These graphs along with the other classical data make it a valuable and useful book for which a more comprehensive index should have been provided. To sum up, this is an excellently written almost personal account of Professor Goutarel's contribution to the chemistry of steroidal alkaloids and the reviewer very much enjoyed reading it.

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**The Electronic Structure of Molecules. A New Approach.** By J. W. LINNETT, F.R.S. John Wiley and Sons, Inc., 605 Third Ave., New York, N. Y. 1964. vii + 167 pp. 14.5 × 22 cm. \$4.75.

So much time had gone by since the electron-pair bond concept took shape that one felt sure no new approach at the same usefully unsophisticated level could possibly be forthcoming. Yet, as the title claims, here is a new approach, and in the opinion of this reviewer the claim is justified. This is not to say that the approach is perfect. In fact in another paragraph some criticism will be provided. But the over-riding consideration is that the approach is a fresh one, and one finds himself reading the book with considerable excitement.

Electron pairing is revealed as important often simply as a sort of coincidence. What is physically important is an automatic separation between electrons having the same spin together with separations coming from coulombic repulsions among electrons not having the same spin—all repulsions working against attractions of the sort found in the hydrogen molecule-ion. This theme is helpfully introduced in a few simple chapters in a way which does no great violence to accepted concepts. In the remainder of the book the author goes through examples from inorganic and organic chemis-