

under some continuous group provides one of those all-too-rare revelations which is probably as close to a religious experience as one encounters in science, but this beautiful generalization is not mentioned. By contrast, the Legendre differential equation, while admittedly essential, is comparatively uninspiring. The emphasis on mathematical isomorphism often obscures the physical continuity, and still does not prevent some subjects from recurring in several places (*viz.*, Legendre polynomials). Against the fact that most important proofs are given, it is regrettable that a proof of the Fourier Integral Theorem, such as MacRobert's, which requires only half a page, was not included.

The amount of space devoted to quantum mechanics seems out of proportion, especially relative to that allotted statistical mechanics. Chemists will be dissatisfied that no molecules more complicated than hydrogen are treated, while physicists will miss a discussion of the most fundamental subject of scattering. The authors' hope that this hundred page chapter, supplemented by two or three others, would serve as a text in quantum mechanics courses is probably seldom realized. In the chapter on statistical mechanics, no mention is made of the grand ensemble and its associated partition function, although several pages are devoted to the method of Darwin and Fowler. Indeed, one might wonder why quantum mechanics and statistical mechanics have been singled out for special treatment of their physical, rather than mathematical, content.

Especially noticeable is the omission of any discussion of nonlinear differential equations, particularly those of hydrodynamics and electrodynamics. One might have expected to find these latter subjects also treated under vectors, which find their most elegant applications there. In the discussion of statistics, no mention is made of the extremely useful central limit theorem and its applications. The treatments of the Dirac δ -function and of Green's functions are altogether too brief considering the frequency with which these are met in current literature.

The chapter on matrices, a nice example of lucid condensation, is, however, concerned exclusively with matrices of finite order, for which the basic equation of matrix mechanics, $PQ - QP = h/i$, cannot hold. Incidentally, the statement concerning matrices which commute with a diagonal matrix has been corrected in the second edition, although the error persists concerning the invariance of the trace of a product with respect to permutation of factors (no restriction being made to cyclic permutations).

In summary, this reviewer feels that the greatest shortcoming of the exposition lies in its conventionality, which leads to a lack of portability. There are few points at which the reader feels the subject has been encapsulated for easy retention. As an illustration, the rather complete treatment of the thermodynamic relations culminates in Bridgman's table. Like a table of integrals, this is indeed useful; but how much more useful is a simple four-step rule, such as that of Carroll and Lehrman, which emancipates the student from reliance on a handbook.

Considering the doughnut, the hole represented by these criticisms is comparatively small. The second edition will undoubtedly continue to enjoy the success of the first. It is printed on somewhat better quality paper and, at 1.13 cents per page, is a bargain in today's technical book market.

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Reduction with Complex Metal Hydrides. By NORMAN G. GAYLORD, Interchemical Corporation, New York, N. Y., Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1956. xvi + 1046 pp. 16 × 23.5 cm. Price, \$15.00.

The reduction of thirty organic compounds by lithium aluminum hydride was reported in 1946. Today more than eight thousand compounds have been reduced by hydride reagents. Thus, it is apparent the complex metal hydrides have found extensive and important applications as synthetic tools in the selective reduction of various functional groups.

The book consists of 1,046 pages which includes the text, ninety-eight tables, literature and patent references, and the index. The coverage of the literature includes "Chemical Abstracts" as well as a page-by-page examination of thirty journals from 1947 up to January 1953. In addition, a few later references have been included.

Reductions of inorganic and organic compounds by lithium aluminum hydride, aluminum hydride, magnesium aluminum hydride, zinc aluminum hydride, lithium gallium hydride, sodium borohydride, potassium borohydride, lithium borohydride, sodium trimethoxyborohydride and other hydrides are described.

Arrangement of material is based on the reactions of functional groups. Much of the presentation is factual copy of published work which includes the preparation and properties of complex metal hydrides, the reaction with inorganic reactants, reactions with organic derivatives of inorganic reactants, the use of complex metal hydrides as analytical reagents, the mechanism of reduction of organic compounds by complex metal hydrides, the reduction of oxygen-, nitrogen-, sulfur- and halogen-containing organic compounds, the reduction of carbon-carbon multiple bonds, miscellaneous reactions such as the Ziegler olefin polymerization, and experimental conditions for carrying out hydride reductions on a laboratory and commercial scale.

The author well demonstrates his acquaintance with the field of hydride reactions. Some topics are given critical review. These include the mechanism of reduction, the cleavage of the C-O bond in amides, and the cleavage of the

$\begin{array}{c} | \\ -N-C-O- \\ | \end{array}$ and $\begin{array}{c} | \\ -N-C-S- \\ | \end{array}$ linkages by lithium aluminum

hydride. Also, wherever possible he presents a correlation of so far unrelated works with conclusions based thereon.

The text is well written and presented but the indexing leaves much to be desired. For example, aminoalcohols can be prepared by reduction of fifteen different types of starting materials, but this information can be obtained only by paging through the book. Although the continuing growth of hydride chemistry, especially in the field of "tailor-made" hydrides for selective reductions, has made this book somewhat less valuable, all chemists should benefit tremendously from this stimulating and excellent monograph on hydride reductions.

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Proceedings of the Sixth Meeting of the International Committee for Electrochemical Thermodynamics and Kinetics.

By G. VALENSI, Editor-in-Chief, Poitiers, France. Butterworths Scientific Publications, 88 Kingsway, London, W. C. 2, England. 1955. xvi + 567 pp. 17 × 23 cm. Price, 84s.

This volume contains over 50 papers presented at Royau-mont and Poitiers in September, 1954, by representatives of fifteen nations. The wide range in subject matter covered in this informative collection makes it a valuable addition to the libraries of a variety of institutions and individual scientists. It also makes it impractical to attempt critical reviews of so many somewhat disconnected topics.

A small but important part is devoted to fundamental principles. The Report of Commission 2, covering 27 pages of parallel texts in French and English, should be studied in connection with earlier recommendations in *Z. Elektrochem.*, 58, 530 (1954), and is the result of painstaking attempts, on an international basis, to bring logical uniformity into the nomenclature and definitions of electrochemistry. The members of this commission are P. Van Rysselberghe (Oregon) chairman, J. O'M. Bockris (Pennsylvania) formerly of London, R. Defay (Brussels), G. Valensi (Poitiers), and R. Piontelli (Milan) *ex officio*. This report is followed by two papers by E. Lange on the description of mixtures and derived quantities of material. G. Valensi formalizes the distinction between electrovalency and oxidation number, and K. Nagel discusses the definitions of polarization and overvoltage. Some controversial aspects of single electrode potentials receive attention in a study of the temperature coefficients of half cells by M. Bonnemay and a note on electrocapillary curves by G. and E. Darmais.

A short section devoted to experimental methods in electrochemistry contains a progress report of Commission 3 charged with this subject, observations on the use of rotating electrodes by H. V. K. Udupa and B. B. Dey, a note on