

Finally, Lynen, Knappe and Lorch describe work which has led to a detailed understanding of the part played by biotin in carboxylation reactions.

The book by Ingraham is quite different. Clearly, the author's intention is to provide a suitable introduction into molecular biochemistry for undergraduates. Unfortunately, by British standards, the price is rather high. The book is divided into two parts. The first section provides a concise account of the mechanistic principles of reactions and starts from atomic structure and the nature of chemical bonds; there is a pause to mention transition states, and then ionic, displacement, and concerted reactions are described. This section concludes with a section on "high-energy" bonds (notice the quotation marks!), and the reader is surprisingly left to cope with the remainder of the book without having encountered more than a few sentences on the kinetics of enzyme catalysis. In the second part, the author deals with esterification and hydrolysis, elimination reactions, decarboxylation, oxidation, condensation, alkylation, and rearrangement, and pays considerable attention to the comparison between reactions which occur with and without enzyme catalysis. Of course, in a book of this size, it is all too easy to detect omissions, but a surprising amount of material is covered and well illustrated with formulæ.

This concise book should be attractive to the busy reader who wishes to gain an insight into the fundamentals of biochemical reactions.

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## PETROLEUM CHEMISTRY AND REFINING

### Advances in Petroleum Chemistry and Refining

Vol. 5. Edited by John J. McKetta, Jun. Pp. xiv + 545. 150s. Vol. 6. Pp. xvi + 550. (New York and London: Interscience Publishers, a Division of John Wiley and Sons, Inc., 1962.) 158s.

IN 1958 there appeared the first volume of a proposed annual series designed for the research scientist and refinery engineer, to enable them to keep abreast of present advances in chemistry and chemical engineering as appropriate to the petroleum and especially the petrochemical industries. The aim of the founders of this project, K. A. Kobe and J. J. McKetta, jun., is publication of progress reports written by leading authorities on particular subjects, conceived in a 'blueprint' of the whole industry, grouped into five main sections; these are: economics and future trends; unit operations and design; refining processes; petrochemicals; mechanical equipment. Vol. 2 of the series was published in 1959, Vol. 3 in 1960, Vol. 4 in 1961; Vols. 5 and 6, jointly subject of this present notice, appeared in 1962 and in them the sequence of sections as originally adopted is maintained.

In Vol. 5, H. R. Batchelder writes on synthetic fuels in Group I; Group II contains papers by J. S. Bonner and J. M. Honeycutt on process design on digital computers, by W. N. Hagler and R. C. Shea on the use of digital computers in petroleum refining, and by R. G. Larsen and J. R. Joyce on atomization. In Group III W. A. Bailey, jun., and A. F. Sartor discuss secondary reactions in catalytic cracking, while S. H. Alexander and J. D. Shurden contribute a report on petroleum asphalt—chemistry, refining and products. Group IV, petrochemical processes, embraces the diversified titles of reactions of olefines, by J. C. Kirk, F. Kennedy and A. J. Lundeen; high-temperature chemistry of the light hydrocarbons, by V. Kevorkian, and manufacture of nitrogen fertilizers from petroleum raw materials, by H. F. Woodward, jun. An article on small gas turbines by H. R. Schelp and P. B. Garner completes Group V of this volume.

In Vol. 6 there are eight reports spread over the five main industrial groupings. W. G. Annable and L. G. Pless discuss road octanes versus laboratory octanes; two essays, one on membrane permeation by C. Y. Choo, the other by W. D. Schaeffer and W. S. Dorsey on clathrates and clathrate separations, concern unit operation and design; refining processes are represented by contributions on thermal cracking, visbreaking and thermal reforming by T. A. Cooper and W. P. Ballard, and on modern grease technology by F. G. Bollo and H. A. Woods. Carbon-silicon compounds by H. J. Fletcher and recovery of sulphur from sour natural and refinery gases, discussed by J. W. Estep, G. T. McBride, jun., and J. R. West, complete the petrochemical section, the volume being wound up by J. Fullemann in his paper on centrifugal compressors.

Both these volumes, 5 and 6, are well designed, printed, and illustrated with clear line-drawings, diagrams, and half-tone blocks from photographs of plant and other subjects germane to the texts. With one exception, photographs of each author concerned attached to short professional biographies preface each report. Indexing in Vol. 5, including a useful cumulative index from Vol. 1 onwards, is adequate, but in my copy Vol. 6 lacks index prior to heading 'W' because sixteen pages are missing (529–544) although the cumulative index has survived. To what extent introductory information and photographs of the authors concerned in such highly technical and serial reports as these enhance the value of each volume as a whole may be debatable, but in my opinion they are unnecessary and not a feature to be generally encouraged in important scientific works. The price of each volume is certainly on the high side, even allowing for collective authorship; in the case of Vol. 6 it should have at least ensured against omission of most of the index; it is hoped, however, that this is just an isolated copy, minus a feature of vital importance to the reader wishing constantly to refer to such authoritative knowledge as is contained in these valuable publications.

H. B. MILNER

## THEORY OF POLYELECTROLYTE SOLUTIONS

### Polyelectrolyte Solutions

A Theoretical Introduction. By Stuart A. Rice and Mitsuru Nagasawa. With a contribution by Herbert Morawetz. (Molecular Biology: an International Series of Monographs and Text-books, Vol. 2.) Pp. xv + 568. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1961.) 118s.

THE theoretical interpretation of the properties of polymer solutions is a problem of great difficulty, and when ionizable groups are introduced into the molecule giving charged sites on the chain so that configuration is affected by electrostatic forces, themselves screened by counter-ions in the solution, the subject becomes one of daunting complexity. The authors of the present enthusiastically written book move in this complicated field with confidence, and in some 550 pages of what is modestly termed a "theoretical introduction" they give an exhaustive mathematical treatment of polyelectrolytes in solution.

The groundwork is laid by discussing the general molecular theory of solutions and the properties of dilute electrolytes, and in this context the theory of rigid macroions is developed and their equilibrium properties and electrophoresis considered. The effect of flexibility in chain polyelectrolytes is introduced in a chapter contributed by Morawetz, and the bulk of the book is then concerned with the systematic treatment of particular aspects of flexible polyelectrolytes such as their dissociation, electrostatic free energy, interaction of poly-ions and