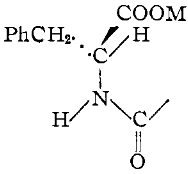
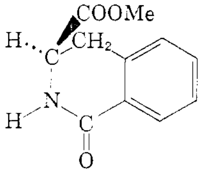
enzyme. To explain the finding of Hein, McGriff and Niemann, all that need be demonstrated is that there are conformations accessible to all the usual substrates of chymotrypsin and to the D isomer of I but not to the L isomer.

We start with the fact that N-acyl-L-phenylalanine esters, notably N-benzoyl-L-phenylalanine ethyl ester, are excellent substrates for chymotrypsin.[2] Sizable and distinct contributions to the activity of these substrates are made by the phenyl, the amino, and the acyl groups as judged by the poorer activity of substrates lacking one or more of these features.[3] We will consider the pertinent features of the "correct" conformation of an N-acyl-L-phenylalanine ester to be as shown in II.

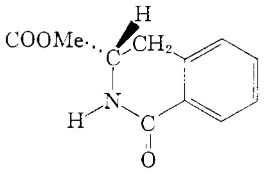


II

If we now examine the L and D isomers of substrate I, it is apparent that the D antipode has



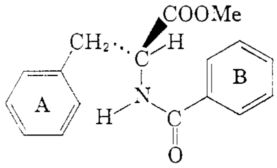
I-D



I-L

the correct conformation and that the L-isomer does not. We thus have demonstrated that an explanation exists within the framework of the polyaffinity theory.

On the basis of the above demonstration, we can formulate the "correct" conformation of N-benzoyl-L-phenylalanine methyl ester



It is pertinent to note that ring B makes a positive contribution to binding as judged by the lower K_m values of substrates and lower K_i values of inhibitors containing an acyl group with a cyclic function. Also, reactivators of diethylphosphoryl-chymotrypsin containing two aromatic rings are far superior to those containing only one.[4]

According to this conformation the aromatic nucleus of compound I interacts with the same part of the active site as the aromatic function of the benzoyl group. The chosen spatial position of ring A is based upon the reactivation studies[4] but its validity does not affect our argument.

The important finding of Hein, McGriff and Niemann can be interpreted within the framework of the polyaffinity theory. When so interpreted, a large number of *a priori* conformations of substrates are eliminated and we thus gain important information concerning the topology of the active site of chymotrypsin.

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(2) S. Kaufman and H. Neurath, *Arch. Biochem. Biophys.*, **21**, 437 (1949).

(3) N. M. Green and H. Neurath, "The Proteins," Vol. IIB, Academic Press, Inc., New York, N. Y., 1954, p. 1057.

(4) W. Cohen and B. F. Erlanger, THIS JOURNAL, **82**, 3928 (1960).

BOOK REVIEWS

Rheology. Theory and Applications. Volume III. Edited by FREDERICK R. EIRICH, Polytechnic Institute of Brooklyn, New York. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1960. xvi + 680 pp. 16 × 23.5 cm. Price, $21.00.

This third volume treats the more applied aspects of Rheology as contrasted with the first two volumes. This was intended to be the final volume but a fourth volume may be required to round out the field. The organization of material parallels the earlier treatments.

The sixteen chapters with authors are: 1. The Normal-Coordinate Method for Polymer Chains in Dilute Solution by B. H. Zimm; 2. The Principles of Rheometry by S. Oka; 3. Viscosity of Suspensions of Electrically Charged Particles and Solutions of Polymeric Electrolytes by B. E. Conway and A. Dobry-Duclaux; 4. The Rheology of Latex by Samuel H. Maron and Irvin M. Krieger; 5. The Rheology of Printing Inks by A. C. Zettlemoyer and Raymond R. Myers; 6. Rheology of Pastes and Paints by Ruth N. Weltmann; 7. Atomistic Approach to the Rheology of Sand–Water and of Clay–Water Mixtures by W. A. Weyl and W. C. Ormsby; 8. The Rheology of Inorganic Glasses by W. A. Weyl; 9. The Rheology of Concrete by M. Reiner; 10. The Deformation of Crystalline and Cross-Linked Polymers by I. L. Hopkins and W. O. Baker; 11. The Viscosity and Elasticity of Interfaces by Dean W. Criddle; 12. Rheology of Lubrication and Lubricants by A. Bondi; 13. The Rheology of Adhesion by J. J. Bikerman; 14. Rheology in Molding by C. E. Beyer and R. S. Spencer; 15. Rheology of Spinning by Bruno R. Roberts; 16. Theory of Screw Extruders by W. L. Gore and James M. McKelvey.

B. H. Zimm has discussed the use of the normal coördinate method of treating a polymeric molecule acted on by the forces of a flowing viscous solvent. Some interesting results have been obtained. S. Oka's chapter discusses various instruments for measuring viscosity and different models of flow. Viscosity is conditioned by all the bonds that impede molecules from sliding past each other. Ionic attractions form an especially interesting chapter discussed by

Conway and Dobry-Duclaux. Subsequent chapters are equally interesting. Very many of the almost endless complications that can be built into the relaxation of flowing systems by awkward arrangements of the interconnecting bonds are illustrated in these pages. While all flow relaxations must obey statistical mechanics as expressed in absolute reaction rate theory, the complications in applying the theory include the usual extreme complexity of reaction kinetics. Whether one wants help in practical problems or background for his theoretical research one will find much of interest in these pages. This is a very useful book in a difficult field and deserves to be widely read.

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Available Energy and the Second Law Analysis. By EDWARD A. BRUGES, B.Sc., Ph.D., A.M.I. Mech. E., Senior Lecturer in Mechanical Engineering, University of Glasgow. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1959. viii + 124 pp. 14 × 22 cm. Price, $5.50.

By virtue of the second law of thermodynamics, the energy of a thermodynamic system can never be completely converted into useful work performed on the surroundings. If the system is at the same temperature and pressure as the surroundings, the maximum useful work available is equal to the change in the Gibbs free energy: $\Delta G = \Delta E - T\Delta S + P\Delta V$. In the more general case when the system (at T and P) is contained in an indefinitely large reservoir whose temperature and pressure are T_0 and P_0, the maximum work obtainable from the interaction of system and surroundings is the "available energy," $\Delta E - T_0\Delta S + P_0\Delta V$.

This concept, first outlined by Gibbs and developed by a number of writers since, is manifestly of great importance to mechanical engineers, of lesser importance to chemical engineers, and of still less importance to research chemists. In this small monograph, the author devotes the first two chapters to a brief and fairly clear review of the first and second laws of thermodynamics (but the concept of heat is never adequately defined, and a careless error has crept into the development of the thermodynamic temperature at the bottom of page 19). Chapters III and IV develop the ideas of available energy and irreversibility. Eight chapters of applications follow, the last two dealing briefly with chemical changes. Engineers may find in this book a useful summary of problems of thermodynamic design, but little insight into chemical thermodynamics is offered. (In fairness to the author, it must be said that the book is written for mechanical engineers, and no service to chemistry is claimed.)

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Fast Neutron Physics. Part I: Techniques. Edited by J. B. MARION, Department of Physics, University of Maryland, College Park, Maryland, and J. L. FOWLER, Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tenn. Interscience Publishers, Inc., 250 Fifth Avenue, New York, N. Y. xiv + 983 pp. 16 × 23.5 cm. Price, $29.00.

"Fast Neutron Physics" consists of five sections. The first four sections are included in Part I and section V will compose Part II which will be published in the future. This volume is devoted to experimental techniques used in neutron studies covering the range from 1 kev. to several hundred Mev. The bulk of the material, however, pertains to energies below 40 Mev. The emphasis of the volume is on monoenergetic neutrons and their interactions with nuclei; however, polyenergetic sources also are discussed.

"Fast Neutron Physics" is meant to be a reference book. It is written so that each chapter is more or less complete in itself. This makes a certain amount of duplication necessary; however, the editors have done an excellent job in minimizing unnecessary repetition of material. There are numerous cross references to other chapters as well as to the original literature. Sixty-two authors, which represents a considerable amount of competence in fast neutron physics, have contributed to this work. The list of chapters and their authors is as follows: Radioactive Neutron Sources (A. O. Hanson); Kinematics of Neutron-Producing Reactions (J. Monahan); Monoenergetic Neutron Sources: Reactions with Light Nuclei (J. E. Brolley, Jr., and J. L. Fowler); Monoenergetic Neutron Sources: Reactions with Medium-Weight Nuclei (Jerry B. Marion); The $Li^7(p,n)Be^7$ Reaction (J. H. Gibbons and Henry W. Newson); Gas Recoil Counters (A. T. G. Ferguson); Recoil Detection in Scintillators (C. D. Swartz and George E. Owen); Recoil Telescope Detectors (C. H. Johnson); Photographic Plate Detection (R. Stephen White); Cloud Chamber Detection (William E. Stephens and H. Staub); Flat Response Counters (W. D. Allen); Neutron Detection by Reactions Induced in Scintillators (C. O. Muehlhause); Helium-3 Neutron Spectrometers (R. Batchelor and G. C. Morrison); Gaseous Scintillation Detectors (Charles M. Huddleston); Fission Detectors (R. W. Lamphere); Time-of-Flight Techniques (J. H. Neiler and W. M. Good); Neutron Flux Measurements (Joseph E. Perry, Jr.); Radioactivation Methods of Determining Neutron Flux (Paul R. Byerly, Jr.); Targets for the Production of Neutrons (J. H. Coon); Neutron Collimation and Shielding for Experimental Purposes (Alexander Langsdorf, Jr.); Laboratory Shielding (C. F. Cook and T. R. Strayhorn); Fast Neutron Dosimetry (G. S. Hurst); Fast Neutron Radiation Hazards (William T. Ham, Jr.); Computer Techniques (Harvey J. Amster, Edward J. Leshan and Martin Walt).

This book in the main is well written, clear, concise and very readable. It has also been well edited. This reviewer would have preferred to see the references as footnotes on each page rather than have them at the end of each chapter; however, this is a minor inconvenience to which readers are becoming accustomed.

"Fast Neutron Physics" will be a welcome addition to the libraries of all scientists interested in fast neutron technology.

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Nomenclature of Chemical Compounds. Edited by Coordination Committee of Documentation and Library Services, Committee on Nomenclature, and Editorial Board of the Journal of Japanese Chemistry. KENZO HIRAYAMA, DOROTHY U. MIZOGUCHI, and YUICHI YAMAMOTO, Editors-in-Charge. Nankodo, 23-3, Haruki-cho, Bunkyo-ku, Tokyo, Japan. March, 1960. xii + 394 pp. 18 × 25.5 cm. Price, yen 750.

Japanese chemists commonly use the English alphabet and spellings in the reproduction of the names of chemical compounds. Many take an active interest in the careful use of good nomenclature. To this end the Japanese Standing Committee on Nomenclature several years ago sought permission to translate into Japanese the various chemical nomenclature reports and pamphlets distributed by the Committee on Nomenclature, Spelling and Pronunciation of the American Chemical Society and to publish them in translated form. With a green light from America and with the coöperation of the Japanese Ministry of Education and the UNESCO Office in Tokyo these steps were taken, except that the names themselves were not changed. The Japanese version of these various pamphlets appeared in 1954 in the form of a 250-page paper-bound book. In 1957, a 368-page book was published which contained additional material, such as the 1951 rules of the Commissions of the International Union of Pure and Applied Chemistry (the IUPAC rules), and signed discussions, as in sections on High Polymers and Labeled Compounds (*cf.* review, THIS JOURNAL, **79**, 5328 (1957)).

In the book now being reviewed, the 1957 IUPAC rules are included. The 1951 IUPAC rules are repeated, except for those parts which have been changed and included by the IUPAC in its 1957 rules. Included in the 1957 rules are reports on hydrocarbons, fundamental heterocyclic systems, inorganic compounds and steroids. The 1955 and 1957 IUPAC recommendations on vitamins are included.

A Trilingual List of Names for Inorganic Compounds, etc. (occupying 21 pages), is included. The compounds are arranged according to the numbers of the IUPAC rules which are applicable, and are listed by formulas, followed