

element series, which he prefers to divide into uranides (uranium through americium) and curides (curium through lawrencium). His arguments for so doing are given in detail in the chapter entitled "Les Transuraniens."

In large part this controversy reduces ultimately to personal preferences in matters of nomenclature, and hence lies outside the area of logical debate. Where it is a question of the interpretation of experimental evidence the correct interpretation no doubt will ultimately be made clear.

Whatever the faults of this book, they are very minor in comparison with its merits as a comprehensive and up-to-date reference on the physical and chemical properties of the transuranium elements.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA

B. B. CUNNINGHAM

Chemistry of Combustion Reactions. By G. J. MINKOFF, D.Sc., Ph.D., D.I.C., B.P. Research Centre, B.P. Chemical Co., Ltd., Sunbury-on-Thames, and C. F. H. TIPPER, D.Sc., Ph.D., Senior Lecturer, Department of Inorganic, Physical and Industrial Chemistry, University of Liverpool. Butterworth Inc., Medicinal and Scientific Publishers, 7235 Wisconsin Avenue, Washington 14, D. C. 1962. xii + 393 pp. 17 × 25.5 cm. Price, \$14.95.

This treatise attempts to provide a general picture of the knowledge of the chemistry of combustion and flame reactions. Part I deals with the oxidation reactions of hydrogen and carbon monoxide; general experimental techniques and observations are described and followed with detailed discussions of the mechanisms and important radical intermediates. Part II is devoted to a discussion of the gas phase oxidation of organic compounds. A chapter is devoted to consideration of experimental methods, chiefly to outline problems and limitations on the validity of extant data for these complex systems. Succeeding chapters in this part describe results obtained and possible and probable mechanisms for slow combustion of aldehydes and hydrocarbons, oxidation of substituted hydrocarbons, and cool flames and ignition phenomena. Part III, almost half of the book, concludes with a treatment of high-temperature combustion, in which mass and energy transfer processes further complicate the chain reactions considered in Part II. The experimental approach is stressed in this part "to avoid being drawn into premature controversies which will eventually be resolved." Modern spectroscopic and sampling methods are well represented. Studies of energy relaxation and kinetic studies in nonflame systems are included because of pertinence to combustion systems. Chapters are found discussing high temperature pyrolysis of hydrocarbons and derivatives, combustion in stationary flames, and recombination reactions. The literature survey seems to have been broad and reasonably complete through 1960 with many references to 1961 papers in some chapters and a few 1962 references. There are numerous references to the Russian literature. This book is to be highly recommended for those interested in the chemical aspects of combustion reactions.

DEPARTMENT OF CHEMISTRY
HAVERFORD COLLEGE
HAVERFORD, PENNSYLVANIA

JOHN P. CHESICK

Entropy. The Significance of the Concept of Entropy and its Applications in Science and Technology. By J. D. FAST, Chief Metallurgist, Philips Research Laboratories, and Professor at the Technical University, Eindhoven, the Netherlands. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1962. xii + 313 pp. 16 × 23.5 cm. Price, \$10.75.

In recent years, courses in physical chemistry have been upgraded to the point where the elements of thermodynamics are comprehensively discussed. This creates a problem in the choice of subject matter for the traditional senior or graduate course in thermodynamics. One may, on the one hand, cover the same material in a more rigorous manner, or, on the other, depart from the traditional by extending the graduate course to include an introduction to statistical thermodynamics and to irreversible thermodynamics. If one's choice is to include statistical thermodynamics, one should give serious consideration to this excellent book by Professor J. D. Fast as a text book or for supplementary reading.

The subject matter covered in the book is limited so that it cannot be considered a monograph on "Entropy," but it is more extensive than most books on thermodynamics which contain a section on statistical thermodynamics. In addition to the material usually covered in an introductory text, this book contains much that is not, e.g., paramagnetism, interstitial atoms in metals, substitutional alloys, ferromagnetism, vacancies and dif-

fusion in solids, elasticity of rubber, polymer solutions, radiation thermodynamics, fuel cells, and heat pumps.

The author introduces each section with a lucid statement of the problem at hand, follows this with a pictorial description of the solution, and finally with a more exact mathematical treatment with all approximations clearly spelled out. In almost all instances he supplements the discussion with numerical examples which give the reader an excellent idea of the order of magnitudes of the quantities involved.

The various topics discussed in this book are uniformly well treated. Chapter 1 is concerned with classical thermodynamics and contains sections on the second law, Carnot cycles, and the concept of temperature which are outstanding for their clarity. Chapter 2 introduces one to the statistical concept of entropy and discusses the specific heat of an Einstein solid and the vibrational specific heat of gases. The choice of the Einstein solid seems to this reader pedagogically wise since its treatment is mathematically simple and at the same time yields practically all the properties of a real solid. The failure of the model at low temperatures is pointed out and is followed by a description of the improved Debye model without presenting the mathematical detail for this model.

The application of the concept of entropy is discussed in Chapter 3. After a classical presentation of the free-energy concept and chemical equilibrium, the author considers the problem of paramagnetism and the production of low temperatures in sufficient detail so that the methods introduced serve as a basis for the treatment of the remaining topics in the chapter. These topics have already been enumerated above (second paragraph).

Quantum mechanics and statistics as treated in Chapter 4 begin with Heisenberg's uncertainty principle, Schrödinger's equation, and the problem of the particle in a box. The presentation is clear, concise, and yet more detailed than that given in other books of this type. The discussion of Bose-Einstein, Fermi-Dirac, and Maxwell-Boltzmann statistics as well as their comparisons which follow is exceptionally good. The chapter ends on the subject of electrons in solids.

The last two chapters, 5 and 6, are devoted to the entropy of monatomic and diatomic gases. The material covered is the usual, but one must again comment that the treatment is clear, concise, and more detailed than the usual.

It should be obvious from the above that this reader has enjoyed this book, and while exception might be taken to a few points in the text, these are trivial when considered in the light of the whole book. Professor Fast's book is strongly recommended for chemists, metallurgists, and writers of text books. It could well serve as a model for the latter.

DEPARTMENT OF CHEMISTRY
COLUMBIA UNIVERSITY
NEW YORK 27, NEW YORK

CHARLES O. BECKMANN

Progress in Medicinal Chemistry. Volume 2. Edited by G. P. ELLIS, Bengel Laboratories Limited, Holmes Chapel, Cheshire, and G. B. WEST, School of Pharmacy, University of London. Butterworths, London. 1962. ix + 201 pp. 16 × 25.5 cm. Price, \$11.25.

This compact volume, a worthy companion to Volume 1 of the series, consists of five chapters: 1, The Patenting of Drugs by F. Murphy; 2, The Testing and Development of Analgesic Drugs by A. H. Beckett and A. F. Casy; 3, Mechanisms of Neuromuscular Blockade by W. C. Bowman; 4, 2-Halogenoalkylamines by J. D. P. Graham; and 5, Anaphylactic Reactions by G. E. Davies. These articles, written by experts in their respective fields, provide authoritative, thorough, yet concise, reviews of the five topics.

Chapter 1 gives a clear, detailed, and up-to-date account of the procedures and problems involved in the patenting of drugs. Although the discussion of the requirements for securing patents in various countries is limited to those of the United Kingdom, the United States, France, and Germany, two tables conveniently summarize the scope and other characteristics of patents in numerous other countries.

In Chapter 2 are described the various types of analgesics which are capable of relieving moderate to severe pain and the tests used to assess their analgesic activity and addictive liability in animals and in man. This article admirably summarizes the status of the long and arduous search, still in progress, for a potent analgesic which is free of addictive liability and other undesirable side-effects. Although a considerable amount of structure-activity data is presented in the course of discussion of the development of clinically useful analgesics, full treatment of structure-action relationships as well as consideration of mechanisms of action, metabolism, and analgesic antagonists have been reserved for treatment in a future volume of this series.

Chapter 3 is devoted mainly to the physiology of neuromuscular transmission and to consideration of the possible mechanisms by which neuromuscular block is produced. Differences in the modes of action of various types of blocking agents are clearly de-