

---

 BOOK REVIEWS
 

---

**Kinetics and Mechanism. A Study of Homogeneous Chemical Reactions.** Second Edition. By ARTHUR A. FROST and RALPH G. PEARSON, Professors of Chemistry, Northwestern University. John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, N. Y. 1961. ix + 405 pp. 15.5 × 23.5 cm. Price, \$11.00.

This is a second edition of a well-known introductory text to chemical kinetics first published in 1953. The general theme of the first edition is preserved, which is an emphasis on the basic concepts of chemical kinetics and the methods of interpreting experimental data in terms of reaction mechanism. As before, the material is limited to homogeneous reactions, and is supplemented at the end of each chapter by several problems selected from the literature.

Although a good deal of the text is a verbatim reprint of the first edition, the additions and changes are numerous. Throughout, the typography has been improved and the references revised to take into account new work. The new material in the chapter on reactions in solution consists of a discussion of the electrostatic contribution to the enthalpy and entropy of activation. In the chapter on homogeneous catalysis, the discussion of linear free energy changes has also been expanded.

Most revisions and changes involve the section dealing with elementary gas phase reactions. The discussion of unimolecular reactions has been brought up to date with a brief discussion of the theory of Slater; a new subchapter has been added on the effect of pressure on unimolecular reactions, which includes a survey of the latest results on the isomerization of cyclopropane and the reactions of excited methylene radicals. The chapter on chain reactions has new subchapters on chain transfer reactions and bond dissociation energies. The subchapter on inhibition has new material dealing with the action of inhibitors in autooxidation. An up-to-date discussion of the pyrolysis of acetaldehyde has been added as an illustration of the Rice-Herzfeld mechanism.

A new chapter entitled "The Study of Rapid Reactions" has been added. It first deals with the principles of flow methods, steady-state methods and encounter-controlled reactions, and then goes on to outline briefly the basis of experimental techniques involved in the quenching of fluorescence, polarography and flash photolysis, and in the rotating sector, magnetic resonance, mass spectrometer, shock tube and relaxation methods. This is a departure from the policy the authors adhered to in the first edition of excluding discussion of experimental techniques.

The final chapter, which discusses in detail the evidence for the mechanism of several reactions in solution and the gas phase, has been revised in the light of recent work.

The addition of new material has brought about, perhaps inevitably, some awkward situations. For example, the effect of pressure on unimolecular reactions is discussed in Chapter 6, while unimolecular reactions are discussed in Chapter 4. The inhibition by nitric oxide and propylene is dealt with in Chapter 6, while inhibition in general is relegated to Chapter 10, with no cross-reference. One might also question the logic of including a brief account of flash photolysis but not of ordinary photolysis, although photochemical evidence is used in several instances. Finally there is the strange omission (common with the first edition) that throughout the book (except for a paragraph on p. 115) there is scarcely a hint of the troubles with heterogeneous effects that commonly beset the investigations and interpretations of supposedly homogeneous reactions. A word of caution to the unwary would have been useful. However, these are only minor reservations.

Despite the numerous additions, the book has grown only about 50 pages in length, which still keeps it reasonably compact for use as a textbook and reference text. The book thus preserves the virtue of the first edition which was a lucid exposition uncluttered by unnecessary detail. The price, however, has gone up almost 100% compared with the first edition, and is quite high even by today's standards for a volume of such modest size. As a result, it is very

likely that the book will be found mainly in institutional libraries rather than in personal libraries where it belongs and where it would be most useful. Unfortunately it would be overly optimistic to expect that publishers will wake up to the possibilities of paperbacks in this field, or that they will recognize that expensive binding is an unnecessary frill for technical books, most of which become obsolete in five years.

DEPARTMENT OF CHEMISTRY  
LAVAL UNIVERSITY  
QUEBEC, P.Q., CANADA

W. FORST

**Radiation Chemistry of Gases.** ACS Monograph No. 151. By SAMUEL C. LIND, Oak Ridge National Laboratory, Operated by the Union Carbide Corporation for the Atomic Energy Commission, with Collaboration of CLARENCE J. HOCHANADEL, Oak Ridge National Laboratory, and JOHN A. GHORMLEY, Parma Research Laboratory, Union Carbide Corporation, Parma, Ohio. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1961. x + 313 pp. 16 × 23 cm. Price, \$12.50.

This is the second of two authoritative monographs on radiation chemistry published in the United States, both authored by Samuel C. Lind. The first (ACS Monograph No. 2) was published in two editions (1921 and 1928). The present volume is both a revision and a substantial enlargement of the 1928 edition. It is presented under two section headings: Part I—Physical Principles, Part II—Gaseous Reactions. Part I includes two chapters on the use of radon as a source of ionizing radiation in studies of the radiolysis of gases, a brief chapter by Ghormley on other sources of ionizing radiation and on some aspects of dosimetry, and a brief chapter by Hochanadel on interactions of ionizing radiation with matter. The material on radon is substantially the same as in the 1928 monograph, but these experimental techniques and methods for calculating dosages and kinetics data continue to be valuable to radiation chemists using gaseous radionuclides other than radon. Ghormley briefly presents useful information on characteristics and properties of a variety of radionuclides and electrical sources of vital interest to chemists, *e.g.*, availability, useful chemical forms, maximum available intensities, shielding problems, etc. The discussion of dosimetry is concerned almost entirely with methods for measuring energy deposition in condensed phases. Measurements with liquid and solid dosimeters are, of course, not directly applicable to determination of dosages in gases exposed to penetrating radiation from an external source. A statement of and discussion of problems in determining energy absorption from external sources would have been a valuable complement to the chapters on the use of radon as an internal source. Hochanadel's discussion of mechanisms of interaction of various kinds of ionizing radiation with matter is a model of conciseness and includes a number of illustrative and otherwise valuable tabulations and figures. All of the chapters of Part I are supplied with valuable references to definitive articles in the literature.

Part II seems to be as close an approach as is presently possible to a critical survey of all published work on gaseous reactions from its beginnings to July, 1960. Experimental results, including extensive tabulations of experimental data in many instances, are presented under the headings: Reactions of One Component, Oxidation, Hydrogenation, Polymerization, and Nitrogen Oxides. A brief chapter on the chemical effects of nuclear transformations, *e.g.*, Szillard-Chalmers reactions and reactions induced by isomeric transition, is also included. Much of the work reported under these headings is again discussed and correlated in chapters on the effects of foreign gases and the effects of various experimental parameters, *e.g.*, temperature, intensity, phase, etc. The work of Essex and others on radiation chemistry in electrical fields is reported in a separate chapter. Recent studies of reactions between charged and neutral species (ion-molecule reactions) are

reported in a chapter on mass spectrometry. The author includes a discussion of some dangers of extrapolating the findings of these studies in the mass spectrometer to gaseous reaction systems at normal pressures and points out a number of apparent inconsistencies occasioned by the attempt. In addition to the wealth of experimental information in the text, the author has added an appendix of tables summarizing products and yields of a large number of gaseous reactions. The appendix also contains some tabulations of selected physical data of direct interest to radiation chemists. This monograph is a welcome addition to the literature of a rapidly growing field of research which was introduced to this country and rapidly nourished to maturity largely through the efforts and inspiration of the principal author. Some sixty references to work of S. C. Lind and collaborators are cited in the text. The book should serve primarily as a valuable ready reference source for radiation chemists and kineticists. It is also probably the best single volume for non-specialists who seek an understanding of the aims, scope, problems, and experimental approaches of the past and present in studies of the chemical effects of ionizing radiation.

CHEMICAL LABORATORY  
OHIO STATE UNIVERSITY  
COLUMBUS 10, OHIO

RICHARD F. FIRESTONE

## BOOKS RECEIVED

October 10, 1961—November 10, 1961

- ADRIEN ALBERT. "Heterocyclic Chemistry. An Introduction." Oxford University Press, Inc., 417 Fifth Avenue, New York 16, N. Y. 1959. 424 pp. \$9.00.
- D. AMBROSE AND BARBARA A. AMBROSE. "Gas Chromatography." George Newnes Limited, Tower House, Southampton Street, London, W. C. 2, England. 1961. 220 pp. 40 s.
- DR. KARL BLUMRICH, DR. HERBERT SCHWARZ AND DR. AUGUST WINGLER. Edited by. "Unfallverhütung im Chemischen Laboratorium Cancerogene Substanzen." George Thieme Verlag, Herdweg 63, Stuttgart N, Germany. 1961. 56 pp. \$2.20.
- JOHN R. CATCH. "Carbon-14 Compounds." Butterworth Inc., 7235 Wisconsin Avenue, Washington 14, D. C. 1961. 128 pp. \$5.50.
- CHEMIKERAUSSCHUSS DER GESELLSCHAFT DEUTSCHER METALLHÜTTEN- UND BERGLEUTE e. V., Edited by. "Analyse der Metalle." Zweiter Band. "Betriebsanalysen." Zweite neubearbeitete Auflage. Erster Teil. "Aluminium bis Schwefel." Zweiter Teil. "Selen bis Zirkonium." Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, Germany. 1961. 1568 pp. DM. 158.—.
- NICHOLAS D. CHERONIS, Edited by. "Microchemical Journal Symposium Series." Volume 1. "Submicrogram Experimentation. Based on a Symposium Sponsored by the National Academy of Sciences and the National Research Council, Arlington, Virginia, May 15-18, 1960." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1961. 351 pp. \$12.75; \$10.75 (paper).
- GERHARD A. COOK, Editor. "Argon, Helium, and the Rare Gases. The Elements of the Helium Group." Volume I. "History, Occurrence, and Properties." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1961. 427 pp. \$17.50.
- ANIL K. DE. "Separation of Heavy Metals." Pergamon Press Ltd., Headington Hill Hall, Oxford, England. 1961. 308 pp. \$9.00.
- J. H. DE BOER, Editor-in-Chief. W. G. BURGERS, E. W. GORTER, J. P. F. HUESE, AND G. C. A. SCHUIT, Editors. "Reactivity of Solids. Proceedings of the 4th International Symposium on the Reactivity of Solids, Amsterdam, May 30th-June 4th, 1960." D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1961. 762 pp. \$28.75.
- D. D. ELEY, Edited by. "Adhesion." Oxford University Press, 417 Fifth Avenue, New York 16, N. Y. 1960. 290 pp. \$8.80.
- G. P. ELLIS AND G. B. WEST, Edited by. "Progress in Medicinal Chemistry." Volume 1. Butterworth Inc., 7235 Wisconsin Avenue, Washington 14, D. C. 1961. 262 pp. \$11.25.
- THE FARADAY SOCIETY. "The Physical Chemistry of Process Metallurgy. Discussions of the Faraday Society." No. 4, 1948. Butterworth Inc., 7235 Wisconsin Avenue, Washington 14, D. C. 1961. 344 pp. \$11.00.
- LOUIS F. FIESER AND MARY FIESER. "Advanced Organic Chemistry." Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1961. 1158 pp. \$14.00.
- ALFRED W. FRANCIS. "Critical Solution Temperatures." Advances in Chemistry Series Number 31. American Chemical Society, 1155 Sixteenth Street, N. W., Washington 6, D. C. 1961. 246 pp. \$5.00.
- WALTER J. GENSLER AND KINERETH D. GENSLER. "Writing Guide for Chemists." McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1961. 149 pp. \$4.50.
- DAVID M. GREENBERG, Edited by. "Metabolic Pathways (Second Edition of Chemical Pathways of Metabolism)." Volume II. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1961. 814 pp. \$24.00.
- INTERNATIONAL UNION OF BIOCHEMISTRY. "Report on the Commission of Enzymes of the International Union of Biochemistry 1961." I. U. B. Symposium Series. Volume 20. Pergamon Press Ltd., Headington Hill Hall, Oxford, England. 1961. 159 pp. \$7.50.
- STANLEY KIRSCHNER, Edited by. "Advances in the Chemistry of the Coordination Compounds." Proceedings of the Sixth International Conference on Coordination Chemistry, held at Wayne State University, Detroit, Michigan, August 27 to September 1, 1961. The Macmillan Company, 60 Fifth Avenue, New York 11, N. Y. 1961. 682 pp. \$15.00.
- MICHAEL LEDERER, Edited by. "Chromatographic Reviews. Progress in Chromatography, Electrophoresis and Related Methods." Volume 3. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1961. 187 pp. \$10.25.
- E. A. MOELWYN-HUGHES. "States of Matter." Oliver and Boyd, Tweeddale Court, Edinburgh 1, Scotland. 1961. 100 pp. 15 s.
- N. F. NEWBURY. "The Teaching of Chemistry." Second Edition. Philosophical Library, Inc., 15 East 40th Street, New York 16, N. Y. 1961. 294 pp. \$6.00.
- ROBERT F. ROLSTEN. "Iodide Metals and Metal Iodides." John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, N. Y. 1961. 441 pp. \$17.50.
- ARTHUR AND ELIZABETH ROSE. Completely Revised and Enlarged by. "The Condensed Chemical Dictionary." Sixth Edition. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1961. 1256 pp. \$17.50.
- FRANCIS J. C. ROSSOTTI AND HAZEL ROSSOTTI. "The Determination of Stability Constants and Other Equilibrium Constants in Solution." McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1961. 425 pp. \$12.50.
- D'ARCY WENTWORTH THOMPSON. JOHN TYLER BONNER, Edited by. "On Growth and Form" An Abridged Edition. Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1961. 345 pp. \$5.95.
- PIERRE VALLET. "Tables Numériques Permettant L'Intégration des Constantes de Vitesse par Rapport à la Température." Texte Trilingue: Français, Anglais, Espagnol. Gauthier-Villars et Cie., 55, quai des Grands-Augustins, 55, Paris 6, France. 1961. 114 pp. \$2.75.
- JOHN R. VAN WAZER, Edited by. "Phosphorus and its Compounds." Volume II. "Technology, Biological Functions, and Applications." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1961. 1092 pp. \$35.00.