

namic phase diagrams is necessary in order to predict the proper conditions required to produce a particular type of crystal.

IV. Thermal Conductivity of Metals at Low Temperatures by K. Mendelssohn and H. M. Rosenberg. At very low temperatures the thermal conductivity of metals behaves in an anomalous manner. However, when the metal becomes electrically superconducting, the thermal conductivity decreases. Heat conductivity is explained by the manner in which the two carriers of heat, the electrons and the phonons, are scattered in their passage through the material. Considerable attention is given to the effect of crystal defects.

V. Theory of Anharmonic Effects in Crystals by G. Leibfried and W. Ludwig. This chapter is concerned with the secondary effects which become all-important as one tends to exceed Hooke's law, or as the crystal is heated to near the melting point. The mathematical treatment is necessarily very complicated. However, the authors are to be complimented on making their treatment clear and concise.

This book is especially valuable since each of its articles is self-contained and pitched at a level which is not too tough for a good research chemist. The twelve volumes of this series which have already been published constitute a liberal education in solid-state physics. Already, 34 additional articles are listed as under preparation for future volumes. All solid-state chemists will want to keep abreast of these new developments in solid-state physics. Thus, this series is a "must" for most chemical libraries.

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Pyrazolone und Dioxypyrazolidine. By DR. WALTER KROHS and DR. OTTO HENSEL. Editio Cantor, Aulendorf i. Wurtt., Germany. 1961. xx + 488 pp. 17 × 24.5 cm. Price, DM. 98.--.

This book is the eleventh of a series published in German by Editio Cantor on progress in the chemistry of medicinal compounds. It is a welcome addition to the scant body of collected literature on pyrazolones and diketopyrazolidines. The pyrazolones, especially, are important to several industries, providing numerous dyes, pigments and medicinal. Both classes are important to medicine. This fact has prompted the writing of the book. Further justification is found in the editor's charge to the authors, "to prepare a monograph on pyrazolones which should be the most outstanding in this interesting field."

The book is divided into several sections. At the outset Ludwig Knorr is hailed as the father of pyrazolone chemistry in a two-page biography reprinted from a 1927 issue of *Berichte der Deutschen Chemischen Gesellschaft*. There follow twelve pages of generalities, one hundred and ten pages of chemistry on medicinal compounds, two hundred and thirty-seven pages of tabulated structural formulas and references, thirty-five pages of empirical formulas, and seventy-five pages about pyrazolone dyes, chiefly structural formulas. The general and medicinal sections were written by Walter Krohs, that on pyrazolones by Otto Hensel. The tables were apparently compiled jointly.

Importance of these heterocyclic classes in medicine is emphasized repeatedly. Their utility is discussed at length with extensive references to physiological and pharmacological sources. The single compound antipyridine, 1-phenyl-2,3-dimethyl-5-pyrazolone, furnishes a base on which much of the knowledge of pyrazolones has been constructed. In consequence, a seemingly unwarranted bulk of the book describes 1,2,3-substituted-5-pyrazolones.

Readability of this book is enhanced by numerous techniques. The table of contents is organized conscientiously. It leads to the interesting result that as many as four entries may be used to describe the content of a single page or that a single entry describes the content of sixteen pages. Structural formulas are numerous and uncrowded. A more vigorous adherence to the conventions for orienting the given heterocycles would have been a slight but real improvement. Possibly the habits of the two authors are reflected by noting that the medical pyrazolones are oriented with the number 1 nitrogen at the top of the page whereas the dye pyrazolones are oriented just the opposite.

The method of presenting the chemistry contributes to the readability if not to the depth of understanding. All the chemistry is descriptive without any attempt to rationalize reaction mechanisms. Apparently the authors were motivated more strongly to make their compilations as complete as possible rather than by any desire to make critical comment. For example, on page 103 Conrad and Zahrdt's version of the reaction between ethyl cyanoacetate and phenylhydrazine is reported to give 1-phenyl-3-keto-5-iminopyrazolidine. No acknowledgment is made of the Porter and Weissberger study of this reaction from which came a correction of the chemistry and the important color photographic chemical, 1-phenyl-3-amino-5-pyrazolone.

The literature is covered to the end of 1958.

Someone has combed the text for typographical errors. They are noted on page X, directly after the table of contents. Errors noted by your reviewer were trivial. On page XII B.I.O.S. is recorded as B.J.O.S. At the top of page 90 either the covalency count is wrong or a charged structure should be shown; the same is true with structures on pages 94 and 95. The type structural formula on page 357 needs correction. The misspelled Eastman on page 419 seemed unnecessary.

In conclusion, your reviewer wishes to emphasize again the timeliness and usefulness of this book to anyone interested in this area of heterocyclic chemistry. The literature gap since Cohn's "Die Pyrazolofarbstoffe" published in 1910 or Henecka's "Chemie der β -Dicarbonyl Verbindungen" published in 1950 is no longer glaring.

RESEARCH LABORATORIES
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Chemical Kinetics for General Students of Chemistry. By B. STEVENS, M.A., D. Phil., Lecturer in Chemistry, Sheffield University. Chapman and Hall, Ltd., 37 Essex Street, London, W. C. 2, England. 1961. viii + 107 pp. 13 × 19 cm. Price, 12s. 6d.

This slim book is the first of a series of six Physical Chemistry texts, the others to include: Atomic Structure and Valency, Chemical Thermodynamics, Molecular Structure, Electrochemistry and The States of Matter. They are intended "primarily for the degree student who is reading chemistry as a secondary subject." By North American standards, judging from the first volume, the level is approximately that of undergraduate work by chemistry majors. In this respect, the series represents an interesting publishing venture—the production of the equivalent of a standard physical chemistry textbook as a set of small flexible units. If this method were adopted more widely, the selection of references for particular courses could be greatly simplified, but the total cost would exceed that of most one-volume texts. However, since all six of these books will be written by but two authors, rather than by experts in each area, the principal advantage of the system has been lost.

After an introductory section there follow conventional chapters on the rate of reaction and its integrated forms, on the concentration and temperature dependence, all summed up by a very brief theoretical outline covering unimolecular, collision and absolute rate theories. Both homogeneous and heterogeneous catalysis receive extensive coverage which includes a short discussion of autocatalysis and inhibition. Two unaccountably brief chapters on photo and radiation chemistry and on atom and free radical chemistry conclude the text. References by author and date identify experimental data, but no general references to more advanced monographs have been made. A set of 25 problems covers most aspects of experimental kinetics dealt with in the book.

A strong feature of the book concerns the emphasis given to experimental data. Almost every subject is neatly illustrated with well drawn diagrams. Its main weakness is to be found in the last chapter, on atom and free radical chemistry. The introductory part of this chapter will erroneously imply to the unwary student that in a bond dissociation reaction the energy " kT " only must be supplied, and that "hot" radicals do not exist. The now defunct treatment (chain *versus* molecular reaction) of the inhibition of hydrocarbon decompositions by nitric oxide should not have been included. "Chemical Kinetics" thus does not

represent a marked improvement over the usual physical chemistry text treatment in either approach or standard, but does provide a short and elementary approach to kinetics.

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Organophosphorus Poisons. Anticholinesterases and Related Compounds. By D. F. HEATH, Toxicology Research Unit, Medical Research Council Laboratories, Carshalton, Surrey. Pergamon Press Ltd., Headington Hill Hall, Oxford, England. 1961. vii + 403 pp. 16 × 23.5 cm. Price, \$12.50.

This book is volume 13 in the Modern Trends in Physiological Sciences Division of the International Series of Monographs on Pure and Applied Biology. In his preface, the author states that he has tried to make a multidisciplinary presentation of organophosphorus compounds that will be of value both to the expert in one subject who desires to understand the research in another closely related field and to the tyro in all fields. The author's approach to these two ends can be seen by an examination of the structure of his book.

The book starts with an Introductory Chapter, which really is a summary of the entire book. This chapter occupies the first 14 pages of the volume. Thereafter follow in order sections entitled Chemistry, Biochemistry, Pharmacology in Mammals and Pharmacology in Insects. Each of these sections contains one or more appropriate chapters. The text ends on page 353. An appendix on the Theory of Reaction Rates in Solution is followed by a Glossary of common names, systematic names and structural formulas for organophosphorus compounds. The final 29 pages of the book are occupied by subject and formula indices.

The chemistry section of the book contains discussions of nomenclature for organophosphorus compounds, of the electronic theory of reactions (with particular reference to nucleophilic replacement reactions), of synthetic methods for making various types of organophosphorus molecules, of methods for purifying the reaction products and of reactions between organophosphorus molecules and other organophosphorus molecules or other types of substances (with reference particularly to hydrolytic actions).

The section on Biochemistry begins with an account of various enzymes that react with the organophosphorus anticholinesterases, either being inhibited by them or altering them chemically. Then follows a discussion of the stoichiometry and kinetics of enzyme inhibition *in vitro*, including considerations of reversal of the inhibition and of the nature of the inhibited site. Aging of phosphorylated cholinesterase, resulting in irreversibility of the inhibition, is discussed in this chapter but without consideration of the altered electronic configuration of the enzyme inhibited by a monoalkylphosphoryl moiety, rather than by a dialkyl one, that renders protonation by an oxime difficult under physiological conditions. The third chapter in this section treats in greater detail the metabolism of phosphorus compounds *in vitro*, considering hydrolytic, oxidative and reductive reactions. The following chapter on inhibition of enzymes *in vivo* includes a discussion of the correlation between intravenous LD50's and I50's and ends with a section on

inhibition of enzymes in insects and other non-mammalian species. The two final chapters in this section consider metabolism of the organophosphorus compounds by mammals and insects and by plants, soil bacteria and soils themselves.

The section on Pharmacology in Mammals begins with an introductory chapter that presents the basic phenomena of cholinergic transmission, a few methods for studying the effects of chemicals on tissues and the usual effects of several common drugs. It is both surprising and disappointing that nothing is said here about methods for studying either the central or the peripheral mechanisms of pulmonary ventilation, which are of crucial importance in poisoning by the organophosphorus anticholinesterases. This is all the more surprising because some of the earliest work of Barnes' group, to which the author of the volume belongs, pertained to the actions of organophosphorus anticholinesterases on ventilatory activity.

The introductory chapter is followed in order by chapters on effects on organs *in vitro*, on organs *in vivo*, on mammals, on therapy for poisoning and on narcotic and demyelinating effects. These discussions are reasonable ones, in general; this reviewer can not agree with the statement, p. 323, that "P2-AM is usually found to be at least as effective therapeutically as atropine." In studies with rabbits, cats, dogs, monkeys and chimpanzees we find regularly that P2-AM alone raises the LD50 dose of such compounds as Sarin by only about 1.5-fold whereas atropine raises it by 2.5 to 3.0 times. A mixture of P2-AM and atropine raises the LD50 of Sarin by nearly 30 times. This reviewer can not agree either with Heath's statement that MINA and DAM are more effective against Sarin than P2-AM. For example, in experiments parallel to the last one summarized above a mixture of atropine and DAM raised the LD50 dose of Sarin by only about 4 times.

The final section, and chapter, of the book starts with a discussion of neuroeffector transmission in insects and then presents briefly the actions of organophosphorus anticholinesterases on important systems in insects. The general summation of this chapter, to the effect that no conclusion can be reached about the mechanism of lethality in insects of the organophosphorus cholinesterase inhibitors until more is known of normal nervous function in these animals, will serve perhaps to spur efforts by the small band of insectophilic physiologists to secure the basic information on which can be founded an understanding of the mechanism of death in poisoning of insects by organophosphorus compounds.

Although there are a few surprising lacks in this book (for example, there is no discussion of the types of cholinesterases in different tissues), on the whole the book seems to have achieved its purpose. It is a volume that will be of interest particularly to chemists and biochemists but will have distinct value as a summary of existing knowledge to practitioners of other scientific disciplines. It is rather interesting that suddenly the organophosphorus inhibitors of cholinesterase are the subjects not only of several review papers but also of the excellent book by O'Brien, of this book and of a forthcoming volume of Heffer's Handbuch. One wonders unavoidably about the forces shaping such a sudden outpouring of considerations of the same body of literature.

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