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 BOOK REVIEWS
 

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**Linear Polymers.** By ELIZABETH M. FRITH and R. F. TUCKETT. Longmans, Green and Co., Inc., 55 Fifth Avenue, New York, N. Y. 1951. xi + 355 pp. 15 × 22.5 cm. Price, \$3.50.

Although the reviewer is guilty of inexcusable procrastination in submitting this review, this delay appears to be quite moderate compared with the four years which passed between the completion of the manuscript and the publication of the book. This long delay has been unfortunate for two reasons. In the first place it has robbed the book of two or three of its most useful years; secondly it has denied to this book the equal status it deserves along side the two other top books in this area (Bawn and Mark-Tobolsky) which were published during this interim. Nevertheless, despite its attenuated delivery and the rapid pace of progress in polymer science, this book remains essentially modern. This is a tribute to the success with which the authors have attained their goal: "Our aim throughout has not been to write a completely up-to-date monograph but rather to create a general physico-chemical framework which would be durable and on to which new developments could be grafted."

It is in this spirit that the reader is introduced first to the structure of polymers and their crystalline state, and then taken into a detailed discussion of their formation through polymerization. Leaving problems that are predominately kinetic ones, the next chapter takes up the principles of thermodynamics. Despite the conceptual error with which the chapter opens, it serves well to acquaint the student who has had only one year of physical chemistry with the thermodynamics that is necessary for the development in the remainder of the book. This remainder, which is half the book, consists of an extensive treatment of solution properties, molecular weight determinations and physical properties.

Throughout the book one is impressed with the clarity of expression and urbanity of style. From the pedagogical point of view, it is a joy to find that difficult matters are recognized as such and treated with the extra consideration and detail that an understanding of them requires. Constant reference to the basic principles of physical chemistry makes the reader conscious of the fact that the principal task at hand is the incorporation of the observed behavior of large polymer molecules into the framework of physical chemistry.

Aside from the absence of developments since 1947, several minor criticisms can be made. The individuality of polymers receives little notice. Naturally occurring polymers are almost completely neglected. The relations between chemical composition and physical properties, for example as displayed in fibers, is only lightly touched. Copolymerization, as of 1947, is inadequately treated. As a result the student will probably develop little appreciation of the diversity and uniqueness of polymers and their potential for further development.

These are, however, omissions and not errors. The book is highly recommended as an introduction to the science of high polymers. Nevertheless, it is not too early to hope that the authors, in spite of their increased responsibilities, might favor us with a second edition. Finally, the publisher does deserve praise for the low cost at which this book has been made available.

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**Imperfections in Nearly Perfect Crystals.** Symposium Held at Pocono Manor, October 12-14, 1950. By W. SHOCKLEY, Chairman, J. H. HOLLOWAY, R. MAURER and F. SEITZ (Editorial Committee). John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1952. xii + 430 pp. 15.5 × 22 cm. Price, \$7.50.

This book is a great credit to its editorial committee who carried through the organization of the program of a con-

ference entitled, "Lattice Imperfections"; then collected the presentations and discussions into what seems to be as complete and authoritative a discussion of the imperfections in crystals as could be made available at this time. Although the authors of the various papers are solid state physicists or metallurgists, there is a great deal of material in this book of great interest to chemists, especially those who work in the fields of heterogeneous catalysis or crystal structure.

The book is divided into four parts, each of which consists of a collection of papers by recognized authorities. Part I, entitled "On the Nature of Imperfections in Nearly Perfect Crystals," contains a paper describing the various kinds of disturbances which are found in the otherwise perfect structures of crystals, namely: (a) phonons, (b) electrons and holes, (c) excitons, (d) vacant lattice sites and interstitial atoms, (e) foreign atoms, (f) dislocations, (g) light quanta, (h) charged radiations and (i) uncharged radiations. The important subject of the geometry of dislocations is treated in a separate paper.

Part II is entitled "The Role of Imperfections in Deformation" and contains five papers treating the experimental and theoretical results that have been obtained in this rapidly developing subject. The emphasis in this section is on the mechanical properties of metals and their explanation in terms of dislocations.

Part III, entitled "Diffusion and Related Phenomena," contains four papers which together cover a range of subject matter from the F-centers in alkali halides to diffusion in metals. The discussion here is less concerned with dislocations and more with the other kinds of imperfections.

Part IV, "On the Properties and Effects of External and Internal Surfaces of Crystals," contains six papers concerned mainly with grain boundaries from what might almost be called a surface chemistry point of view. This section, concerned with surface energies and other related subjects, should be particularly interesting to chemists.

It is difficult to single out for special mention any particular paper from this collection, since all are of such high quality. No one concerned with the solid state can fail to find interesting and important material in this book and the many references at the ends of the papers make it even more valuable. The discussions which follow many of the papers not only round out the subjects, but also show how rapidly ideas are developing. Needless to say, this reviewer found this book fascinating and thinks it should be widely used.

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**Modern Radiochemical Practice.** By G. B. COOK, Ph.D. (Cantab.) and J. F. DUNCAN, D. Phil. (Oxon.) Oxford University Press, 114 Fifth Avenue, New York 11, N. Y. 1952. xx + 407 pp., 17 × 24 cm. Price, \$8.50.

As stated in the preface, this book is designed to provide a detailed guidance on the practical aspects of radiochemistry. After an introductory chapter on radiochemistry, the authors discuss (1) radiations and radioactive decay, (2) measurement of radiations, including electrical equipment and source of errors in counting, (3) radioisotope production and (4) health precautions. Following the main part of the book, an interesting series of thirty laboratory experiments is presented. These experiments are designed to give a scientifically trained person first-hand experience with many of the standard procedures of radiochemistry, such as measurement of radioactive half-lives, calibration of counters and analysis of mixtures by isotope dilution as well as some of the complicated aspects of nuclear chemistry. These latter include the identification of activities produced by pile and radium-beryllium irradiation, the Szilard-Chalmers reaction and radioactivation analysis of trace elements. Some of these experiments would be difficult to do in the ordinary university laboratory used for teaching radiochemistry, but the authors have presented

some nice suggestions. The book is completed by a table of isotopes and an author and subject index.

The subject of radiochemical practice covers many specialized fields, and it is not easy to discuss all of these in one book. This task has been allotted 283 pages in this volume; the rest of the 407 pages of the book is used for the laboratory exercises, tables and indexes. In order to cover such an extensive subject in this space, the authors have had to restrict their discussion of most subjects to a verbal outline of the ideas involved and a reference to the current literature. They have, however, at least mentioned almost all of the more important procedures of radiochemistry.

Since the book was apparently written in 1950, it is not surprising that a number of modern developments, particularly in counting techniques, are either missed or inadequately emphasized. These include such items as  $\beta$ - and  $\gamma$ -scintillation counting,  $\beta$ -proportional counters, halogen-filled Geiger-Mueller tubes, low-level assay of carbon-14 and tritium counting. The curie has also been redefined since the book was written.

This book will probably find its most use as a source of ideas for the research worker who has already been introduced to the subject of radiochemistry. In this respect, the authors have certainly achieved their principal aim in writing the book. It will be especially useful in the United Kingdom since the instrumentation is described from the point of view of what is available in England. A good bibliography is presented at the end of each chapter.

The volume is not satisfactory as a teaching book for radiochemistry, since it treats the fundamental ideas in too cursory a manner. Similarly, it is of limited value to the specialist in radiochemistry because of the lack of any profound discussion.

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**Advances in Enzymology and Related Subjects of Biochemistry.** Volume XIII. By F. F. NORD (Editor), Fordham University, New York, N. Y. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1952. ix + 413 pp. 16.5 × 23.5 cm. Price, \$8.50.

This latest volume of a series which has become an indispensable source of knowledge for the biochemist, contains individual contributions and a cumulative index of Volumes I-XIII. In the opening chapter, Heinz Holter (Copenhagen) gives a critical but brief view of techniques used, and results obtained, in the study of the intracellular distribution of certain enzymes which participate in the metabolism of the cell itself. In a review entitled "Some Aspects of the Application of Tracers in Permeability Studies," Hans H. Ussing, also from Copenhagen, develops in a logical and critical fashion the application of tracers to the permeability of giant plant cells, amoeba and amphibian skin to water, and of such tissues as skin, mucosa and nerve to ions. This discussion is preceded by lucid definitions of terms and by quantitative considerations of the basic concepts of permeability.

It is gratifying to read the stimulating account of Jacques Monod's challenging and searching views on the subject of "La Biosynthèse Induite des Enzymes (Adaption Enzymatique)" to which he and his associates at the Pasteur Institute have contributed so much in recent years. In this chapter, written in collaboration with Melvin Cohn, the biosynthesis of enzymes is considered as a specific aspect of protein synthesis, with due consideration of the relations to energy metabolism, to enzyme precursors and to the kinetics of the process. Examples are listed for the induced biosynthesis of more than twenty different enzymes and enzyme systems covering a wide spectrum of specificities. The role of the inducing agent in the kinetics of enzyme synthesis and the specificity of the inducing agent are perhaps the most intriguing aspects of the entire phenomenon since they relate so closely to the fundamental problem of the origin of the specific structure of enzymes and proteins.

In a chapter entitled "Genetic Formulation of Gene Structure and Gene Action," G. Pontecorvo of the University of Glasgow develops a dynamic concept of the elementary genetic units. The view is expressed that the chemical make-up of chromosomes is not static but may vary at dif-

ferent stages of the reproductive cycle. Similarly, genes are defined in terms of processes or functions rather than as megamolecules of definite size and shape. A discussion of the relation of genes to enzymes forms a major portion of this contribution.

"Adenosine Triphosphate and the Structural Proteins in Relation to Muscle Contraction" is the title of an authoritative and well balanced chapter from the pen of Dorothy M. Needham. Primary attention is given to the interaction between adenosine triphosphate (ATP) and the structural proteins of muscle and to the significance of these interactions for contraction and relaxation. The chapter is divided into six sub-topics which include: the structural proteins of muscle; the enzymatic breakdown of ATP; the interaction of myosin, actin and ATP in fibrils, gels and solution; some special types of muscle; biochemistry of the myofibrillar structure; and a concluding discussion of the mechanism of contraction. This objective review will be welcomed by those who struggle to maintain a balanced view of the rapid, lively and sometimes emotionally shaded developments in this field.

Karl Meyer and Maurice M. Rapport present a systematic account of the chemical and biological properties of "Hyaluronidases" and of their mode of action, with due emphasis on the advances which have been made in the authors' laboratory. The longest chapter of the volume is entitled "Certain Aspects of Intermediary Metabolism of Glutamine, Asparagine and Glutathione," by Heinrich Waelsch. These three compounds are considered under a common point of view since according to recent work by the author and others (Hanes, Fruton, Bloch) the two amides and the tripeptide participate in enzyme-catalyzed exchange reactions related to peptide and protein synthesis. The present discussion includes considerations of the metabolism of glutamine, asparagine and glutathione, in microorganisms, plant and mammalian tissues and of the synthesis of glutamine and of the tripeptide by tissue slices and cell-free extracts. The concluding discussion deals with exchange reactions mediated by  $\gamma$ -glutamylpeptides and leading to the formation of  $\alpha$ -peptides.

The editor is to be commended for including in volumes of this series short but up-to-date reviews of acute problems which are under active investigation. One of these is the specific inactivation of certain esterases by organic phosphates, such as the "Stoichiometric Inhibition of Chymotrypsin" by diisopropyl fluorophosphate and related compounds, discussed in twenty pages by A. K. Balls and Eugene F. Jansen. While the focus of interaction between enzyme and inhibitor awaits elucidation, the experimental facts leading up to this jack-pot question are authoritatively and lucidly explained. The last chapter of the volume, entitled "The Comparative Biochemistry of Nitrogen Fixation," by Perry W. Wilson represents a critical discussion of the contribution which investigations of biological nitrogen fixation have made to the field of comparative biochemistry. Particular attention is paid to the recent work involving the use of  $N_2^{15}$ , as applied to certain fungi, excised nodules and photosynthetic bacteria. The view is advanced that regardless of the organism involved, ammonia is the end-product of fixation and the initial reactant of assimilation. The review is concluded by a speculative outlook on future developments pertaining to new agents of fixation and on the nature of the chemical intermediates between nitrogen and ammonia.

The technical production of this book is of the high level characteristic of the entire series.

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#### Correction

**Les Théories électroniques de la Chimie organique.** By BERNARD PULLMAN, Docteur ès sciences, Chargé de recherches à l'Institut du Radium à Paris, et Mme. Alberte Pullman, Docteur ès sciences, Chargée de recherches à l'Institut de Radium à Paris. Masson et Cie, Éditeurs, 120 Boulevard Saint-Germain, Paris VI<sup>e</sup>, France, 1952. 17 × 25 cm. 665 pp. + 170 figs. Price, 5,800 Frs. (Price misprinted in review, 74, 6158 (1952), as 2,800 Frs.)