

acyclic nitriles have been shown to yield symmetrical carbanions under these conditions<sup>5</sup> we feel that our results are best explained by assuming that the cyclopropyl carbanion retains its asymmetry. These results also indicate that there is indeed an energy barrier to the rehybridization of the electron pair from a hybridized orbital into a p-orbital (I-Strain).<sup>9</sup> However, in aprotic solvents such as ether the nitrile (I) racemizes very rapidly.<sup>6a</sup>

In a recent study it has been demonstrated<sup>10</sup> that the acidity of the  $\alpha$ -hydrogen in isopropyl phenyl sulfone and cyclopropyl phenyl sulfone is

(9) H. C. Brown, R. S. Fletcher and R. B. Johannesen, *J. Am. Chem. Soc.*, **73**, 212 (1951); H. C. Brown and M. Barkowski, *ibid.*, **74**, 1894 (1952).

(10) H. E. Zimmerman and B. S. Thyagarajan, *ibid.*, **82**, 2505 (1960).

nearly equal. In the nitrile system it appears that the  $\alpha$ -hydrogen of the cyclopropyl nitrile is more acidic than it is in its acyclic analog 2-methyl-3,3-diphenylpropionitrile (II). Under the identical conditions used to study the racemization of I the  $k_1$  at 50° for II was found to be  $1.75 \pm 0.03 \times 10^{-6}$  sec.<sup>-1</sup>. Since the rate of deuterium exchange and racemization have been found to be equal for 2-methyl-3-phenylpropionitrile,<sup>5</sup> one can assume that this will also be the case for II. On this basis the  $k^{\text{Iexc.}}/k^{\text{IIexc.}}$  would equal 31.<sup>11</sup>

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## BOOK REVIEWS

**The Biosynthesis of Proteins.** By H. CHANTRENNE, Free University of Brussels, Belgium Pergamon Press Ltd. Headington Hill Hall, Oxford, England. 1961. viii + 220 pp. 15 × 23.5 cm. Price, \$6.50.

It takes courage to write a book on Protein Biosynthesis. For one thing, the field covered is so extensive: genetics, embryology, cytology, cell physiology, microbiology, immunology, crystallography—as well as chemistry. Another difficulty is that new developments are coming in this field at break-neck speed. Despite the odds against him, Professor Chantrenne has written an excellent book. It is both precise and broadly based.

In his preface he expresses concern lest much of what he has written will soon become obsolete. He need not fear that this would seriously impair the value of his book. It is true that the rush of events has already outdistanced parts of what he has written. A reader of the book is, however, well prepared for the next steps in discovery. It is indeed curious to see that one of Professor Chantrenne's readers was so well informed that he could be brought fairly well up to date (at the date on which this review is being written) simply by reading the January issue of the *Proceedings of the National Academy of Sciences*.

The reason that Chantrenne's book has a certain lasting quality is that when introducing most topics he usually first presents the fundamental concepts and the significant original observations and experiments. The only serious criticism of his book is that he does not always do this. Several examples may be mentioned: (1) The great concept of genetic continuity, reaching back to Mendel and Weismann, is frequently presumed but not explicitly stated. (2) The development of the concept relating genes to protein synthesis begins, of course, with Garrod and reaches a high-point in the work on hemoglobin. The account given is blurred by the inclusion of irrelevant material and by the failure to note that an important breakthrough was the discovery by Sumner, Northrop and Kunitz that enzymes are proteins. (3) One reason that human material has been so important for investigation of protein biosynthesis is that the proteins are often readily available, as Chantrenne says. Even more readily available, however, are the proteins of cattle. The special significance of human material is that individual human organisms mean far more to us than do any other individual organisms, so that a prodigious effort is made to recognize genetic individuality in man. The essence of the genetic procedure from Mendel down is that investigation of individual differences is the key to an understanding of fundamental processes. (4) In introducing the term *cistron* no mention is made of the original experiments

by Edward Lewis on *cis-trans* position effects in *Drosophila*. My experience has been that a student grasps this subject more readily if the exposition begins with Lewis' work.

When a second edition of Professor Chantrenne's fine book is called for, as one may confidently expect, he will of course include the fascinating novelties that are now being discovered every month; one hopes that he will then do some pruning and so find space for more of the classical concepts and experiments that date back before the present decade.

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**Surface Activity. The Physical Chemistry, Technical Applications, and Chemical Constitution of Synthetic Surface-Active Agents.** Second edition, revised and enlarged. By J. L. MOILLIET, B.S. (Rice), Ph.D. (Lond.), B. COLLIE, B.Sc. (Aberd.), Ph.D. (Lond.), and W. BLACK, B.Sc. (St. Andrews). D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1961. xvi + 518 pp. 16.5 × 25.5 cm. Price, \$15.00.

Progress in the last decade in the field of surface and colloid chemistry and the rapid expansion in the applications in technology and in general consumer uses of surface-active agents have necessitated substantial changes in the subject matter treated in the first edition of this well-known book. Therefore, it is not surprising that the authors have found it necessary to expand the first edition by 132 pages.

Nearly half of the added material is in Part I ("The Physical Chemistry of Surface-Active Agents and Interfacial Processes"), which is in accordance with the authors' original objective of emphasizing "the unifying scientific discipline of colloid science." It is unfortunate that in their enlarged presentation of physical chemical principles, the authors have not taken the time to improve the general style and balance of the most poorly presented portion of their book. Also, as in the first edition, Part I represents an unbalanced treatment of the subject. This feature, coupled to excessive preoccupation with theoretical aspects needing more sophisticated discussion than is given in most books, results in making Part I of little value to anyone but a specialist. For example, little is said about constitutive effects on surface tension or interfacial tension, only a page is concerned with the nature of interfacial films, and the discussion of the surface viscosities of adsorbed films is so trivial as to be useless. No reader without a good background on the physical chemistry of surfaces and adsorbed

films could be expected to derive much instruction or inspiration from reading this portion of the book. Difficulty in sustaining interest in Part I is still evident not only as a result of the authors' repeated emphasis on the difficulties and obscurities of the subject, but also because of the authors' tendency to present ideas in involved sentences requiring several readings and to add numerous and sometimes lengthy footnotes. Nearly all of the footnotes of the first edition are still retained. Despite the obvious unbalanced presentation in Part I and, at times, the uninteresting writing style used, a diligent reader will find some rewarding sections, such as excellent discussions of aqueous micelles, solubilization, flocculation, deflocculation, precipitation, nucleation, foaming and defoaming.

Part II ("Technical Applications of Synthetic Surface-Active Agents") represents an expansion of about 38 pages. In the added material will be found discussions of the effect of intensive mixing on the dispersions of solids in liquid media, on detergent builders, fluorescent brightening agents, public health aspects of the use of synthetic detergents, brief comments on the flotation of ores, effect of surface-active agents on the mass transfer at interfaces (including the effect on the evaporation of water), and briefer discussions of applications to metallurgy, geophysics, engineering construction and fire fighting. On the whole, Part II is authoritative, interesting and up to date. Portions which deserve particular attention are the excellent reviews on water proofing, emulsification and demulsification, dispersion of solids in liquid media, bactericides and emulsion polymerization.

Although Part III ("The Chemical Constitution of Synthetic Surface-Active Agents") exhibits an expansion of only 20 pages, it represents various improvements with respect to coverage over the first edition. Much effort has been made to make the literature and patent references up to date, and new material has been added on topics such as non-ionic agents, aliphatic sulfonates, perfluoro compounds and their surface activity, sequestering agents, and the water-soluble surface-active polymers such as polyvinyl pyrrolidone.

Like the first edition, the revised book is not suitable for teaching or for newcomers to the field. It is a valuable reference for specialists and especially for chemists interested in applications of surface-active agents. The new edition should be a useful addition to any technical library concerned with applied chemistry.

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**Uranium Dioxide: Properties and Nuclear Applications.**  
Edited by J. BELLE. Superintendent of Documents,  
U. S. Government Printing Office, Washington 25, D. C.  
1961. xiii + 726 pp. 15 × 23 cm. Price, \$2.50.

This book is one of a series of books sponsored by the Naval Reactors group of the Atomic Energy Commission as "a comprehensive compilation of the more significant aspects of reactor technology developed in the Naval Reactor Program and the Shippingport Pressurized Water Reactor Project." As might be expected, then, this book is not a comprehensive discussion of all areas of knowledge concerning uranium dioxide, but rather deals with those properties of uranium dioxide which affect its use as a reactor fuel.

The contents of the book are perhaps best indicated by a listing of the nine chapter titles: Uranium Dioxide and its Application to Nuclear Power Reactors; Preparation of Uranium Dioxide; Characterization of Uranium Dioxide; Fabrication of Uranium Oxide; Physical Properties of Uranium Dioxide; Phase Relationships in the Uranium-Oxygen and Binary Oxide Systems; Solid State Reactions of Uranium Dioxide; Oxidation and Corrosion of Uranium Dioxide; and Irradiation Effects in Uranium Dioxide.

Because of the orientation of this book toward reactor applications, certain topics receive rather cursory treatment, while other topics of no greater interest to chemists are treated in painstaking detail. For example, Chapter Two—"Preparation of Uranium Dioxide"—fills fifty pages with descriptions of various mechanical details involved in large scale production of uranium dioxide, while the topic "Chemical Characteristics of Uranium Dioxide" is given seven pages at the end of Chapter Three. Chapter Nine—

"Irradiation Effects in Uranium Dioxide"—is a lengthy (220 pages) and comprehensive review of this subject.

The bibliographies following each chapter are extensive and include a great deal of the recent literature. The book includes a large number of diagrams, photographs, and electron micrographs, and the printing is of good quality. Because of the paper binding, the volume may have a rather short "half-life"; however, the resultant low price of \$2.50 should make this book available to anyone even remotely interested in the field.

In general, this book will be of interest chiefly to nuclear engineers, but may well be a worthwhile investment for chemists interested in uranium.

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**Chemistry in Non-Aqueous Solvents.** By HARRY H. SISLER, Head Professor of Chemistry, University of Florida. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1961. vii + 119 pp. 12.5 × 18.5 cm. Price, \$1.95.

This book is one of a new series called "Selected Topics in Modern Chemistry." An attractively designed paper-back, the book is a well-written treatment of its subject. It "is intended to present to the undergraduate chemistry student some of the basic concepts which relate the chemical and physical characteristics of a solvent to the chemical processes which may be carried out in that solvent, and which determine the usefulness of a given liquid as a solvent."

After an excellent introductory chapter, "The Role of the Solvent in Chemical Reactions," four solvents are considered in some detail: liquid ammonia, 100% sulfuric acid, liquid dinitrogen tetroxide, and liquid sulfur dioxide. The final chapter briefly discusses many other non-aqueous solvents. Each chapter concludes with a concise summary and a brief list of Selected Readings.

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**The Radiation Chemistry of Water and Aqueous Solutions.**  
By AUGUSTINE O. ALLEN, Ph.D., Senior Chemist, Brookhaven National Laboratory. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1961. xi + 204 pp. 16 × 23.5 cm. Price, \$6.00.

Energy absorption from incident ionizing radiation by the various components of a mixture is determined largely by the electron fraction which each contributes. Consequently, the understanding of the radiation chemistry of a dilute solution requires a knowledge of the number, nature and spatial distribution of the entities produced by the action of the radiation on the solvent. This fact and the large aqueous component in living cells and many inanimate systems, which are, or could be, irradiated, endow the subject of this book with special importance. Surprisingly, in view of the fact that many of the reactions in this book have been known for many decades, a reasonably full understanding of their nature has only very recently been achieved. This monograph by one who has played a major role in this development over almost two decades is therefore especially welcome, and its perusal is both rewarding and pleasurable.

The arrangement is much as would be expected, being dictated by the logic of the subject. The author first describes briefly the mechanism of energy deposition. Then after a hint as to methods of experimentation launches into the free radical theory and the diffusion model which now provide the intellectual framework for much of the research in this field. Wisely, Dr. Allen marshals the evidence in support of this model and discusses the dependence of molecular and radical yields on experimental variables such as pH, LET, temperature, dose-rate, etc., before describing features of interest in individual systems. This has the advantage that after studying the first six chapters the reader is then adequately prepared to appreciate the discussion of any one of the particular systems, the description of which occupies roughly the second half of the book.