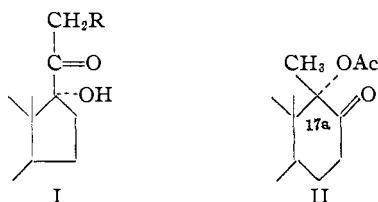


derivatives (I), of which the naturally occurring adrenal cortical steroids are the most common examples, has not hitherto been accomplished.

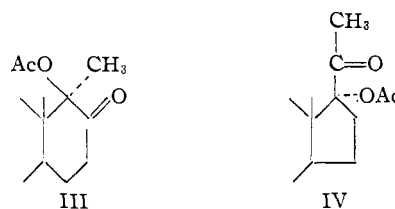


Thus allopregnane-3 β ,17 α -diol-20-one (Reichstein's compound L) with acetic anhydride and pyridine furnishes only a 3-monoacetate, whereas treatment of the ketol with BF₃-HOAc-Ac₂O results in rearrangement² and the formation of 17 α -methyl-D-homoandrostane-3 β ,17 α -diol-17-one diacetate (II) in virtually quantitative yield.³ The reaction of compound L with acetic anhydride and acetic acid in the presence of *p*-toluenesulfonic acid, on the other hand, follows a different course. Under these conditions a diacetyl derivative, m.p. 197.5–198.5°, [α]_D -9.3° (dioxane), found: C, 71.72; H, 9.08, is obtained, which differs from both epi-

(2) Cf. C. W. Shoppee and D. A. Prins, *Helv. Chim. Acta*, **26**, 201 (1943).

(3) R. B. Turner, forthcoming publication.

meric D-homo derivatives II and III,² and from which compound L can be regenerated by *mild* alkaline hydrolysis. On the basis of this evidence and the infrared spectrum (maxima at 1715 and 1735 cm.⁻¹), the new product is formulated as allopregnane-3 β ,17 α -diol-20-one diacetate (IV) (L



diacetate). It has further been shown that treatment of allopregnane-3 β ,17 β -diol-20-one (iso L) with *p*-toluenesulfonic acid, acetic acid, and acetic anhydride affords the known iso L diacetate.¹

This reaction provides a method for protecting sensitive ketol side chains of adrenal steroids from attack by reagents that might otherwise promote degradation or rearrangement.

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BOOK REVIEWS

Punched Cards. Their Applications to Science and Industry. Edited by ROBERT S. CASEY, W. A. Sheaffer Pen Co., Fort Madison, Iowa, and JAMES W. PERRY, Massachusetts Institute of Technology, Cambridge, Massachusetts. Reinhold Publishing Corporation, 330 West 42nd Street, New York 18, N. Y. 1951. viii + 506 pp. 16.5 × 23.5 cm. Price, \$10.00.

The primary purpose of this book is to furnish sufficient information to permit the application of punched card techniques to individual problems although the editors admit that the present state of knowledge of this subject does not allow full definitive treatment. Another purpose is to record present knowledge and experience so that better use of the presently available punched card devices and design of devices better suited to practical needs will be stimulated. Hand-sorted edge-punched cards are discussed in greater detail than machine-sorted cards; in fact, the book is intended to serve as an operating instruction manual for edge-punched cards. The discussions concerned with the use of machine-sorted cards indicate that the capabilities of available machines are not being fully exploited, *e.g.*, the automatic reproduction of replicates of original punched cards. Also, the advantages of pre-filing of machine-sorted punched cards for hand selection are not adequately discussed.

The book is divided into five parts. Part 1 is concerned with punched card fundamentals such as elementary manipulations of hand-sorted cards, the application of a simple coding procedure to the assembly of information on the chemistry of coal formation and to brief descriptions of commercially available hand-sorted and mechanical punched card systems, equipment and supplies. It was noted that a description of the IBM Interpreter and Cardtype (card operated typewriter) were omitted.

Part 2 is devoted to a description of case histories of punched card applications. These include interesting accounts of the use of punched cards (a) in analyzing the subject matter of publications and correspondence pertaining to nickel compounds and nickel catalysts; (b) applied to the results of corrosion tests; (c) based on word coding as well as on the Dyson and National Research Council codes; (d) for indexing reports; (e) for identification of unknown substances through the optical properties of crystals and other physicochemical data; (f) for indexing organic compounds by means of a code based on the Beilstein system; (g) for patent searching as conducted by the Plastics Division of Imperial Chemical Industries; (h) for preparing reports, papers and books (the described technique was used in the preparation of a review on organosilicon compounds published in "Chemical Reviews"); (i) for abstracting and providing information service on plant breeding and genetics; (j) for anesthesia records; (k) for routine library operations; (l) for general use in industry; (m) for production control in a textile finishing plant and in screw manufacture; and (n) for keeping inventory records.

Part 3 is concerned with some of the fundamental problems involved in the use of punched card techniques. A mathematical analysis of coding systems is presented and a description is given of the use of punched cards in the correlation of research data and of a number of the leading chemical codes. The balance of this section of the book is devoted to a discussion of indexing and index searching, literature and patent searching, classification, transcription problems and use of punched cards in scientific computations. There is some doubt in the mind of the reviewer as to the justification of including certain of the chapters in Part 3 in a book entitled "Punched Cards."

Part 4, written by E. H. E. Pietsch of the Gmelin Institute, deals with future possibilities of applying mechanized methods to scientific and technical literature and includes an interesting discussion of the mechanized Gmelin Information Center.

Part 5 contains a more complete bibliography (276 references) on uses of punched cards than was presented in earlier mimeographed editions.

The volume contains both a subject and author index. A novel feature is the presentation of the background of each of the contributors to the book under the heading "About the Authors."

Many sections of this book will prove useful and interesting to anyone concerned with, or contemplating the use of, punched cards in connection with scientific problems.

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A Study of Antimetabolites. By D. W. WOOLLEY, Member The Rockefeller Institute for Medical Research. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1951. xiii + 269 pp. 15 × 23.5 cm. Price, \$5.00.

Studies of biological antagonism have been pursued so vigorously, particularly during the past decade, that this field has been ripe for book-length review. This has been recognized by the appearance recently of two books, *Biological Antagonisms*, by Gustave J. Martin, Blakiston Company, 1951, and the book which is the subject of this review.

The book, *A Study of Antimetabolites*, is written by D. W. Woolley, one of the authorities in the field by virtue of his outstanding contributions. The book serves as an effective mirror of the author's contributions in research and his interpretation of the accumulated phenomena, yet at the same time it presents an accurate reflection of the field, for the author is careful to present in the foreground, as well as in the background, viewpoints other than his own. Thus it is that the book appears to accomplish the stated objectives which are "To summarize the facts in the field and to call attention to the underlying principles which appear close to the experimental findings." Possibly the best way to suggest the manner in which this is done is to list the chapters in the book. They are:

1. Competition between metabolically important compounds and substances related to them in chemical structure.
2. Some general aspects of the phenomenon.
3. Hypotheses about mechanism of action of antimetabolites.
4. The spectrum of activity of antimetabolites.
5. The natural occurrence of antimetabolites as participants in physiological processes and as etiological agents in disease.
6. Selectivity of action of antimetabolites.
7. Applications to chemotherapy.
8. Other applications to pharmacology.
9. Applications to biochemistry.
10. The designing of antimetabolites.
11. Practical suggestions for the synthesis and testing of antimetabolites.

The chapters are further divided into sections with subtitles listed in the Table of Contents and which also may be found by appropriate reference to the subject index. The usefulness of the subject index could be increased by expansion to include the compounds discussed in the text. As an example, several compounds cited as an example of antagonism could not be found in the index. There is a combined bibliography of 500 references listed in order of their citation. Also included is a useful index of structural formulas. The book is well constructed and printed on good paper. Only a few typographical errors were noted.

As a book covering biological phenomena pertinent to many fields of biology it should find a wide audience. It cannot fail to be useful to anyone interested specifically in antimetabolites whether as a reference for the experienced investigator or as a comprehensive survey to introduce a new

student to the subject. The book, in attempting to present the many facets of the study of antimetabolites, may seem repetitious to the person well versed in the field: on the other hand this repetition should prove helpful to those less familiar with the subject. The book is so well rounded and covers the subject matter in such a way that it could well serve as a text for seminars, lectures or laboratory courses in undergraduate or graduate instruction. Examples of its usefulness as a text for instruction are a three and one-half page table summarizing antagonistic analogs of metabolites, numerous structural formulas to show relationships upon which antagonisms are based, methods of synthesis of antimetabolites and typical experiments for their tests which have been proven of value in the author's hands.

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Physical Properties and Analysis of Heavy Water. National Nuclear Energy Series. Manhattan Project Technical Section. Division III—Volume 4A. By ISIDOR KIRSHEBAUM, Ezzo Laboratories, Standard Oil Development Company. Edited by HAROLD C. UREY, Institute for Nuclear Studies, University of Chicago and GEORGE M. MURPHY, Washington Square College, New York University. McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York 18, N. Y. 1951. xv + 438 pp. 16.5 × 23.5 cm. Price, \$5.25.

This recent addition to the National Nuclear Energy Series combines a critical evaluation of the data on the physical properties of heavy water published prior to 1945 and a record of some contributions to this literature and to the experimental techniques for isotopic analysis developed on the Manhattan Project. Of the numerous possible heavy water molecules, only isotopic molecules containing deuterium, protium and oxygen of mass sixteen are treated extensively.

The physical properties of deuterium oxide are tabulated and critically discussed in the first chapter. Equilibrium constants for the exchange reactions important to processes and analytical procedures to be considered in subsequent chapters are developed in the second chapter. Experimental details and original data on hydrogen-deuterium exchange reactions involving ammonia are published for the first time.

Nearly two hundred pages are then devoted to a comprehensive consideration of the mass spectrographic analysis of hydrogen-deuterium mixtures over the entire composition range from very low through high deuterium content including the important intermediate region. Application of mass spectrometry is extended to oxygen and other light element isotopes. This chapter contains a wealth of design and constructional detail, operational procedures, recommended experimental technique in preparing a water sample for analysis, and information on the sources of error and the reliability of the resultant data. Here, as throughout the book, excellent graphs, diagrams and photographs facilitate the presentation.

Other methods of isotopic analysis of heavy water based upon such physical properties as density and index of refraction are also examined in considerable detail over an additional hundred pages. The relative abundances of hydrogen and oxygen isotopes in terrestrial water sources are presented in the last chapter.

The author is to be credited with a very useful compilation of data from the chemical literature, supplemented in turn by his own experimental procedures and by considerable heretofore unpublished research of the Manhattan Project done mostly at the SAM Laboratories of Columbia University. The thorough treatment, generously illustrated and skillfully edited, will be appreciated by workers concerned with the application of isotopic analysis to specific problems.

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