but no cobalt(II) complex and no C-methyl in the Kuhn–Roth determination. The substance did not consume periodate; it yielded succinic acid upon permanganate oxidation. These observations, coupled with the absence of N-alkyl functions in streptolin itself, allow three structural possibilities: (i) β,ϵ-diaminocaproic acid, (ii) γ,ϵ-diaminocaproic acid, and (iii) α-aminomethyl-δ-aminovaleric acid.[6] Through synthesis we have confirmed the first possibility. L-Di-(N-phthaloyl)-ornithine, m.p. 187–188.5°, $[\alpha]^{25}\text{D}$ $-31.5 \pm 0.5°$ (alc.) (found: C, 63.95; H, 4.09) was homologated *via* the Arndt–Eistert sequence[7] to methyl β,ϵ-diphthalimido caproate (II), m.p. 156–157°, $[\alpha]^{25}\text{D}$ $-13.5 \pm 0.5°$ (chf.) (found: C, 65.33; H, 4.64). The melting point of II was not changed on admixture with the corresponding derivative (m.p. 155.5–156.5°) from iso-lysine; the infrared spectra of the two substances were identical. Hydrazinolysis[8] and subsequent acid hydrolysis of II afforded β,ϵ-diaminocaproic acid, which was purified and characterized as the di-(p-hydroxyazobenzene-p'-sulfonate) (III), dec. 242.2–243°, $[\alpha]^{25}\text{D}$ $+6 \pm 1°$ (alc.) (found: C, 51.31; H, 5.09). The infrared spectra of I and III were indistinguishable, as were the paperstrip chromatograms (R_f = 0.65; developed with phenol–water–formic acid).

Details of the present work as well as syntheses of (ii) and (iii) and the demonstration of their non-identity with iso-lysine will be published shortly.

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[6] H. E. Carter and associates have independently arrived at similar conclusions (presented at the 120th meeting, American Chemical Society, New York, N. Y., September, 1951).

[7] K. Balenović and D. Fleš, *J. Org. Chem.*, **17**, 347 (1952).

[8] J. C. Sheehan and V. S. Frank, THIS JOURNAL, **71**, 1856 (1949).

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BOOK REVIEWS

The Theory of Isotope Separation as Applied to the Large-scale Production of U^{235}. By KARL COHEN, Director, Atomic Energy Division, The H. K. Ferguson Company; formerly Director, Theoretical Division, SAM Laboratories. Edited by George M. Murphy, Washington Square College, New York University; formerly at SAM Laboratories, Columbia University. McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York 18, N. Y. 1951. xviii + 165 pp. 16 × 23.5 cm. Price, $2.00.

This book gives a presentation of the theory of isotope separation by methods in which elementary processes are multiplied to reach large end results. The first five chapters develop the theory of cascades. Applications to centrifuges, two-phase separation, thermal diffusion, and the concentration of deuterium are included in the latter two chapters. The theory has been presented in clear and logical fashion and the numerous tables and very clearly drawn graphs present numerical data in usable form. A wide variety of problems in the design of efficient cascades has been treated. These include necessary deviations from ideality. A variety of types of operation is discussed.

It is probable that the book has suffered because of security restrictions in that examples of the use to which theoretical results can be put are virtually absent. The author has not attempted to compensate for this by elaborating the physical significance of the mathematical relations. It is not until one reaches Chapter 6 on centrifuges that any of the discussions relate to the characteristics of equipment itself. It may be of interest to note that the terms "barrier," "barrier diffusion," and "mass spectrograph" do not appear in the index.

In many respects the derivation of the theory of cascade processes is analogous to the study of thermodynamics since the theory does not depend on the nature of the element. It is based on a fundamental axiom—the conservation of matter—and the consequences are derived through mathematical treatment without reference to physical phenomena. The significance of the results is unfortunately not elaborated.

This book is useful for the engineer who needs specific numerical solutions as well as for the theorist who is interested in the mathematical formulations which have been developed. For the reader having the empirical approach, the book will bear fruit in proportion to the background on cascade processes which he brings to it.

W. R. KANNE

Starch Chemistry. By JIRO NIKUNI (Editor), Osaka University. Asakura Publishing Co., 1-10 Nishiki-Cho, Kanda, Chiyoda Ku, Tokyo, Japan. 1951. 540 pp. Price, regular 1000 Yen ($2.80); special 880 Yen.

The book is edited by Professor Jiro Nikuni of Osaka University and is divided into seven chapters which are contributed by ten men including the editor. The following are the titles of the various chapters: I. General Discussion on Starch Chemistry; II. Metabolism of D-Glucose in the Organism; III. X-Ray Diffraction of Starch; IV. Enzymatic Studies of Starch; V. Fundamental Experimental Methods; VI. Experimental Enzymatic Methods; and VII. Industrial Preparation.

As it stated in the preface, a part of the aim of this publication is to bring up to date the recent advances in starch chemistry which the Japanese missed during the war years. For this reason the material for the most part is probably familiar to Western students. The book is intended primarily for students and research men in Japan. However, the volume undoubtedly will be an excellent source of information and reference to all students in the field of starch chemistry.

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