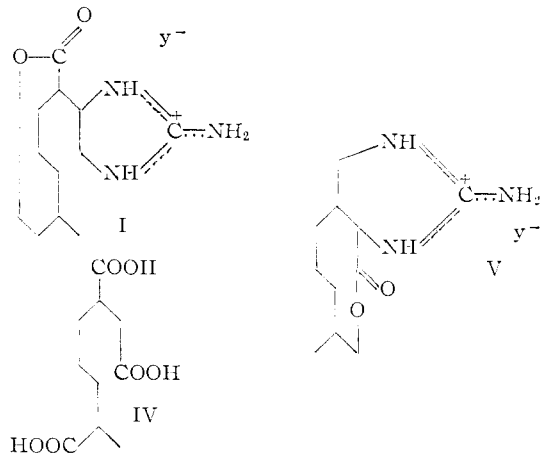
Besides II, a mixture of amino-acidic material was formed in the alkaline hydrolysis. Acetylation with acetic anhydride and sodium hydroxide, and then partition chromatography on silica gel, allowed the isolation of a diacetyldiaminohydroxy acid III, $C_{14}H_{26}N_2O_5$: m.p. 163–164°. (Found: C, 55.74; H, 8.62; N, 9.24; O, 26.39. Calculated: C, 55.62; H, 8.67; N, 9.27; O, 26.46; infrared 1700, 1665, 1640, 1565 cm.$^{-1}$).



I

IV

V

A mild oxidation of chaksine with permanganate in water gave a good yield of acidic material which was decarboxylated by heating under nitrogen to 170° for 20 minutes and oxidized with chromium trioxide in glacial acetic acid. Partition chromatography on silica gel of the acids thus obtained, permitted the isolation of α-methylpimelic acid, identified by infrared spectroscopy of the acid and the corresponding dimethyl ester with authentic specimens.

Exhaustive extraction of the acidified aqueous solution from the permanganate oxidation gave a large amount of oxalic acid. Previously, chaksine has been reported to give α-methylpimelic acid on alkali fusion.[3]

This compound can clearly be formed from I by a reverse Mannich reaction and oxidation of the primary alcohol.

Pyrolysis of chaksine iodide with copper filings has been reported[4] to produce *p*-isopropylbenzoic acid.

The tricarboxylic acid $C_{10}H_{16}O_6$, m.p. 147°, reported[3] as the second product of the alkali fusion must have structure IV and the report that it is lacking a C-methyl group clearly must be erroneous.

The structure V for chaksine iodide, which is compatible with most of the data seems to be excluded by the infrared spectrum of II characteristic of a five-membered cyclic urea. (Carbonyl maximum of 2-imidazolidone in CCl_4 was found at 1718 cm.$^{-1}$.)

Structure V also presents greater difficulties than I in rationalizing the formation of *p*-isopropylbenzoic acid from chaksine.

Thus chaksine seems to be the first recorded example of a monoterpenoid alkaloid.

(3) Gurbakhsh Singh, G. V. Nair, K. P. Aggarwal and S. S. Saksena, *Chem. and Ind.*, 739 (1956).

(4) S. Siddiqui, G. Hahn, V. N. Sharma and A. Kamal, *ibid.*, 1525 (1956).

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BOOK REVIEW

Behaviour of Metals at Elevated Temperatures. Lectures Delivered at the Institution of Metallurgists Refresher Course, 1956. Philosophical Library, Inc., 15 East 40th Street, New York 16, N. Y. 1957. vii + 122 pp. 14.5 × 22.5 cm. Price, $6.00.

This book is actually a series of lectures given at the Institution of Metallurgists Refresher Course, which was held in Llandudno in October, 1956. The book is divided into four sections; the first section is a general survey and the remaining three deal in the specific areas of the behavior of metals at elevated temperatures.

The first paper by Dr. N. P. Allen, F.R.S., Superintendent, Metallurgy Division, National Physical Laboratory, is entitled "The Engineering Properties of Metals at High Temperatures." Dr. Allen discusses in general and gives specific examples of the behavior of metals at high temperatures. The topics are physical properties and dimensions, elastic constants and coefficients of expansion, resistance to plastic deformation and fracture under constant stress, behavior under fluctuating stresses and temperature, and resistance to chemical attack. He also discusses some of the important principles to be followed in developing high temperature alloys.

The second paper, by G. E. Meikle of the Metallurgy Department, Ministry of Supply, is entitled "The Effect on Metals of Temperatures up to 450°C." This paper is concerned with specific classes of alloys and assesses their range of applicability for use in airframe structures. The final section deals with the basis for selection of materials for particular purposes in airframe structures.

The third paper, by L. B. Pfeil, Director, Mond Metal Company, is entitled "Non-Ferrous High Temperature Materials" and deals with the properties of non-ferrous alloy systems useful at temperatures 500° upwards. He discusses, giving examples, resistance to corrosive attack, strength and ease of manipulation. He concludes by briefly giving the progress so far made and future prospects for high temperature materials.

The final paper, by W. E. Bardgett, Research Manager of the United Steel Companies, Limited, is entitled "High Temperature Steels." He first discusses the high temperature strength of several types of steels, ranging from carbon to stainless steels. The final section deals with high temperature ductility.

This book will be useful to engineers who are dealing with the high temperature materials problem, since it brings together a great deal of useful information under one cover. Unfortunately, there is necessarily much of the empirical approach to the problems in this field; however, the authors have done a good job of presenting the fundamentals, generalizations, and a large amount of empirical data.

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