Table I

Barbituric Acid Derivatives

N-Benzyl deriv. of	M. p., °C.	Nitrogen, % Calcd.	Nitrogen, % Found
Diethylbarbituric acid	127	10.22	10.19, 10.24
Ethyl *iso*-amylbarbituric acid	90	8.88	8.96, 8.97
Ethylphenylbarbituric acid	113	8.69	8.48, 8.66
Diallylbarbituric acid	116	9.39	9.29, ...
Allyl *sec.*-butylbarbituric acid	90–91	8.92	9.13, 9.14
N-Allyl deriv. of			
Diethylbarbituric acid	75	12.50	12.66, 12.61
Diallylbarbituric acid	68–69	11.29	11.40, 11.38
Dipropylbarbituric acid	73	11.11	10.90, 10.71

reactants are used, some tetra-alkyl derivative is simultaneously formed and a corresponding amount of the original substance remains unreacted. The former is readily removed by means of its insolubility in dilute alkali, but for the separation of tri- and dialkylbarbituric acids several crystallizations are necessary. In only one case was the tetra-alkyl derivative isolated and identified, *viz.*, diallyldipropylbarbituric acid, which melted at 62–63°; N found, 9.50, calcd., 9.59.

Summary

The sodium salts of 5,5-dialkylbarbituric acids react with such halides as benzyl chloride and allyl bromide to give further substitution on the nitrogen. A trialkyl- or even a tetra-alkylbarbituric acid can thus be obtained. This further substitution results in a marked lowering of the melting point.

Detroit, Michigan

NEW BOOKS

The Physics of Crystals. By Abram F. Joffe, Ph.D., D.Sc., D.Eng., LL.D., Director, Roentgen Institute; Director, Physical Technical Institute, Leningrad, Russia. Edited by Leonard B. Loeb, Associate Professor of Physics in the University of California. McGraw-Hill Book Company, Inc., 370 Seventh Avenue, New York City, 1928. xi + 198 pp. 61 figs. 15 × 23.5 cm. Price $3.00.

When the reviewer first read the publisher's announcement of this book he was at once prejudiced against it. The story in that announcement of the way in which the author's results had first been treated looked too much like the efforts of a newspaper sob-reporter. After having studied the book (it deserves study, not merely reading), the reviewer's prejudice has been entirely overcome and he has even pasted the publisher's announcement on the flyleaf as a permanent record of some of the difficulties which the author overcame.

The first two chapters give a highly compressed account of the electrical theory of crystal lattices. After these two introductory chapters the author takes up in fifteen chapters the investigations of himself and his staff on the mechanical and electrical properties of crystals. These experiments show such unusual ingenuity and skill that many of them make as fascinating reading as a detective story. He shows that elastic aftereffect, and elastic fatigue are properties of polycrystal materials, but are absent in single crystals; he explains clearly what goes on when a crystal is permanently deformed (as in plastic flow of solids); he accounts satisfactorily for the discrepancy between the values of tensile strength as calculated from crystal theory and the values ordinarily found by experiment. He proves that even the crystals of insulating substances like quartz obey Ohm's Law if only polarization is taken into account. It appears that ordinary "pure" individual crystals of insulators have specific conductivities which differ considerably from specimen to specimen, and extreme precautions must be taken in purification to get successive crystals to give identical results. The conductivity increases about 10% per degree centigrade. Strangely enough no increase in conductivity is produced by the presence of water of crystallization. Faraday's laws of electrolysis were checked in solid crystals with an accuracy of 0.1%. The reviewer would interpret Joffe's results on electrolysis by saying that if an ionic crystal is composed of ions of considerably different packing radius, the only one to migrate appreciably in electrolysis at ordinary temperatures is the one with the smaller packing radius. The degree of dissociation in quartz is found (7×10^{14} at 17°) and the order of magnitude of mobility of the ions has been calculated (10^{-6} cm. per sec.). It is hard to think of ionization by collision in solids, but Professor Joffe not only makes it look plausible, but he goes further and discusses the distribution of space charges in crystals. In fact the gap between the electrical properties of gases and solids seems to be pretty well bridged. Dielectric losses are largely explained by Joule's law of heating. The book closes with some interesting speculations on the maximum possible electric field in a dielectric and a statement of the effects to be expected.

The book is worth more than a single edition. That the English of the first edition is as smooth as it is, is evidently due to the efforts of the editor. The reviewer offers the following suggestions, not in the spirit of criticism, but in the hope that they will not only smooth the path of readers of the present edition, but also help in the preparation of a second edition.

1. The bottom of p. 38 should be interpreted in terms of the middle of p. 45.
2. On the fifth line of p. 70, "of" should read "between."
3. On the fifth line of p. 78, "of" should read "with."
4. The thirteenth and fourteenth lines of p. 106 would be more easily understood if the phrase "or cells deprived of positive ions" were in parentheses.

5. The use of "especially true" in the eleventh line of p. 105 is unfortunate.

6. In most places in the book "crystal" means "crystal of rock salt." Unless the reader discovers this, he may interpret some statements as generalizations which appear to apply strictly to sodium chloride, and which apply to other crystals only by inference.

7. The figures would be more readily understood if they had titles. The lack of titles is especially disturbing in Fig. 17 (p. 41) where the reader is left in doubt as to Curve IV until pp. 56 and 58, and where no explanation is given of squares, circles and crosses. Fig. 26 (p. 61) is a plot of log π against log S. The reader must infer from the text what these symbols mean, for they are nowhere explicitly defined. In Fig. 34 (p. 103), no explanation is given of the dots and circles. Apparently they merely serve to distinguish between curves. If so, it would have been easier for the reader if one curve had been full-line and the other dotted.

8. On p. 33 reference is made to an expansion which was said to have been made in a previous chapter in a series in Δr. The ordinary reader would appreciate a more adequate preparation for this statement.

9. Some of the equations are not accompanied by an adequate explanation of symbols. On p. 54, E and α are not defined. Equations 33 and 34 (p. 110) evidently follow the custom of using t for °C. and T for °K., but the fact is not so stated.

10. At the bottom of p. 33, $f_0' \Delta r$ should read $f' \Delta r$.

11. In Equation 32 (p. 109), σ^{100} should read σ_0^{100}.

WHEELER P. DAVEY

Organische Chemie. (Organic Chemistry.) By Prof. CARL OPPENHEIMER, Dr. Phil. et Med. (Berlin). Second, revised edition. Georg Thieme, Leipzig, Germany, 1928. xiv + 471 pp. 7 figs. 17 × 24.5 cm.

The chief novelty of this work is that the author has sought not only to present a clear and interesting account of the principles of organic chemistry, but to indicate the applications and extensions of this subject to the neighboring field of biology and to technology. The book is addressed to two groups: to those who are already fairly well grounded in the principles of organic chemistry as a pure science but who seek a first, orienting survey of the intensely interesting applications of the science to the study of life processes, and, secondly, to those specialists in fields other than that of organic chemistry who desire a comprehensive account of the present status of this subject. It is thus designed for the use of advanced readers.

The first six chapters, covering 93 pages, are devoted to a thorough and critical exposition of the general characteristics of the compounds of carbon, and of the modern theoretical conceptions regarding their reactions and properties. This is followed by a special part in which representatives of the different types of compounds are described. In this part of the book the author gives particular attention to the physiology and pharmacology of the substances and to their technical preparation and uses wherever the opportunity arises. The average organic chemist will find in these sections, and in the interesting descriptions of some of the more important biochemical processes, a wealth of information and a suggestive presentation of theory. The carbohydrates, the proteins and the alkaloids are treated more comprehensively than in most textbooks of organic chemistry, and one finds, in addition to the usual chapters, sections dealing with the relationship between structure and pharmacological action, chemotherapy, depsides, tannins, polyterpenes, sterols and bile acids, blood and leaf dyestuffs, ferments, antigens.

This second edition will be valued particularly for the inclusion of a large amount of work completed within the last few years. It may be noted, by way of example, that some account is given of the recent contributions to stereochemical theory of Weissenberg, Wohl and Freudenberg, Fajans, Kuhn, Ruzicka, Hückel and of Levene, of the views of the different German investigators in the field of the polysaccharides, of the investigations of Windaus on ergosterol, of Hans Fischer's porphyrin syntheses, of Scheibler's studies of bivalent carbon compounds, of Warburg's work on the respiration ferment. Furthermore, the author makes repeated use of the important Werner-Pfeiffer conception of the nature of complex compounds, and of the extensions to this general theory which we owe to Hantzsch and to Dilthey. The possibility of applying these new ideas to a wide variety of phenomena has been suggested throughout the book. Wieland's theory of the nature of oxidation processes likewise receives considerable attention. Dr. Oppenheimer, in addition to his wide experience in biochemistry, is thus in close touch with modern organic chemical theory, and he has written with enthusiasm a book which is highly useful and stimulating.

While the reviewer considers that the merits of this unusual text far outweigh the faults, he would like to call attention to certain shortcomings from the point of view of the organic chemist. It should be realized that the book is not well suited to the needs of the student who seeks to predict the properties of an unknown compound, or to devise a suitable method for its preparation. Thus one fails to find a statement regarding the directive influence of substituents in the benzene ring, and little is said regarding the effect of one group on the reactivity of other groups. β-Hydroxypropionic acid is dismissed with the remark that "(sie) kommt biologisch nicht vor und bietet kein weiteres Interesse." More serious than such omissions is the tendency of the author to adopt a too positive attitude with regard to debatable questions. It is stated, for example, that the C-alkylation of β-ketonic esters is dependent upon a tautomeric process, and no mention is made of the addition theory. Anthraquinone and phenanthrenequinone are regarded as entirely lacking in the properties of true quinones. The mechanism given for substitution in the benzene nucleus was probably intended to conform to the current theories, but the exposition is ambiguous and incorrect. The views of a large number of chemists have been disregarded in the failure even to mention the Erlenmeyer formula for naphthalene or the bridge-bond structure for anthracene.

Finally, it may be observed that the effort to condense the book by the liberal use of small type and abbreviations, and by omitting many important formulas and all references to the literature, appears somewhat unfortunate. The same object might have been achieved more happily had the author avoided the constant repetition of certain passages.

L. F. FIESER

Hormone und Innere Sekretion. (Hormones and Internal Secretions.) BY FRITZ LAQUER, Lecturer at the University of Frankfort. Theodor Steinkopff, Dresden-Blasewitz, Germany, 1928. viii + 136 pages. 15.5 × 22 cm. Price, unbound, RM. 8.50; bound, RM. 10.

In the present plethora of monographs on the endocrine organs and hormones in health and disease, it is refreshing to read this little volume of Dr. Fritz Laquer because Dr. Laquer has succeeded in condensing the essential facts, biochemical, physiological and clinical, in a few pages with remarkable clearness, accuracy and critical judgment. No essential facts appear to be left out on any topic and wherever the author expresses his own judgment on controversial points this judgment appears unusually sound. In many cases, however, the individual authors' findings and conclusions are merely presented parallel with findings of opposite results. In separate chapters Dr. Laquer discusses the pancreas and insulin, the thyroid and thyroxin, the parathyroids, the hypophysis, the adrenals, the ovaries and testes and the thymus. In a final chapter the author briefly summarizes the claims and theories for endocrine functions and hormone character of other substances and organs such as pineal gland, choline, etc.

This little monograph by Dr. Fritz Laquer appears to be one of the briefest and at the same time most comprehensive, readable and reliable guides in the endocrine field in any language. 1218 separate literature references are given in connection with each subject under discussion.

A. J. CARLSON