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 BOOK REVIEWS
 

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**The Reactive Intermediates of Organic Chemistry.** By JOHN E. LEFFLER, Florida State University, Tallahassee, Florida. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1956. ix + 275 pp. 16 × 23 cm. Price, \$6.00.

In the introduction to his book Dr. Leffler states: "The objectives of the present book are to provide some of the background of information about stable radicals and ions needed by those interested in organic reaction mechanisms, to point out some of the pitfalls awaiting the unwary, and to show some of the criteria for preferring one type of intermediate over another." I believe that the author is to be congratulated in his attainment of these objectives.

The book has many fine points. It is well organized, so that even without recourse to the author or subject index a topic often may be located readily. References to the original literature are pertinent and timely. Typography is good, with clear formulas and few errors. As with a few other modern books, the properties and reactions of radicals are given a treatment to match their importance.

More importantly, the author is in full command of his material. In almost every case the analysis or explanation seems clear, succinct and reasonable.

With so much of the material of this book recent and potentially controversial, however, each reader may find a few points on which the book does not completely satisfy him. For the reviewer these included:  $\pi$ -complexes as intermediates in the hydration of olefins, the decomposition of decalyl perbenzoate, attachment of adjacent atoms in ozone to olefins, relative acidities of nitroalkanes and the direction of methylation of unsymmetrical ketones. If deficiencies indeed exist here, it is not surprising as there are few areas in which the last word has been said.

This book should be especially useful to graduate students of organic chemistry, to advanced undergraduates and to professional chemists who want a brief, up-to-date, thoroughly competent report on how organic reactions proceed and why. The reviewer plans to use this book for a second-term graduate lecture course in organic chemistry this spring.

I hope that Dr. Leffler's book will find its place on the chemist's shelf next to the excellent complementary texts by Hine and by Ingold.

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**The Mathematics of Diffusion.** By J. CRANK, Courtauld's Limited, Research Laboratory, Maidenhead. Oxford University Press, 114 Fifth Avenue, New York 11, N. Y. 1956. vi + 347 pp. 17 × 24.5 cm. Price, \$8.00.

The author is not concerned with the mechanism of diffusion but rather with solutions of the differential equations which pertain to diffusion. The starting point is the expression presented by Fick, 100 years ago. The writing concludes with research published in 1954. The first half of the book shows clearly that many diffusion problems can be solved analytically by means of separation of variables, error functions, Laplace transforms, hyperbolic functions, Bessel functions, Fourier series and gamma functions. The work of Carslaw and Jaeger on heat conduction is relied on heavily in this portion, and a number of their tables are reproduced in the Appendix.

Chapter VIII is an excellent treatment of diffusion and chemical reaction, including several modern treatments of important cases.

Crank's principal contribution occurs in the last 5 chapters. Variable diffusivity is treated in far greater detail than in the earlier books by Barrer and by Jost. Diffusivity is allowed to be a function of time, space or concentration. For most of the imagined conditions, closed analytical solutions are not possible. Therefore the author presents graphical and numerical schemes for getting approximate answers. These solutions are represented in well-drawn

graphs which are suitable for actual use of the results. Nearly a fourth of all references cited by Crank cover the period 1950-1954. These occur predominantly in this portion of the book.

Chapter XI on The Definition and Measurement of Diffusion Coefficients should clear up many ambiguities existing in the literature and in peoples' minds.

It is unfortunate that Crank did not include a treatment of diffusion between phases with resistance in the interface as this is a problem of considerable importance to chemists, engineers and biologists and recent articles are available. The greatest criticism of the book is the lack of a good complete table of nomenclature. This makes it difficult to look at specific solutions without extensive searching for definitions. It is strongly recommended that such a table be included in any reprinting.

This is a well written, useful book and will be indispensable for workers in the diffusion field. It could also be very valuable for engineering teachers of applied mathematics.

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**Changes of State. A Mathematical-Physical Assessment.**

By H. N. V. TEMPERLEY, M.A., Formerly Fellow of King's College, Cambridge University Lecturer in Physics and Smithsonian Research Fellow of the Royal Society; now Senior Principal Scientific Officer at Atomic Weapons Research Establishment, Aldermaston, Berks. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1956. xi + 324 pp. 16 × 25.5 cm. Price, \$7.50.

This book gives a discussion of a number of aspects of phase transitions. It is not a coherent, systematic or critical exposition of the theory of phase transitions. The book should be valuable as a guide to the physical and chemical literature on the subject; the metallurgical literature is not covered, although the field is not without current interest. The occasional inelegance of the discussion is exhibited by the derivation of energy fluctuations in a canonical ensemble. Four pages are taken with a derivation on unnecessarily restrictive assumptions, whereas the result is usually derived very generally in half a page.

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**An Introduction to Modern Organic Analysis.** By SIDNEY SIGGIA and HANS J. STOLTEN, Central Research Laboratory, General Aniline and Film Corporation, Easton, Pennsylvania. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, New York. 1956. vii + 250 pp. 16 × 23.5 cm. Price, \$4.50.

This book contains a discussion of the utilization of the methods of organic analysis and the logical deductions which lead to the solution of either the problem of the structure of an individual organic compound or the application of these methods for deducing the composition of mixtures. Emphasis is placed on the interpretation and coordination of the data obtained by the organic analyst with the synthetic procedures and previous history of the sample.

Chapters survey the important organic analytical tools: *viz.*, elementary analysis, functional group determination, titration methods, spectroscopic studies (ultraviolet and infrared), polarography, amperometric titrations, X-ray diffraction, molecular refraction and methods of separation. The book is not a specific treatment of these techniques with experimental details but a survey of the principles and information obtainable by the use of the methods and their interpretation. However, the authors do give many illustrative examples with a procedure sufficient for an experienced analyst to carry out. As an example, may be men-