

the preface of the author is dated September, 1961, all references except one (which is from the January, 1961, issue of *Analytical Chemistry*) refer to publications through 1960, and this cannot be accidental. My impression is that the manuscript was compiled late in 1960 or early in 1961, and it took more than one year until it was published. In this respect, I would like to refer again to my earlier remarks in the previous book review: If fast publication is necessary in a general textbook, it is even more important in a short handbook.

Despite certain limitations, the book of Dr. Knox contains much valuable information and gives a good compilation of difficult questions, the knowledge of which is necessary in the everyday work; therefore, the book belongs in the library of the practical gas chromatographer.

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**Biochemical Mechanisms.** By LLOYD L. INGRAHAM, Department of Biochemistry and Biophysics, University of California, Davis, California. John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, N. Y. 1962. x + 108 pp. 15.5 × 23.5 cm. Price, \$5.75.

This book represents a birds eye view of biochemical mechanisms, albeit from a considerable height. The first part of the book consists of a review of atomic orbitals, bonding, conjugated systems, ligand field theory, transition states, ionic reactions, displacement reactions, concerted reactions, metals as acid catalysts, charge transfer complexes and "high energy" bonds in the course of 30 pages, presumably to enable the reader to grasp the second part, which consists of a more detailed discussion of specific mechanisms of different types of reaction. The usefulness of the first part for the average biochemist is open to question, especially in the case of more recent developments. Thus, for example, the treatment of charge transfer complexes occupies less than one page.

The reaction mechanisms put forward are lucidly explained and alternate possibilities are pointed out, although for an introductory treatment of this type perhaps too many of the proposed schemes are of a speculative nature. It is interesting to consider how even within a single year after publication, some of the proposed mechanisms have been disproved and others confirmed. Thus the mechanisms for rearrangements catalyzed by vitamin B<sub>12</sub> discussed on pp. 100, 101, and 102 cannot be correct since it has now been shown that these reactions are not accompanied by deuterium uptake from a D<sub>2</sub>O medium (Barker, *Fed. Proc.* 20, 956 (1961), and Overath, *et al.*, *Biochem. Z.*, **335**, 500 (1962)). Similarly, on p. 63 the view is expressed that the decarboxylation of prephenic acid, if concerted, would require a *trans* configuration for the COOH and OH groups. Plieninger (*Z. Naturforsch.*, **16b**, 81(1961)) has now shown, however, that the stereochemical relationship between these two groups in prephenic acid is *cis*. On the other hand, Lindberg, *et al.* (*Biochemistry*, **1**, 182 (1962)) have confirmed the mechanism of the decarboxylation of mevalonic acid 5-pyrophosphate described in the same section.

It is also regrettable that there are a considerable number of what are presumably printing errors in the labeling of formulas and in the equations; *e.g.*, on p. 69 the equation contains 2 Fe on one side and 3 on the other, and on p. 71, the second reaction is obviously meant to lead to the formation of a ferryl ion and not FeO<sup>+</sup>.

Perhaps the most valuable part of this presentation are the references, quoted in connection with each reaction mechanism, which will lead the conscientious student to a more thorough contemplation of the subject.

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**L'oxydation des métaux. Tome I. Processus fondamentaux.** Sous la direction de JACQUES BÉNARD, Professeur à la Faculté des Sciences de Paris. Avec la collaboration de JEAN BARDOLE, FLORENT BOUILLON, MICHEL CAGNET, JEAN MOREAU et GABRIEL VALENSI. Gauthier-Villars et Cie., 55, Quai des Grands-Augustins, Paris 6, France. 1962. 465 pp. 16.5 × 24.5 cm. Price, NF. 55.

The rapid development of ideas and theories in the field of oxidation of metals has led to the publication, in 1962, of two important books dealing with this subject matter: the one under review and a second, thoroughly revised edition of Kubaschewski's and Hopkins' standard monography. The reviewer has read both with infinite pleasure and found them to be complementary. Both should be consulted frequently by any one interested in the mechanism of gas-solid reactions.

The book edited by Prof. Bénard, whose fundamental work on many aspects of oxidation is universally appreciated, is the result of the coöperation of many authors. But they have clearly worked as a team, comparing results and exchanging ideas, so that there is little duplication and the unavoidable heterogeneity of a collective enterprise has been reduced to a minimum.

This is not an encyclopedia, a work of compilation, and the book should complement rather than replace older ones.

The classical theories of Wagner, Mott and Cabrera, and others are adequately summarized but more stress is laid on recently discovered facts and on new ideas. Each author dealing with his own subject puts forward his own views resulting from first-hand knowledge acquired by carrying out extensive experimental research. The authors have steered a midway course, avoiding two common pitfalls: they have resisted the temptation of considering only too simplified models, and they have not restricted themselves to purely descriptive statements. One finds in every chapter a sound and constructive criticism of experimental methods, a number of reliable data, which are classified and interpreted and a fresh and original outlook on many well known facts.

Every single chapter has its merits, but the reviewer has been particularly struck by the following ones.

*Chapters II to V dealing with the adsorption of oxygen* (by J. Bénard): The influence of chemisorption of oxygen on the surface structure of metals, and the importance of adsorption as a first step in the formation of an oxide layer, is clearly shown. This aspect has never been treated so exhaustively.

*Chapter VI. Nucleation in oxide films* (by J. Bénard): Nucleation is interpreted as resulting from the local crystallization of a primary film. Nucleation is shown to be a very general phenomenon, representing an intermediate stage between the formation of thin continuous layers at low temperatures, and thick ones, kinetically controlled by diffusion, at high temperatures.

*Chapter VIII. Orientation of reaction products at the surface of a metal* (by J. Bardolle): This orientation results from a superposition of *lines* rather than *planes* of maximum atomic or ionic density.

*Chapter XI. Quantitative theory of the kinetics of metal oxidation* (by G. Valensi): Thermodynamics of irreversible processes are applied far more thoroughly and rigorously than is usual in this field, so that this chapter should be invaluable to many readers.

*Chapter XV. Various modes of oxidation of alloys* (by J. Bénard and J. Moreau) and *Chapter XVI. Internal oxidation of alloys* (by J. Moreau): The importance of dissolved oxygen is discussed, and certain conclusions might be extended to the oxidation of pure metals.

*Chapter XVII. The real structure of oxidation layers* (by M. Cagnet): The importance of the mechanical properties of the oxide layer and of their variation with temperature is pointed out.

Finally it must be stressed that process of oxidation is followed in a logical sequence: adsorption, nucleation, thin films, thick films, oxidation of alloys, so that the book should be read from cover to cover. It is well worthy of an English translation.

As is frequently the case with French books, the printing and binding might be better, but illustrations, including microphotographs, are reasonably good, and there are few misprints.

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**Physical Organic Chemistry. Second Edition.** By JACK HINE, Professor of Chemistry, Georgia Institute of Technology. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1962. x + 552 pp. 16 × 23.5 cm. Price, \$11.50.

The appearance of a new edition of this well-known and widely-used textbook is an event to be welcomed. I still believe it is the best available general introduction to organic reaction mechanisms. Its judicious tone and its excellent balance between rigor and clarity inform the student without prejudicing him, and without teaching him blatant oversimplifications that he must unlearn later. This is not to say that all experts will agree with everything in the book, but all will certainly agree that Dr. Hine tries his best to be fair in controversial matters. There are times when he is a bit too reticent about expressing an opinion. I wondered, for example, just what views he does hold on hyperconjugation and on mechanisms of borderline displacement reactions.

Among the new features of this edition are the problems at the end of each chapter. Though obviously intended to meet the competition, they are by no means perfunctory, and offer ample intellectual stimulus even to the experienced worker. Another improvement is more extended coverage of kinetics and catalysis. Especially to be commended is Chapter 4 on "Quantitative Correlations of Reaction Rates and Equilibria." There is an ex-