

BOOK REVIEWS

Contributions to the Theory of Chemical Kinetics. A Study of the Connection between Thermodynamics and Chemical Rate Processes. By THOR A. BAK. W. A. Benjamin, Inc., 2465 Broadway, New York 25, N. Y. 1963. 101 pp. 15 × 23 cm. Price, \$5.50.

It is a pleasure to note that Dr. Bak's most interesting book on chemical kinetics is now accessible to the broad audience it deserves. The problems discussed are of significance, and the treatments are elegant and lucid. The book is not a general introduction into the theoretical aspects of chemical kinetics; rather, a limited number of topics are treated rigorously and in detail. Students in advanced courses in thermodynamics, statistical mechanics, and kinetics will find this book excellent supplementary reading, and the specialist will find the book and its bibliography (through 1958) quite useful.

Bak first discusses the application of the principle of minimum entropy production in steady states; diffusion, nucleation, sets of consecutive first-order reactions, and LeChatelier's principle are treated. He then turns to the question of oscillating reactions, often thought to be of biological interest, and employs the methods of Krylov and Bogoliubov to investigate the qualitative behavior of solutions to nonlinear rate equations which may show oscillatory behavior. The theory of electrodiffusion in steady and alternating fields is then presented, and application is made to systems in which electrodiffusion is coupled to chemical reaction. The mathematical treatment of electrodiffusion is adapted to the analysis of chromatography, which is briefly discussed. The next portion of the book is concerned with the problem of the presence of irreversibility in a world whose equations of motion are reversible. Bak shows how such irreversibility appears for certain limiting cases; the general problem remains to inspire and baffle the theoretician. The last chapter of the book deals with the statistical mechanical treatment of chemical reactions by methods similar to those employed by Kramers. The reaction system is treated as a canonical system in contact with a lattice (the thermostat), and the Liouville equation for the entire system (including the lattice) is then examined.

I was pleased to see that the editors have retained the Danish flavor of the book. It is to be regretted that the price of the book, a short paperback, is such as to make it unavailable to most students.

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Chemical and Biological Aspects of Pyridoxal Catalysis. Proceedings of a Symposium of the International Union of Biochemistry, Rome, October, 1962. Edited by E. E. SNELL, P. M. FASELLA, A. BRAUNSTEIN, and A. ROSSI FANELLI. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1964. xv + 599 pp. 16 × 23.5 cm. Price, \$20.00.

Anyone interested in reading this book to gain a complete analysis of how pyridoxal phosphate functions as a coenzyme in enzymatic reactions will be disappointed to learn that almost as much remains to be learned as is already known about this subject. Although there is general agreement among researchers in this field that the Braunstein-Snell theory of the mechanism of action of pyridoxal is fundamentally correct, there remain disagreements concerning the details of the chemical events associated with the functioning of this compound. Also, a number of experimental observations have been made that cannot yet be explained to everyone's satisfaction. These uncertainties exist largely because of the complexities of the problems with which the experimentalist is confronted. The development of new experimental techniques, such as the temperature-jump method already being used (see the chapter by Fasella and Hammes in the book), offers renewed hopes for a more complete understanding of this subject.

Certainly, it must be said that the subject of vitamin B₆ has been thoroughly covered in this book. The title, "Chemical and Biological Aspects of Pyridoxal Catalysis," is used in its broadest sense, because not only is the subject of the mechanism of

catalysis with pyridoxal covered, but also much information is included on such allied subjects as antimetabolites of pyridoxal, purification and properties of enzymes, physiological effects associated with the presence or absence of the vitamin, and the metabolism of pyridoxal.

The book contains 46 separate papers, the first eight of which deal with the mechanism of catalysis with pyridoxal studied in model reactions. Generally speaking, these eight papers were written in clear and concise language, and enough experimental data were included so that the reader can clearly follow the reasoning of the authors in arriving at conclusions. The findings reported in these chapters mostly seemed significant in providing bases for an understanding of the mechanism of catalysis of pyridoxal, although a complete picture is still not available.

The next eight papers present a clear view of what is known about the chemistry of pyridoxal phosphate catalysis in enzymatic transamination. The major portion of the remaining chapters is devoted to discussions of individual enzymes that are either known to contain or suspected of containing pyridoxal phosphate as a prosthetic group. Some of these investigations make significant contributions to knowledge of the mechanisms of action of these enzymes. However, a number of the papers contain mostly descriptions of purification procedures and general properties of enzymes and, thus, are of little value to the reader interested in understanding the mechanisms of enzymatic action.

In assessing the plus values of the book, one could probably agree that there is some merit in having all of the knowledge of vitamin B₆ compiled into a book and presented with data so that one can critically evaluate the conclusions of the authors. The discussions at the close of each chapter were in some cases very spirited and in most cases interesting and valuable. The first and last chapters of the book deserve special mention because they provide excellent summaries of the history of pyridoxal catalysis (first chapter by E. E. Snell) and the current state of knowledge of the subject (last chapter by A. Braunstein).

In general, the book makes a favorable impression and should certainly be a welcome addition to the biochemistry sections of science libraries, although the relatively high cost is a factor that may influence individuals in deciding whether or not to add the book to their private libraries.

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Inorganic Complexes. By CHR. KLIXBÜLL JØRGENSEN, Cyanamid European Research Institute, Cologne, Geneva, Switzerland. Academic Press, Inc., Ltd., Berkeley Square House, Berkeley Square, London, W1, England. 1963. 220 pp. 16 × 23.5 cm. Price, \$7.50.

The classical valency theories provided principles that allowed the deduction and classification of the compounds capable of existence; their aim was not to elucidate the nature of chemical bonds. Modern theories of valency are of a different character because of our belief that all chemical phenomena are the consequences of the known laws of physics, and much effort is being spent in showing that certain chemical phenomena can indeed be derived from these laws. Among theoretical chemists, Chr. Klíxbüll Jørgensen is outstanding for his intense interest in chemical reality and for his efforts towards its classification. His concepts of the nephelauxetic effect and optical electronegativities are the results of surveying a large body of experimental facts and have grown out of the same type of reasoning as the atomicity concept of Kekulé and the coordination principle of Werner.

What Jørgensen believes to be the most fruitful theoretical background for a comprehension of inorganic complex chemistry has been made the content of his book "Orbitals in Atoms and Molecules" (Academic Press, 1962). The book to be discussed here may be described as a confrontation of these theoretical principles with chemical reality. Inorganic complexes are defined as clusters MX_N or MX_aY_{N-a} of a central atom M surrounded by