

11. Kinetics of Mechanical Relaxation Processes in Inorganic Glasses, P. L. Kirby
12. Non-Newtonian Relaxation in Amorphous Solids, Sang Joon Hahn, Taikyue Ree, and Henry Eyring
13. Amorphous Sulfur and Selenium, J. A. Prins
14. Kinetics of Ion Motion in Anodic Oxide Films, D. A. Vermilyea
15. Amorphous Layers and Their Physical Properties, R. Hilsch
16. The Chemical Approach to Problems of the Glassy State, R. W. Douglas
17. Network Defects in Non-crystalline Solids, J. M. Stevels
18. The Anomalous Properties of Vitreous Silica, O. L. Anderson and G. J. Dienes
19. Strength of Amorphous Solids, R. J. Charles and J. C. Fisher
20. The Thermal Conductivity of Glass, P. G. Klemens

The discussions following each chapter are a very important aspect of the book. Here, additional results and interpretations are given often in a thought-provocative manner, highlighting the many questions that still remain. In at least one instance, the discussions brought out an important omission in the main presentations by pointing out the application of nuclear electric quadrupole resonance spectroscopy to the non-crystalline state, a technique which has promising potentiality in this research area.

At the end of each chapter the pertinent references are included, supplying the specialist with references from other fields which may ordinarily escape him.

Some of the chapters treat the experimental and theoretical aspects of certain techniques and then follow with applications to the non-crystalline state. Some of these methods have been discussed in a number of recent books and consequently represent a repetition of material that is covered as well or better in other easily available sources. A reader who is familiar with such coverage may feel a pertinent reference would eliminate the necessity of duplication and then the writer could devote the corresponding space to a crucial discussion of more of the applications to the problem of interest, *i.e.*, non-crystalline solids. However, it is a convenience to the reader to have the technique summarized between the covers of one book and it undoubtedly contributes to the smoothness of the presentation.

The book is well edited and the articles are written in a clear and readable fashion. The book will be a useful addition to the libraries of individuals interested in non-crystalline solids and it will encourage research workers to apply techniques from fields of science other than their own to this important research area.

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Proceedings of the Symposium on the Mechanism of Heterogeneous Catalysis. 12-13 November, 1959, Amsterdam, The Netherlands. Edited by J. H. DE BOER. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey, 1960. ix + 180 pp. 13 × 19 cm. Price, \$3.00.

This symposium volume stands out as exceptional in the morass of symposia which are being announced in the lists of technical publishers with increasing frequency. With the shortening of transportation time between the various scientific centers of the world, symposia, with hundreds of participants from many lands, each bringing digests of earlier publications, are proliferating in abundance. Participants concede, when the proceedings are concluded, that the antechambers of the symposium were more fruitful in scientific exchange than the lecture halls. But that condition does not help the purchaser of the subsequent volume.

This monograph on heterogeneous catalysis is distinguished by the fact that there are nine contributions in 177 pages and one of these only two pages long, in summary, because the material had already been published elsewhere. There were 27 participants in the discussions and their very significant participation is recorded in the total number of pages already mentioned. All the authors and participants lived in Holland so transportation expenses were minimal. The end-product abundantly justifies the

hope expressed by the Chairman, Professor Dr. J. H. de Boer, that it will be "well received not only in the Netherlands, but in other countries as well." Authors' and discussants' views have therefore been given in English, although the symposium language was Dutch.

Anyone who wishes to learn the main features, as of November, 1959, of current aspects of heterogeneous catalysis, as to general theory of mechanism, electronic and chemical factors in heterogeneous catalytic change in gas phase or solutions, with decomposition of formic acid or the synthesis of ammonia as typically standard examples, of Ziegler catalysts, selective hydrogenation, and, finally, bifunctional catalysis, cannot do better than purchase this volume. In two sessions of evening reading he can, thanks to our Dutch brethren, be brought abreast of current thought in catalysis, probably more effectively than by prolonged reading of volumes five-fold in size that are appearing at frequent intervals. The book is as excellent and pleasurable as a well-engineered small car.

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Archives de l'Institut International des Sciences Théoriques. Fascicule 10. Théorie Fondamentale du Système Périodique des Éléments. By S. DOCKX, O. P., Directeur de l'Institut. Office International de Librairie, 30 Avenue Marnix, Bruxelles 5, Belgium. 1959. 183 pp. 16.5 × 24.5 cm. Price, BF 300,—.

Chemical similarities and the masses of the atoms formed the back-ground for the early representation of the periodic system of the elements. Much later it became possible to explain the periodicity, in terms of electronic configurations, arrived at by extrapolating the properties of the hydrogen atom to the other atoms and combining this with the Pauli principle. In quite a few cases, however,—transition elements, rare earths and actinides—the assignment of a certain electronic configuration to a certain atom has not been unambiguous.

In this book an attempt is made to get rid of these ambiguities. The author sets up a series of theorems (which are actually postulates), concerning the filling of the sub-shells. By means of these postulates he is able to construct a periodic system in which the rare earths and the actinides are included in a "natural" way instead of being placed in separate "boxes" below the main table. In the cases where his electronic configurations differ from the ordinarily accepted ones, the author supports his results with recent experimental evidence. The periodic system presented in this way is certainly esthetically more appealing than the ordinary one. Which one is the more "correct," is, however, very difficult to say. The whole question is tied up with the problem as to whether it is meaningful at all to use the shell-approximation for large atoms.

The second part of the book is unfortunately invalidated by conclusions, which are contradictory to the basic theory of angular momenta for atoms. The author seems to be unaware of the fact that the quantum numbers  $J, L, S$  (or rather  $J(J+1), L(L+1), S(S+1)$ ), are the eigenvalues of the operators  $J^2, L^2, S^2$ , and as such never negative. From the author's notation one gets the impression that he has mixed up the two types of quantum numbers  $J, L, S$  and  $M_J, M_S$ .

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3<sup>e</sup> Colloque de Métallurgie sur la Corrosion (Sèche et Aqueuse). Organisé à Saclay les 29-30 juin et 1<sup>er</sup> juillet, 1959. Organized by M. SALESSE, Chef du Département de Métallurgie. North-Holland Publishing Company, P. O. Box 103, Amsterdam, Holland. 1960. 241 pp. 21 × 28 cm. Price, \$10.00.

This is yet another of the many "books" based on collecting papers given at a meeting, symposium or conference. There is some discussion to act as cementing material, but by and large this volume, like others similar to it, does not deserve review as a book. To do so would be much the same

as reviewing each paper in this issue of the Journal and then writing a single, cogent review for the whole without being too concerned about its parts. With this in mind it is best to review the collection of papers in terms of statistics and to give some consideration to those articles which might have widest interest, and inevitably to those of most interest to the reviewer.

There are 17 papers, plus a brief conclusion by M. Salesse, who organized the symposium. Of these, seven are concerned with reactions of metals (or carbon) with gases or vapors, generally at elevated temperatures; nine deal with corrosion by liquids, mainly high temperature water; and one describes the activities of the Seawater Corrosion Testing Station at Biarritz.

Having made the point above that books such as these are not proper subjects for review it remains to be said that all the papers were of some interest. A few were largely reviewed with the authors' recent thoughts on the matter added. Among these is the introductory paper by Bénard which dealt briefly with the postulates of Wagner, Mott-Cabrera and others and then undertook to relate oxidation rates to chemisorption, diffusion and nucleation. Moore's paper is similar in character but is concerned mainly with the theory of the diffusion process. The other articles on metal-gas systems are original experimental works, the most impressive one to me was Páidassi's paper on the morphology of films formed by oxidation. This is in three parts and considers the problem of precipitation within the film, structure of the film, nucleation, film growth, the effect of the substrate on the film, and the influence of plastic deformation. The papers on corrosion in liquids are almost wholly observational in character except for a review-like article by Berge and Jacquet on the usefulness of the potentiostat in corrosion studies. They also give some preliminary results on work relating microstructure observations with potentiostatic polarization measurements. Intergranular corrosion and stress corrosion cracking of metals and alloys in high temperature liquids are described under a variety of conditions and with numerous photomicrographs by others. Of particular interest is one by Coriou, *et al.*, on the stress corrosion cracking of Inconel in 350° water, apparently ascribable to intergranular effects. LeBoucher, *et al.*, describe experiments which show that chemisorbed sulfur increases the corrosion rate of iron in HCl whereas physically held sulfur or sulfur in the form of sulfide has no effect in this regard. Others will find the paper by Wanklyn on the role of hydrogen in corrosion of zirconium by hot water, or the paper by Plateaus, Henry and Crussard on the relationship of oxide "strength" to intergranular corrosion, or still others, of greater interest. However, as already implied, the only way to determine whether it is advisable to have a copy of the book available for ready reference is to examine it, or at least a table of its contents, and make the decision on the basis of one's own interests.

Mechanically, the book is well done. The figures are clear, the type is legible, and the binding is good. It is, however, 8½ × 11 inches, a somewhat awkward size for handling and storing.

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applications. For the industrial physician, much material will have direct use; for the general practitioner, a knowledge of the metabolic products of drugs or of chemicals (from occupational exposures or accidentally) may help to elucidate a puzzling clinical picture.

By restricting his attention to reactions of "foreign" organic molecules, Williams excludes several fields. The intricate biochemistry of normal metabolism is omitted except to discuss reactions of abnormal molecules that follow common pathways or are acted upon by "normal" enzymes. Two other major topics not included are (a) the fate of inorganic compounds, and (b) biosynthesis.

The advances in this field of study since the first edition (1947) may reasonably be described as tremendous. Although parts of the first edition have not been brought forward, Williams has preserved his basic organization, *i.e.*, presenting summaries by classes of compounds: 19 of the 21 chapters are headed by such titles as "The Metabolism of Phenols," "The Metabolism of Heterocyclic Compounds," etc. Chapters are devoted to (a) aliphatic and (separately) aromatic hydrocarbons, alcohols, ketones, acids, amines and derivatives; (b) compounds containing sulfur, arsenic, phosphorus; (c) special groups, *e.g.*, dyestuffs, terpenes and camphors, nitrites, heterocyclic compounds. Within chapters, important compounds or well-studied reactions are treated in some detail. Worthy of note are the discussions of the metabolism of alcohols, chloral hydrate, histamine, adrenaline and related compounds, polycyclic hydrocarbon carcinogens, acetylcysteyl substitution, halogenated aromatic hydrocarbons, aromatic acids, cyanides, azo compounds, sulfonamides, barbiturates. Although not every publication (prior to 1957) has been reviewed or abstracted, references are listed at the end of each chapter to guide a search for additional specific information. A comfort for the non-organic chemist is the profusion of structural formulas, inserted paragraph by paragraph, illustrating many important reactions. Detailed indexes, subject and author, are provided.

There is a deceptive simplicity of presentation. William's command of the subject permits him to tie together in a unified way the gist of complex publications from many laboratories on a large number of compounds. In this field a newcomer could not prepare such summaries by reading the papers. Tabulations of data (some apparently unpublished) and charts of metabolic alterations using structural formulas are synthesized into logical summaries of exceptional value.

A tendency to oversimplify the toxicological aspects is offset by the frequent references to toxicological data, for example, including tables of LD<sub>50</sub> values and pointing out toxicological interpretations of metabolic studies.

Biochemists, pharmacologists, toxicologists and medical men will find helpful guidance in this book. It will prove useful for students of chemistry and of biology generally. Indeed, it is hard to suppress superlatives in recommending this needed compendium.

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**Detoxication Mechanisms. The Metabolism and Detoxication of Drugs, Toxic Substances and Other Organic Compounds.** Second Edition, Revised and Enlarged. By R. TECWYN WILLIAMS, Ph.D. (Wales, D.Sc. Birmingham), Professor of Biochemistry in the University of London at St. Mary's Hospital Medical School. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1959. x + 796 pp. 15 × 22 cm. Price, \$19.00.

This massive (796 pp.) little volume attempts successfully to perform a difficult and important task—to bring together in a simplified and condensed but cohesive form an encyclopedic statement of the fates of "foreign" organic molecules in the body. To the biochemist, the metabolism of foreign compounds is a field in which a major upsurge in work began during World War II; this book therefore for the most part presents new material. To the pharmacologist, an understanding of the fate of "drugs and toxic substances" is an essential part of understanding drug action. The metabolic data are consistently interpreted in the light of toxicological

**Nouveau Traité de Chimie Minérale. Tome XVI. Fluor, Chlore, Brome, Iode, Astate, Manganèse, Technétium, Rhenium.** Edited by PAUL PASCAL, Membre de l'Institut, Professeur Honoraire à la Sorbonne. Masson et Cie., 120, Boulevard Saint-Germain, Paris 6, France. 1960. xxxix + 1195 pp. 18 × 26 cm. Price, broché (2 vol.), 170 NF.; cartonné toile (1 vol.), 185 NF.

Volume 16, on fluorine, chlorine, bromine, iodine, astatine, manganese, technetium and rhenium, continues the major effort to rewrite this famous French series in the light of modern theories and recent results (see THIS JOURNAL, 82, 4121 (1960)). The series is more than just factual in the inorganic sense: it tells the reader where, among all the libraries of France, he may find the journals which are cited; it covers the history of the elements, as well as the ways of obtaining them; and it describes the uses of the elements and their principal compounds. Other compendia do not attempt to do all these things, and yet users will usually agree that at least one reference series ought to do so.