Models and Nuclear Processes" and "Chemical Probes" which discusses the Mössbauer effect. Many of the old sections have been expanded and in addition much of the copious reference data at the end of the chapters date from this edition alone. The publisher's claim that *ca.* 50% of the second edition is newly written material is believable.

The story of Becquerel's discovery of radioactivity on page 1 remains incorrect, and the uranium salts he examined were fluorescent rather than phosphorescent. Again the neutron activation analysis sensitivities are off by a factor of 10^5. The power and neutron flux of "representative reactors" have increased in the last ten years as have the maximum biologically permissible doses listed in the tables. And to conclude on a happy note, hydrogen and cobalt bombs are no longer to be found in the index!

The book is highly recommended.

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Friedel–Crafts and Related Reactions. Volume II. Parts 1 and 2. Alkylation and Related Reactions. By GEORGE A. OLAH, Research Scientist, Dow Chemical of Canada, Ltd., Sarnia, Ontario. Interscience Publishers, John Wiley and Sons, Inc., 605 Third Ave., New York, N. Y. 1964. 1362 pp. 16 × 24 cm. Price, $50.00.

In planning the four-volume work of which this is a part, the editor and authors were confronted with a basic problem: what catalysts and what reactions should be included? Chemists will applaud their decision, which is reflected in the title, to attempt the difficult task of correlating a broad spectrum of catalytic reactions now recognized to be related—"any substitution, isomerization, elimination, cracking, polymerization, or addition reactions taking place under the catalytic effect of Lewis acid type acidic halides (with or without cocatalyst) or proton acids." Thus the reactions included are both aliphatic and aromatic, and the catalyst systems include Lewis acids and Brønsted acids, solid acids and liquid acids, halide acids and hydrous oxides. The scope of this work is a measure of the tremendous recent progress in our understanding of this area of organic chemistry.

Volume II covers, in the first of two separately bound parts, the alkylation of aromatics (including heterocyclics) with alkenes, alkanes (*via* cracking of the latter), cycloalkanes, dienes, alkynes, haloalkanes, alcohols, ethers, aldehydes, ketones, and esters of inorganic acids and of arylsulfonic acids. Part 2 covers haloalkylation, cycloalkylation (involving intramolecular ring closure), dehydrogenation condensation of aromatics (Scholl reaction), isomerization of aromatic and of saturated hydrocarbons, alkylation of saturated hydrocarbons, condensation of haloalkanes with alkenes and haloalkenes, alkylation of alkenes with carbonyl compounds (Prins reaction), hydrogen exchange in aromatic compounds, and cationic polymerizations.

Within the area covered, the editor and authors have sought to provide, not total coverage of all work done, but a reasonably complete summary of data, particularly those which have significance; an evaluation of the data in the light of theoretical concepts; and correlations which will be of aid to the preparative chemist.

In these aims, nearly all of the contributing authors have succeeded admirably. Thus all but a few of the shorter chapters are replete with detailed summary tables in which are listed, in systematic form, reactants, catalysts, operating conditions, and products. The material generally covers the period through 1960, and there are occasional references as late as 1963.

But these factual summaries, in readily retrievable form, are by no means the only attractive feature of this work. There is thorough coverage of the catalyst systems and their complexes, of the reaction mechanisms involved in their action, and of the thermochemistry and kinetics of many of the reactions studied. The excellent balance between fact and theory will make this volume equally attractive to the student, to the research man who wishes to survey the prior art or look up a synthesis quickly, and to the chemist who wishes to brush up on current theories of acid catalysis in the areas covered.

Despite the general excellence of this volume, there are several respects in which it is deficient. Thus, there is only a short, rather generalized subject index to this volume, for which the rather detailed Table of Contents and the extensive tabular information are only partial compensation. A comprehensive author and subject index are promised at the end of Volume IV; but it appears to this reviewer that anyone who spends $50 for this volume is entitled to its complete indices without further expenditure.

Again, the editor has allowed the contributing authors to use their individual judgments in deciding the extent and manner of coverage of their topics. "Indeed," he writes, "it is hoped that each chapter will reflect to a certain degree the character and personality of its author." In spite of this latitude, there is more uniformity of approach than might have been expected, considering the diversity of backgrounds and points of view of the authors, who were drawn from seven countries and about equally from universities and industry. In a few cases, however, the coverage might have been improved if the editor had persuaded the authors to conform to the practices of most of the contributors.

The coverage of patents is a case in point. Of the 17 chapters in this volume, 13 include references to significant patents, particularly "if they contained examples supplying a fair amount of experimental detail." The authors apparently felt qualified, as experts in their fields, to select from the patent literature material of validity and pertinence. The contributors of four chapters chose to ignore the patent literature, although at least two of the fields covered are of considerable industrial importance. Several significant recent developments have therefore been omitted.

Despite these shortcomings, Volume II of this series is a major contribution to the current literature on catalysis, which will be welcomed as a valuable tool by chemists everywhere.

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Les Triterpénoïdes en Physiologie Végétale et Animale. By P. BOITEAU, B. PASICH, and A. RAKOTO RATSIMAMANGA. Gauthier–Villars, 55 quai des Grands-Augustins, Paris, France. 1964. xi + 1370 pp. 16.5 × 25 cm. Price, 310 F.

The title of this book does not indicate its wide scope. This monumental work is doubtlessly the most exhaustive and complete survey of triterpenoids that has appeared until now, every conceivable aspect of the subject being covered in considerable detail.

The book is divided into eight chapters, several of which are of such breadth that they could well have been published as separate monographs. The scope of the book can be judged by a short summary of the contents of each chapter. Chapter I (27 pp.) deals with the definition, biosynthesis, classification into groups, and nomenclature of triterpenoids. Chapter II (375 pp.) consists mainly of a list of every naturally occurring triterpene, with the structure where known, physical properties, derivatives, and references. A particularly welcome feature here is a separate list of triterpenes of unknown structure, which will doubtlessly attract the attention of workers wishing to find research problems in this field. Chapter III (106 pp.) covers all aspects of extraction, purification, and estimation of triterpenes. Various chromatographic and spectroscopic analytical techniques are discussed in detail, as well as color reactions, etc. Chapter IV (208 pp.) describes the various methods used in structure determination, both physical and chemical. This chapter ends with a useful account of the properties and reactions typical of the different groups of triterpenes. Chapter V (232 pp.) gives a systematic account of the distribution of triterpenes in the animal and plant kingdoms. Chapters VI (38 pp.) and VII (341 pp.) describe the role of triterpenes in plant and animal physiology, respectively. Aspects of biosynthesis and bioconversion are discussed. In particular, a very full account of the various biological activities of the different groups of triterpenes is presented. Finally, Chapter VIII (14 pp.) gives some hypotheses regarding the biological properties of the triterpenes.

There are many valuable tables and compilations of data throughout the volume. Triterpenoids are classified in several ways; *e.g.*, according to name, functional groups, empirical formula, melting point, and optical rotation. A table of contents appears at the end of the book, but no general subject or author index. This omission is unfortunate, since such indices would have been of considerable help in locating a particular topic.

Comparatively recent work is included, references up to 1963 being given. There are several tables of addenda, mainly referring to work published in 1962 and 1963.

The book is probably rather longer than necessary, since at times a subject is discussed in more detail than appears justified.

For instance, it hardly seems appropriate to devote 8 pages (pp. 523–530) to the principles of conformational analysis, beginning with a reference to Van't Hoff in 1875. There appear to be few errors, but one mistake concerning the total synthesis of the oleanane carbon skeleton (p. 637) was noticed. The first synthesis was not carried out by Barltrop, *et al.*, in 1962, but by Corey, *et al.*, in 1959 [*J. Am. Chem. Soc.*, **81**, 5258 (1959); **85**, 3979 (1963)].

The above criticisms are minor ones, and the book can be recommended warmly. It will be found invaluable to all who are interested in triterpenoids, either from a chemical or a biological point of view. It is unfortunate that the very high price will restrict the number of scientists who will be able to purchase the book for themselves.

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Les Mécanismes Réactionnels en Chimie Organique. By BIANCA TCHOUBAR, Directeur de recherches au C.N.R.S. Dunod, 92, rue Bonaparte, Paris, France. 1964. xvi + 231 pp. 11 × 17 cm. Price, 18 F.

Chemical education in France—the home of Dirac and de Broglie—has long segregated the principles of quantum chemistry from the more mundane science of organic chemistry. This little book is a modest effort to bridge the gap between these disciplines at the undergraduate level. More properly to be titled, "An Introduction to Reaction Mechanisms in Organic Chemistry," this pocket-sized volume attempts to survey and classify the processes of organic chemistry in terms of current concepts of the electronic structure of molecules. The first four chapters deal concisely with orbital hybridization, bond polarity and polarizability, conjugation energy, inductive and mesomeric effects, modern concepts of acidity and basicity, and related topics. The treatment is predominantly qualitative, reflects the Ingold influence, and is well illustrated by clear and simple diagrams. The remaining nine chapters include a short but excellent introduction to chemical kinetics and the transition state, followed by surveys of aliphatic substitution reactions, eliminations, additions to olefins, prototropic processes, reactions of carbonyl groups, and aromatic substitution. These necessarily brief surveys are well supplemented by an appendix referring the reader to selected review articles dealing with the key reactions of each class.

The linguistic style of the author is lucid and straightforward; indeed this reviewer recommends the volume to all those who would learn "chemical French" painlessly. The typography and flexible cloth binding are exceptionally attractive. From the scientific standpoint the presentation is essentially sound and up to date. Such subjects of relatively recent interest as the reactions of enamines, arynes, n.m.r., multiplicity of carbenes, and the stereochemistry of carbanions are touched upon in greater or lesser detail. The book does contain a few curious statements which carry unfortunate implications, *e.g.*, that pinene has a conjugation energy of 13 to 14 kcal., that electron delocalization is always more important in a cyclic conjugated system than in the corresponding acyclic system, that demonstration of fast deuterium exchange by a halogenated substrate proves a carbanion mechanism (as opposed to an E2 mechanism) for elimination from that substrate, and that "thermal or photochemical excitation transforms a singlet carbene into a biradical (triplet)." One would also hope for more thorough literature referencing of the various experiments and statements cited in the text. On balance, however, this is a competent little work, and although its use in the theoretically oriented U. S. chemical curriculum would appear limited, one might foresee considerable interest among undergraduates overseas.

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Solvay Institute 12th Chemistry Conference. Energy Transfer in Gases. Edited by R. STOOPS, 76–78, Coudenberg, Brussels, Belgium. Interscience Publishers, John Wiley and Sons, Inc., 605 Third Ave., New York, N. Y. 1964. 554 pp. 18 × 26 cm. Price, $15.00.

This volume presents the week-long discussion of energy transfer between molecules in collision by many of the foremost experts in this field. Chemical kinetics, ordinary unimolecular gas reactions, flash photolysis, chain reactions, and collision theory were discussed. These subjects were followed by reports on shock tube kinetics and electronic excitation, energy exchange in detonation, molecular beams, mass spectrography, and vibrational energy relaxations, and some remarks were made on scattering theory. The following authors are responsible for the chapters: A. R. Ubbelohde, O. K. Rice, R. G. W. Norrish, N. N. Semenov, E. P. Wigner, A. Kantrowitz, A. G. Gaydon, D. F. Hornig, T. L. Cottrell, J. Ross, and E. F. Greene, J. D. Morrison, V. N. Kondratiev, and I. Prigogine. This list should be sufficient guarantee of the high quality of the material presented.

The book contains a surprising number of misspelled words which, however, leads to no special difficulty. The book is well put together and reasonably priced for these times.

One cannot but be impressed with the many new methods for measuring energy transfer and with the effort going into the theoretical calculations which we find summarized here. Collision theory is the growing edge of reaction rate theory and this book provides a welcome review of this important field.

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Crystal Structures. Second Edition. Volume 2. Inorganic Compounds, RX_n, R_nMX_2, R_nMX_3. By RALPH W. G. WYCKOFF, University of Arizona, Tucson, Ariz. Interscience Publishers, John Wiley and Sons, Inc., 605 Third Ave., New York 16, N. Y. 1964. vii + 588 pp. 15.5 × 24 cm. Price, $24.00.

"The author of the volume under review already has an enviable reputation for his brilliant research in developing the science of crystal structure analysis in this country and for his earlier volumes on "The Structure of Crystals," as well as for his more recent ultracentrifuge and electron microscope studies of proteins and other biological substances. This new publication is sure to increase his reputation still more.

"It is a magnificent work, describing, illustrating, classifying, and comparing the crystal structures of all elements and compounds of known structure. . . .

"The reviewer recommends this book highly as a reference work to all chemists and physicists interested in the properties of solid matter and their correlation with structure."

The foregoing comments are from the writer's review[1] of Section I of the first edition of Wyckoff's "Crystal Structures." They are equally applicable to the Second Edition.

The first edition was published in loose-leaf form, with supplements issued from time to time to keep it more nearly up to date. With the rapid expansion of the literature in this field, however, the difficulties of inserting the new material into the proper places among the old pages and of proper indexing made the loose-leaf system unsatisfactory. The second edition is therefore being published in the usual book form. It is to be hoped that the remaining volumes will be rapidly forthcoming and that revisions will appear at frequent intervals.

Volume 1 covered the elements and compounds having formulas of the RX and RX_2 types. Volume 2 covers other inorganic compounds of the R_nX_m class, also $R(MX_2)_n$ and $R_n(MX_3)_p$ compounds. The literature has apparently been thoroughly (and critically) covered through 1961 and a part of 1962.

Except for some intermetallic compounds, the author attempts to report all structures for which the atomic positions (usually excluding hydrogens) have been determined. Dimensions and symmetries of the unit cells and coordinates of the atoms are given, using the terminology and conventions of the "International Tables for X-Ray Crystallography."[2] Some interatomic distance data are included and there are occasional discussions of bond distributions and other structurally interesting or important facts. For more information of this sort, the reader must go to the original papers or to their abstracts, published in the "Strukturbericht"[3] and its successor, "Structure Reports."[4] It may be noted that although there is much overlapping between "Crystal Structures" and "Structure Reports," the latter are essentially abstract vol-

(1) M. L. Huggins, *J. Chem. Educ.*, **26**, 289 (1949).
(2) "International Tables for X-Ray Crystallography," Kynoch Press, Birmingham, England, 1952, 1959, 1962.
(3) P. P. Ewald, *et al.*, "Strukturbericht," Akademische Verlagsgesellschaft m.b.H., Leipzig, 1931–1939.
(4) A. J. C. Wilson, *et al.*, "Structure Reports," Oosthoek, Utrecht.