Book Reviews

Sulfonation and Related Reactions. By EVERETT E. GILBERT, Allied Chemical Corporation, General Chemical Division, Morristown, N. J. Interscience Publishers, John Wiley and Sons, Inc., 605 Third Ave., New York, N. Y. 1965. xi + 529 pp. 16 × 23.5 cm. $16.50.

In this age of prolific and sometimes indiscriminate publication of books prepared for the research library, it is a pleasure to welcome an addition that will find frequent use. For anyone wishing to carry out a reaction involving sulfur trioxide or its derivatives (sulfur trioxide addition complexes, sulfuric acid, sulfuryl chloride, etc.) or anyone wishing to prepare compounds obtained in these reactions, this book provides an excellent introduction to the literature. Chapter 1 summarizes the preparation and properties of the reagents used to introduce the SO_3H group into organic molecules. Chapter 2 discusses the sulfonation of aliphatic and aromatic compounds; there are 26 tables and 489 references, many of them to the patent literature and to other sometimes neglected sources. As an example of the thoroughness of coverage, Table 2-6 in this chapter lists about 70 C_2–C_{19} alkenes that have been sulfonated with one or more of eight sulfonating agents, and indicates the nature of the product(s) obtained (five basic types). Chapters 6 and 7 contain an equally thorough coverage of sulfation and sulfamation, respectively. Chapter 3 covers sulfonation with "compounds of sulfur dioxide." This rather deceptive title is used in order to include a number of diverse methods of introducing SO_3Na, SO_2Cl, etc. groups, including sulfochlorination, sulfoxidation, and the reaction of sodium bisulfite with alkenes, alkyl halides, aldehydes, ketones, epoxides, quinones, and diazoalkanes. Chapter 4 summarizes methods of preparing sulfonates by oxidation. Chapter 5 discusses methods of preparing sulfonates by reactions between two organic species, one of which already contains this grouping; sulfoalkylations using sulfones is an example. Finally, there is a short chapter on desulfonation.

A book of this type provides keys to the literature rather than a critical discussion of the reactions. But there is evidence to indicate that the author has been selective in his choice of examples. Spot checks in areas familar to the writer showed a thorough coverage of the literature with a minimum of errors in referencing.

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Azeotropy and Other Theoretical Problems of Vapour-Liquid Equilibrium. By WLADSLAW MALESINSKI, Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland. Interscience Publishers, John Wiley and Sons, Inc., 605 Third Ave., New York, N. Y. 1965. xi + 222 pp. 15.5 × 23.5 cm. $9.25.

Almost certainly, no research group has made so important a contribution to our understanding of the problems of distillation and azeotropy than that headed by Professor W. Świetoslawski at the Polish Academy of Sciences. The results of their experimental work were summarized in Świetoslawski's recent monograph, "Azeotropy and Polyazeotropy." Now the thermodynamic theory of azeotropy is outlined in greater detail in this companion volume by Dr. Malesiński, an active member of the same group.

The author's aim, as announced in the preface, is "to show that it is possible to predict the appearance of azeotropes of various types with any number of components and to calculate their composition and boiling temperatures or vapour pressures." The thermodynamic treatment is based primarily upon the work of the author and his colleagues, but the important contributions of Prigogine and Haase are clearly recognized.

The application of the most general thermodynamic equations for nonideal solutions becomes rapidly untractable, so Dr. Malesiński wisely confines most of his attention to what Guggenheim has called "simple mixtures," those for which the molar excess free energy $\tilde{G}$ of a binary mixture is simply $A_{12}x_1x_2$, where A_{12} is a coefficient independent of composition, but not necessarily independent of temperature or pressure. (Unfortunately the author refers to these as "regular mixtures" although Hildebrand and others have tried to reserve the term "regular" for solutions with an ideal entropy of mixing, at constant volume, which does not preclude a more complex mole fraction dependence of $\tilde{G}^E$.) Even with this simplification, the resulting equations, especially for ternary systems which properly occupy a major section of the book, are still fairly complex. The exposition of the necessary algebra and geometry is straightforward, but unavoidably lengthy, and the casual reader may find it tedious.

The book is strictly classical thermodynamic theory and applications; as such it will be exceptionally valuable to the specialists—certain chemical engineers and physical chemists—who need to understand this thoroughly. Some exposition of the molecular basis of solution nonideality would have made it more interesting to the general reader, but except for a page or two in Chapter II, such material is totally lacking.

Only enough experimental data are presented to illustrate the applicability of the equations; for more the reader must seek Świetoslawski's companion volume and the various books of tables which have been published. Considering how few mixtures really conform to the simple mixture equations (Malesiński's "regular" mixture), it is surprising to see how generally useful the predictions of the simplified equations are.

The text is carefully written and there are few typographical errors. (The careful reader, however, must guard against misconstruing ambiguities like $1/2\ln p_1°/p_2°$ (eq 355) which more carefully written would be $(1/2)\ln(p_1°/p_2°)$.) One might have wished for more physical and molecular insight, but then it would have been a different book. The author has fulfilled his stated intentions admirably.

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Organosilicon Compounds. Volume 1. Chemistry of Organosilicon Compounds. Volume 2, Part 1. Register of Organosilicon Compounds. Volume 2, Part 2. Register of Organosilicon Compounds. By VLADIMÍR BAŽANT, VÁCLAV CHVALOVSKÝ, and JIŘÍ RATHOUSKÝ. Academic Press Inc., 111 Fifth Ave., New York, N. Y. 1965. Vol. 1, 616 pp. Vol. 2, Part 1, 699 pp. Vol. 2, Part 2, 544 pp. 16.5 × 24.5 cm. $25.00 (each volume).

The unique contribution of this series of three books lies in the last two (Volume 2, Parts 1 and 2), in which the authors have accomplished for organosilicon chemistry what "Beilstein" has done for organic chemistry. The formidable nature of the task undertaken by the authors is indicated by the fact that the two books which comprise their "Register of Organosilicon Compounds" contain some 1200 pages dealing with compounds from SiS_2 to $Si_{26}C_{68}H_{170}O_{31}$.

The arrangement of compounds according to molecular formula follows simple rules which are clearly set out and make it very easy to locate an individual compound. For each compound, the Register readily provides the name, molecular formula, structural formula, common physical constants, calculated elemental analysis (independently checked by the authors because of errors they discovered), and molecular weight. Methods of preparation and typical reactions for each compound are indicated by numbers which refer to a listing of 54 types of reactions. Properties of a compound which are not included in the above categories, such as bond lengths, spectra, dipole moments, etc., obviously could not be listed explicitly and are handled by using a symbol followed by the literature reference. Compounds reported up to September 1961 are included, as are also additional listings of unpublished work communicated privately.

This reviewer believes that the Register will be of value to any chemist interested in any aspect of chemistry having to do with organosilicon compounds.

The first 364 pages of Volume 1 report, in brief and noncritical form, the major methods of preparation and reactions of organosilicon compounds. For the nonspecialist this portion of Volume 1 may serve as an adequate introduction to organosilicon chemistry. In their preface, the authors state that this discussion was not in-