

## BOOK REVIEWS

**The Handbook of Solvents.** By LEOPOLD SCHEFLAN, Ph.D., Technical Manager, B. Scheflan, Ltd., Formerly Assistant Chief Chemist, the Pyrene Company, Inc.; and MORRIS B. JACOBS, Ph.D., Director of Laboratory, Dept. of Air Pollution Control, N.Y.C. D. Van Nostrand Company, Inc., 250 Fifth Avenue, New York, N. Y. 1953. .viii + 728 pp. 18 × 25 cm. Price, \$10.00.

According to the publishers this handbook is intended to cover various theoretical and practical attributes of solvents, solvent recovery and the physical properties of over 2700 liquid organic compounds. The first eight chapters, amounting to seventy-eight pages, deal with the topics of statistics, safe practices, solvent action and power, vapor pressure, dilution ratios, inflammability, and solvent recovery. The remaining six hundred and fifty pages consist of tabular data on commercial solvents and liquids which may become important solvents in the future.

The book appears to be generally uncritical, superficial as regards the introductory chapters and somewhat out of date. Thus, statistics of the solvent industry are limited to estimates for production and usage in 1935 and a tabulation of the 1950 figures of the U. S. Tariff Commission for synthetic organic chemicals. Similarly, in the chapter on solvent action and power no mention is made of the more recent work on solubility with the concept of solvent energy density and its usefulness, for example in predicting high polymer swelling and solubility. No reference could be found to the work of Magat or Huggins, while the reference to Hildebrand's classic "Solubility" is to the 1924 edition, rather than that of 1936 or the still later revision of Hildebrand and Scott in 1950. Indeed, with one exception all references in this chapter are before 1950, while the majority are before 1940. In the succeeding chapters the treatment appears to be similar; for example, the handling of evaporation rates also leaves something to be desired. The fundamentals are nowhere clearly stated and the references are again old.

The data on individual solvents are handily arranged for reference by the industrial chemist, an index of synonyms for those unfamiliar with chemical terminology being included. For the research chemist the tables will be of little utility since no specific references are given for the values cited. While a list of sources is appended, no attempt has been made to key these to the individual solvents. Further, no effort appears to have been made to be selective and critical in the values quoted. Thus, under benzene, one finds: "Melting Point: 5.4 to 5.5°C. Surface Tension (dynes per cm.) 28.9 at 20°C. 29.0 at 20°C." Reference by the reviewer to one liquid commonly used as a solvent for nitrocellulose in molecular weight determinations, revealed no value for the viscosity of the pure ester although peculiarly enough the viscosity of a 10%  $\frac{1}{2}$  sec. RS nitrocellulose in ethyl lactate solution was given. On the other hand, a check of the "cellosolve" series of solvents indicated general completeness.

The book should have utility for those desiring rapid reference to the formulas and common physical properties of a wide variety of organic liquids.

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**Gmelins Handbuch der Anorganischen Chemie.** Eighth Edition. By E. H. ERICH PIETRSCH (Editor). Verlag Chemie, G.m.b.H., Weinheim/Bergstrasse, West Germany. System No. 9, Sulfur, Section A2. 1952. Pp. 61-510. 17.5 × 25.5 cm. Price, \$35.30. System No. 9, Sulfur, Section B1. 1953. xi + 368 pp. 17.5 × 25.5 cm. Price, \$29.40.

In addition to the sections mentioned above, A1 (historical) first appeared in 1942 and was reprinted in 1952; A3 on physical and chemical properties of the element is now ready;

B2, which covers the remaining compounds of sulfur, is due late in 1954.

No reviewer could approach his task without a feeling of humility in view of the monumental scholarship and labor everywhere in evidence. In preparation of these sections the staff "reviewed and analyzed more than 25,000 original publications, extracting information of essential nature, comparing and evaluating data from thousands of authors, and eliminating erroneous and superficial views." Obsolete references are mentioned in separate paragraphs, while the systematic arrangement of valid items makes it easy to find any desired detail. In addition, the Gmelin Institute offers to supply data published from 1950 on, also progress reports and answers to individual questions.

A comparison with the four hundred pages on sulfur and its compounds found in the seventh edition (1907) accentuates not only the vast amount of new work on these particular substances but the rebirth of inorganic chemistry through its integration with the rest of science. The current status of physics, astronomy, geology, geochemistry, mineralogy and metallurgy is mirrored wherever these are related to the chemistry of sulfur.

Section A2 is written primarily for the industrialist. It begins with the occurrence of the element and of its compounds, all the way from stars to organisms, and it includes statistics from every country. Then follow three hundred pages on technology, mainly of sulfur, sulfur dioxide and trioxide, sulfuric acid. In spite of drastic condensation, one gets the impression that all the worthwhile variations in procedure are sufficiently outlined, and interpreted in the light of fundamental principles. The corresponding patents are listed and briefly abstracted. Lastly, there is a valuable chapter on colloidal sulfur, and a brief résumé of physiological hazards.

Section B<sub>2</sub> meets the requirements of investigators and teachers. Every type of measurement and generalization is woven into the exposition of properties. Molecular structures and mechanics are set forth in great detail. Reactions are described in terms of mechanisms, kinetics, equilibria and energetics. The complicated chemistry of SO and S<sub>2</sub>O<sub>3</sub>, not to mention S<sub>2</sub>O<sub>7</sub> and SO<sub>3</sub>, is clearly summarized. Especially detailed, of course, is the treatment of sulfur dioxide—its oxidation-reduction reactions including carbon and metals; the liquid as a non-aqueous solvent and as a coolant—also many other features.

Here and there in the wealth of detail, gaps will be perceived by the discerning eye, so that no small number of future investigations is likely to originate through study of this comprehensive work.

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**The Furans.**—American Chemical Society Monograph Series. By A. P. DUNLOP, Assistant Director, Chemical Research, The Quaker Oats Company; and F. W. PETERS, Vice President, The Quaker Oats Company. Reinhold Publishing Corporation, 330 West 42nd Street, New York 36, New York. 1953. xix + 867 pp. 17 × 23.5 cm. Price, \$18.00.

This book is intended to fill the "need for more or less encyclopedic coverage of furan compounds with particular attention to the behavior of the furan nucleus." Its scope includes primarily compounds with the aromatic furan nucleus and excludes condensed systems (benzofuran, etc.) and hydrogenated monocycles. The text is divided into Parts I, Chemistry, and II, Industrial Applications.

Part I comprises fifteen chapters which cover structure, physical properties, nomenclature, synthesis of homologs and functional derivatives and their reactions, cleavages, and hydrogenation of the furans. A comprehensive, critical review is presented with the apparent attempt to mention every known furan, the method of its synthesis, and in most cases its reactions and the physical properties which