BOOK REVIEWS

Organophosphorus Monomers and Polymers. By YE. L. GEFTER, Institute of Element-Organic Compounds, Academy of Sciences of the U. S. S. R. Translated from the Russian by J. BURDON, Ph.D. Pergamon Press Ltd., Headington Hill Hall, Oxford, England. 1962. vii + 302 pp. 17.5 × 25.5 cm. Price, $12.50.

This monograph illustrates the extent to which the research amongst organophosphorus compounds has progressed in the past decade. The few of us who have been "in the game" since the pre-World War II days have expected a proliferation of research in this area of chemistry, but, I dare say, few of us were expecting quite such a flood of published matter during the past several years as has been realized.

The 300-odd pages of this book provide a coverage of organic compounds of phosphorus which may be defined either as raw materials or monomers or as phosphorus-containing polymers. A small part of the book is devoted to general matters of nomenclature and some of the basic facts of phosphorus chemistry. The main bulk of material is very aptly described by the title.

The material dealing with monomers and polymers is arranged mainly in the form of tables which, in turn, are arranged according to the structural types of substances included. Thus, the search for specific substances is relatively facile, although the formal index is rather meager by current American standards. The literature coverage appears to be quite adequate, the general descriptions of the products found in the tabulated part of the book are sufficient for survey purposes and the physical make-up of the book is good. The Western price of the book is, of course, many times that of the Russian original.

However, there are some drawbacks both in the original edition and in the translation, when these are judged by current American standards. The theoretical discussion of matters on hand is totally lacking; that is to say, a good number of equations are given in order that the reactions be properly illustrated. Beyond this, however, no truly theoretical summarization is provided at any significant level. Thus the book presents and digests published facts, but goes no further than published material. The areas of physical applications are shown in purely illustrative manner, again without any substantial theoretical back-up. Much of this information is taken directly from patent claims without critique.

The translator, as expected, uses the English idiom which might trouble some American readers. However a more serious difficulty arises in the translated nomenclature since at times the translator does not follow the English-American agreement which has existed for a decade in the area of phosphorus nomenclature and which has been adopted by the English speaking scientists (or perhaps: English and American scientists). Hence occasional use of "old fashioned" names of phosphorus compounds appears in the book; these are readily understood by the old-timers like the reviewer, but may cause difficulty amongst the late-comers.

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Small Particle Statistics. An Account of Statistical Method for the Investigation of Finely Divided Materials. Second Revised Edition. By G. HERDAN, M.Sc., Ph.D., LL.D., Lecturer in Statistics, University of Bristol. With a Guide to the Experimental Design of Particle Size Determinations. By M. L. SMITH, Ph.D., F.R.I.C., W. H. Hardwick, M. A., B.Sc., and P. CONNOR, A. R. I. C., Atomic Energy Research Establishment, Harwell. Academic Press Inc., 11 Fifth Avenue, New York 3, N. Y. 1960. xxiii + 418 pp. 16 × 25.5 cm. Price, $14.50.

The first Edition of 1952 treated the theory of both the number and physical statistics of particles in the sieve and subsieve size range; it was well received. The revisions of the general section in the second Edition are primarily in the form of additions, notably in the chapters on mixing, theory and practice, molecular weight distribution of polymers, analysis of variance and graphical representation of distributions of particulate matter. Under Experimental Procedures more attention is now paid to the size range below 2 microns, the application of centrifuge methods, use of automatic counting procedures. A new chapter on the application of radio-isotopes as tracers for the sedimentation method has been added. Most of these additions have been well treated and indexed. Unfortunately, when they turn to physical methods and theories, the authors are on less certain ground.

The new chapter on aerosols and particularly the treatment under light scattering is disappointing. The statement (p. 377) "that the "Owl," the Slope-O-Meter... although of proven worth for the comparative assessment of liquid monodisperse aerosols containing spherical particles, they are of little value for solid aerosols, which are generally polydisperse etc." is no longer correct in the light of recent extensions of the light scattering methods presented at the Potsdam, N. Y., Interdisciplinary Conference on Electromagnetic Scattering (August, 1962). Both solid and irregularly shaped are now yielding to the basic methods developed for these two elementary instruments.

The authors have missed a long series of papers, published mostly in the *Journal of Colloid Science* (1946 to date), and as A. E. C. reports, dealing with the applications of light scattering to aerosols and hydrosols which are pertinent to this chapter; also papers of this reviewer and his collaborators; *viz.*, V. Drozin on Filtration Solid Aerosols (2nd. Int. Cong. Surface Activity, III, 601), and on Particle Size Distribution by Precipitation of Charged Particles (*J. Colloid Sci.*, **14**, 74 (1959); P. K. Lee, Forward Angle Light Scattering for Determining Size of Individual Aerosol Particles and their Size Distribution, *Rev. Sci. Instr.*, **24**, 104 (1954); R. Gruen and P. Gendron, The Growth Method, (*Trans. Faraday Soc.*, **48**, 410 (1952); I. W. Plesner, Polymers by H.O.T.S., (*J. Polymer Sci.*, **24**, 147 (1957).

The very useful and important Coulter Counter which measures accurately and rapidly, by electrical conductance, particle size distributions in hydrosols has been on the market for some years, but is not mentioned (R. E. Wachtel and V. K. La Mer, *J. Colloid Sci.*, **6**, 531 (1962)).

(P. 1) Light scattering does not always increase with fineness. The scatter decrease with increase in size in the range 0.3 to 0.8 micron range depending upon the index of refraction with the result that red is scattered better than blue light contrary to the Rayleigh law (V. K. La Mer, *J. Phys. Chem.*, **52**, 65 (1947)).

Omissions and minor errors of this type are counterbalanced by an authoritative presentation of statistical methods, so that the book can be warmly recommended to all interested in this growing field.

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Process in Dielectrics. Volume 4. By J. G. BIRKS, Ph.D., D.Sc., F. Inst. P., General Editor. Professor J. HART, Ph.D., American Editor. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1962. vii + 311 pp. 16 × 25 cm. Price, $12.00.

This volume contains review articles on six special topics selected from the general field of dielectrics; five of these cover subjects which have not been treated in the previous three volumes of the series. The subjects and authors are as follows: Microwave Spectroscopy of Gases, J. Sheridan (The University of Birmingham), pp. 1–36, 149 references; Dispersion and Absorption of Microwaves in Gases and Liquids, K. H. Illinger (Princeton University), pp. 37–100, 367 references; Ferroelectricity, W. J. Merz (Laboratories RCA Ltd., Zürich), pp. 101–149, 212 references; Theory of Gas Breakdown, T. W. Dakin and D. Berg (Westinghouse Central Laboratory, Pittsburgh), pp. 151–198, 160 references; Conduction and Breakdown in Liquid Dielectrics, A. H. Sharbaugh and P. K. Watson (General Electric Research Laboratory, Schenectady), pp. 199–248, 89 references; Static Electrification, Part I, L. B. Loeb (University of California, Berkeley), pp. 249–309, 37 references.

In the first article, Sheridan briefly reviews the present status of experimental methods in this relatively new field of spectroscopy and then outlines the analysis of the spectra (rotation bands, inversion spectra, nuclear quadrupole hyperfine structure and Stark effects). The chapter concludes with a discussion with examples of the information which can be derived from microwave spectra (internuclear distances and angles, dipole moments, and molecular force fields). Illinger discusses the transition from resonant to non-resonant absorption which occurs as the pressure is increased, giving a review of the various theoretical treatments of pressure broadening. Next, the liquid state is considered, and the correlations between the macroscopic delay time and the molecular relaxation time are discussed. Numerous examples of