BOOK REVIEWS

Polyolefins. By A. V. TOPCHIEV and B. A. KRENTSEL,' U.S.S.R. Academy of Sciences. Translated from the Russian by A. D. NORRIS, M.A., D.Phil.(Oxon), F.R.I.C., F.I.L. (Lecturer in Physical Chemistry, Hull University). Pergamon Press Ltd., Headington Hill Hall, Oxford, England. 1962. xi + 92 pp. 14.5 × 22 cm. Price, $3.50.

This short book is a translation into English by A. D. Norris, of Hull University, of the Russian edition published in 1959. Thus, only information known prior to that year is reported; therefore, the wide knowledge acquired in the field of polyolefins during the last few years is lacking. The authors, who have personally carried out research in this field, refer to some results and interpretations obtained from research carried out in the Soviet Union, but the complete bibliography of work done either in Russia or in Europe and in the United States is lacking, *e.g.*, references to journals and year of publication are not given. The translator, an expert in the topics dealt with, has slightly modified the original text and used different symbols or signs for some formulas in an effort to make them more intelligible to readers who are used to conventions adopted by European and American Chemists.

In the *Introduction*, the low-molecular-weight ethylene polymers obtained since 1884 by Russian chemists are mentioned as well as the far more important high polymers of ethylene, obtained at either high, low or medium pressure. The very important polypropylenes are also treated.

Chapter I describes raw materials derived from petroleum from various sources and in particular gives the average composition of cracking gases, and of some Russian natural gases which are more suitable than others for the production of ethylene and propylene by dehydrogenation because of their high content in C_2-C_5 fractions (30–70%).

Chapter II deals with the production of polyethylene by high-pressure processes and discusses its structure and its physical and chemical properties.

Chapter III deals with the production of polyethylene by the low-pressure Ziegler methods, and by the methods used by Ziegler for the production of organometallic compounds of lithium and of aluminum. In comparing the properties of polyethylenes obtained at high and at low pressure, the authors refer to average products, but do not consider the remarkable variations in properties of both the high-pressure polyethylenes, whose properties (*e.g.*, crystallinity) markedly vary with the degrees of polymerization or with molecular weight and branching, and of the low-pressure polyethylenes whose properties also vary considerably with the content of methyl groups (from about 0.3% for polymers obtained with most typical Ziegler-type catalysts to less than 0.1 for those obtained with the aid of catalysts with a crystalline component), which cause remarkable variations in crystallinity, and in the melting temperature (from 130 to 138°).

Chapter IV describes the processes using moderate pressures developed by Philips and by ESSO Standard Oil of Indiana for the production of high-molecular-weight polyethylene with the use of catalysts based on oxides and containing chromium and molybdenum compounds, respectively.

Chapter V deals with the variations of properties of polyethylene treated with high-energy radiations. On page 53, it is stated that the melting temperature of irradiated polyethylene can exceed 200°. Actually, this is either the softening or the viscous flow temperature, because the real melting temperature which corresponds to the complete disappearance of crystalline regions does not exceed 138° for any polyethylene; this value corresponds to the more linear ones, and it is reduced and not increased by the effect of radiations, which reduce the crystallinity.

Chapter VI deals with sulfo-chlorinated polyethylene, its preparation and its properties. The term "Gipalon" used to indicate the product made in the USA is the Russian transliteration of "Hypalon," the correct name.

Chapter VII describes the industrial and domestic applications of polyethylenes. Products obtained at high and at low pressure are compared as to their use for the production of fibers.

Chapter VIII deals with the preparation, properties and practical applications of the new polymers of propylene and describes results and steric configurations of the products, and the influence of these on the properties, mainly referring to results published by Italian authors. Among the applications of polypropylene, a brief description of fibers (compared with those of Nylon) and of films (compared with those of polyethylene) is included.

Finally, the translator has included a short addendum on the mechanism of polymerization processes. Considering that the translation was done in 1961, the addendum is rather incomplete, particularly with regard to chain transfer processes and to interpretations of sterospecificity.

This book is written clearly and can be easily read; thus it may be useful to students or non-specialized chemists who wish general information on the new polyolefins which are acquiring great importance in macromolecular chemistry.

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Introduction to Thermodynamics of Irreversible Processes. Second, Revised Edition. By I. PRIGOGINE, University of Brussels, Brussels, Belgium. Interscience Division, John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, N. Y. 1961. xi + 119 pp. 14.5 × 22 cm. Price, $5.00.

Professor Prigogine is justly renowned for his contributions to the theory of irreversible processes. Therefore it was with high anticipation that I opened my copy of the "Second, Revised Edition" of "Thermodynamics of Irreversible Processes." However, upon turning to the Preface, I was disappointed to discover that "since the appearance of the first edition of this book in 1955, no fundamental progress has been achieved in the thermodynamics of irreversible processes. For this reason, the only modifications introduced herein are the addition of paragraph 6 to Chapter V dealing with "continuous["] systems, and the replacement of the appendix in the first edition by Chapter VII, which deals with non-linear problems." In other words, the second edition is the same as the first except for some rather minor alterations. Since the first edition is too widely known to be reviewed again, I shall focus my attention principally upon the few changes which have been made and upon some which, in my opinion, should have been made.

The new paragraph 6 of Chapter V demonstrates by a formal Fourier expansion procedure that continuous systems can in a certain sense be treated like discontinuous ones. No practical application is made of the result and its physical importance remains concealed in the formalism. The first two sections of the fifteen page Chapter VII are similar to those of the old Appendix. The remaining four sections are concerned mostly with a brief but intriguing account of some academic non-linear reaction rate problems treated from the point of view of entropy production.

The pagination and the corresponding page listings in the Index and in the List of Symbols have been changed to conform with the additions to the text. However, these changes are the only outward signs of care taken by the publisher. A relatively large number of careless editorial errors suggests that the book was constructed hastily. On p. 32, we are referred to reference 9c which has been deleted. On p. 68, a misspelling of the word "proportional" is retained from the first edition. On p. 82, reference is made to the now nonexistent Appendix. In the list of references, number 13, *Thermodynamics* by E. A. Guggenheim, has been twice revised since the 1949 edition which is listed. Number 63, an article by Glansdorff and Prigogine "to appear *Physica*, 1954," presumably has been published. These are but minor irritations. More important is the absence of a systematic revision by the author of the entire list of references. In the first edition, sixty three references were cited. They