new fibers, and a very complete index giving references to page, analytical scheme table, and illustration (where applicable) not only for the fibers but also for the reagents and methods used.

The analytical scheme presented carried the examination of the fibers through: (*1*) a microscopic examination to determine whether one is dealing with a pure fiber or a blend followed by, in the case of single fibers; (*2*) a separation according to whether the fiber is thermoplastic or not; (*3*) microscopic and staining identification of the natural and man-made cellulosic and protein fibers; (*4*) classification of the thermoplastic fiber on the basis of simple chemical tests for nitrogen and chlorine; (*5*) specific solvent or staining identification of individual fibers. Fiber blends are separated and identified by a solvent separation scheme. An alternate scheme for the identification of the fibers completely on the basis of solvent behavior, which does not include differentiation of the several natural cellulosic and protein fibers, is also presented. Each identification method is accompanied by one or more confirmatory tests.

A fine series of photomicrographs of the common fibers accompanies the text as ready reference for the microscopic identification of the fibers.

A section of notes gives suggestions for the removal of dyes and finishes, identification of nitrogeneous finishes, preparation and examination of longitudinal and cross-sectional views of the fibers under the microscope, measurement of fiber density, and the heat shrinkage and melting points of the fibers using simple equipment.

This is a fine book and worthy of recommendation to anyone who finds it necessary to deal with and identify the host of textile fibers with which we are not confronted. It is unfortunate that the book does not include identification procedures for several of the very newest fibers.

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Die Kunststoffe: Eine Einführung in ihre Chemie und Technologie. G. SCHULZ. Carl Hanser Verlag, Munich, 1959. 536 pp. DM 49.

The author set as his goal the presentation in concise form of the whole, rapidly growing field of commercial polymer products (Kunststoffe), all the way from raw materials to the methods of fabricating polymer compositions. (The latter unfortunately are called "compounds," carrying over into German a poor American word usage.) Schulz has accomplished his aim in admirable fashion with the technology of German, American, and British products. The elementary chemistry of polymerization and polymers is presented clearly and briefly; not included are quantitative aspects, such as copolymerization reactivity ratios and chain transfer constants, which are essential to synthetic research workers. The book can be recommended as one of the best encyclopedic books on polymer technology. It is especially valuable as a key to German tradenames, technology, and test methods. Its skillful organization and clear style make it one of the best books in German for young English and American polymer technologists.

Schulz's book includes 57 pages on organic raw materials; 36 pages on polymerization processes; 139 pages describing different chemical types of commercial polymers; more than 15 pages giving tradenames, identity of products, and manufacturers; 22 pages on plasticizers and other auxiliary agents; 107 pages on fabrication methods; and 69 pages on testing methods for polymer products. Specific numbered footnotes are not given, but at the end of each topic discussed there is a valuable list of selected journal articles and books (largely in German and English). Patent references are not given. Subject and author indices are adequate. There are only a few typographical errors such as economy with Dr. Trommsdorff's name.

The book reflects some interesting differences between industrial polymer development in Germany and America. Copolymerization technology, especially graft copolymerization, has made greater industrial progress here. A number of tradenamed products which the book indicates as homopolymers are actually copolymers at present. In contrast to Germany, many more monomers are freely available in the United States along with valuable company booklets on their polymerization and copolymerization.

The discussions of vinyl chloride and vinyl acetate polymers, including emulsion polymerization, are good. The book, however, gives less information than might be expected about injection molded acrylics, reinforced thermosetting resins, thermosetting vinyl pastes, and fluororubbers. Although ethyl cellulose and benzyl cellulose are discussed, the more important water-soluble derivatives of cellulose are hardly mentioned. A good many aspects of paint and rubber technology are not included. Numerous recent products are well described including Delrin, Penton, and polypropylenes.

By and large, Dr. Schulz and Hanser have produced an outstanding book on applied polymer science.

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Polyisobutylen und Isobutylen-Mischpolymerisate. HERMANN GUETERBOCK. Springer, Berlin/Goettingen/Heidelberg, 1959. x + 263 pp. $10.00.

This book belonging to the Springer series, *Chemische Technologie der Kunststoffe in Einzeldarstellungen*, is primarily a literature review of the polymerization and copolymerization of isobutylene, and of applications suggested for isobutylene polymers. Gueterbock, as research leader with Badische Anilin and co-worker with Michael Otto, has known this field intimately and it is not surprising that the areas covered are well done. Valuable detailed tables of German, U. S., and other patents on the preparation and polymerizations of isobutylene are given, but relatively few of the patents since 1952 are included. Preparations of liquid low polymers as well as solid high polymers are given.

It is surprising that a book so titled gives so little about the fundamental physical chemistry and properties of polyisobutylenes and of butyl rubbers. For example, no x-ray patterns are shown and no mention is made of the work of Brill, Fuller, and co-workers. The rheological and rubber characteristics of commercial isobutylene polymers are not

delineated, nor are quantitative comparisons given with other types of rubber. Compatibility and solubility data, as well as the treatment of butyl vulcanization, will disappoint rubber technologists. Molecular weight–intrinsic viscosity relations for the polymers are not presented. Older patent references to some halogenated polymers are included, but no discussion of the recently important brominated and chlorinated butyls.

The printing is good and there are few typographical errors. There is an author index and a rather inadequate subject index. The idea of abbreviating company names in footnotes is a good one, but the system here leads to EIPNC for du Pont and MSGIMC for Montecatini.

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Polythene: The Technology and Uses of Ethylene Polymers, 2nd Ed., edited by A. RENFREW and PHILLIP MORGAN. Interscience, New York; Iliffe, London, 1960. xxi + 781 pp. $25.75.

This book, like the first edition (1957), is separated into three parts: Manufacture and Properties; Processing Techniques; Applications. The present edition is substantially enlarged, bringing the chapters in the first edition up to date and introducing additional chapters covering more recent developments. The new material includes a review of high density polymerization processes, a discussion of the copolymer field, and sections on vacuum forming and reprocessing.

Each chapter is written by a man or men who are well versed in the topic under consideration, with the sections covering structure and properties being particularly well handled. In a book covering such a broad scope each section must be treated in limited detail; however, in most cases the material included reviews the topic at hand very well and many references are given for those interested in more detail. A survey of the references cited in those areas with which the reviewer is more familiar indicates that they cover the literature quite comprehensively up to and through much of 1959. As with all books where a great many authors contribute there is, of course, some overlapping and duplication of material, in most cases from a somewhat different viewpoint. The editors appear to have cross-referenced these overlapping areas well so that it is possible to easily locate all the material included on a given subject.

It is the evident purpose of the book to survey the whole field of polyethylene and it is the reviewer's opinion that this purpose is well accomplished. The book should be of interest to both those who are not experts in the field but have occasional need of information about polyethylene, and to the expert who needs a well referenced text in those areas of polyethylene technology which are outside his particular specialty.

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Nature and Properties of Engineering Materials. Z. D. JASTRZEBSKI. Wiley, New York–London, 1959, xvii + 571 pp. $11.00.

It is a challenge to every new generation of teachers to reassess and update methods and materials used in the college curriculum. To meet this challenge, Dr. Zbigniew D. Jastrzebski, professor of chemical engineering at Lafayette College, has written an informative college textbook on materials. As a description of the theoretical principles which form a common basis for understanding the properties and behavior of matter, his book would be difficult to better. The author brings to the task a considerable knowledge of all the engineering sciences including concepts in modern (nuclear) physics and a valuable experience in teaching.

In 1955, Dr. Jastrzebski had occasion to submit a syllabus for a course called the nature and properties of engineering materials. This memo proposed the inclusion of such a course in his college's curriculum and contained the following statements:

"The great variety of materials now available for use by an engineer makes it extremely difficult to cover satisfactorily this immense and constantly expanding field when treated in a more or less descriptive way. I believe that the best approach to the study of engineering materials should be based on a thorough understanding of fundamental principles combined with practical aspects of their application. Recent developments in the theory of solid state, atomic and molecular structure of matter, and nuclear physics make it possible to provide a broad and comprehensive picture of the nature and properties of engineering materials. The course, when taught in this manner, will eliminate obsolete subject matter and provide a sound basis for practical reasoning. This approach will also encourage the student to think why and how any particular material is used rather than what it is used for."

Shortly thereafter the course became a reality and as a consequence this book was published.

Dr. Jastrzebski's book is divided into 12 chapters. Beginning with an introduction to the Bohr atom, it goes on to describe the elements of the atomic and electronic structure of matter. Chapter 1 also explains the interatomic and intermolecular (Van der Waal) forces and their relationship to the structural characteristics of both crystalline and amorphous materials.

Chapter 2, colloids and organic high polymers, presents a physicochemical description of colloidal materials and emulsions. Specific polymeric materials, their molecular structure, and the mechanics of polymerization are described. This is followed by a discourse, in Chapter 3, on the phenomena of diffusion and crystalline nucleation, phase transformation in solids, and phase equilibria between liquids and solids. Chapter 4 describes the mechanical behavior and structural characteristics of solids. Elasticity, plasticity, and flow characteristics are described in terms of the main types of engineering materials; a discussion of strength and other properties follows. Also included is a short discussion of radiation damage to mechanical properties of materials.

Chapters 5 and 6 are readable, up-to-date surveys of manufacturing processes for metallic and ceramic materials. Included are discussions on the reduction of metals from their principal ores, the alloying of metals, and the production of cermets. Chapter 7 describes electrical and mag-