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A review of: “M. Schnabel: Polymer Degradation, Principles and Practical Applications, Hanser International, Munich, 1981, 227 pp.”

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Book Review

M. SCHNABEL: Polymer Degradation, Principles and Practical Applications, Hanser International, Munich, 1981, 227 pp.

This book is based on a lecture course on degradation and stabilization of polymers offered by the author at the Technische Universität Berlin. Its objective is, therefore, a concise treatment of the various factors causing chemical changes in polymers resulting in a deterioration of their properties.

The book contains six chapters on various types of degradation such as thermal, mechanical, photochemical, radiation chemical, biological, and chemical.

In the first chapter (the Introduction) are described the different modes of degradation of the macromolecular compounds, the mechanistic aspects, the detection of degradation by changes in molecular size, and various other analytical techniques.

The main aspects discussed in the "Thermal Degradation" chapter (the second one) are methods of evaluation of heat resistance, heat resistant polymers, ablation, stabilization, thermal decomposition and polymer analysis, thermal degradation and recycling, and heat effects in biopolymers.

The third chapter, entitled "Mechanical Degradation," deepens the theoretical aspects of bond rupture, the importance of ultrasonic degradation and its mechanism, stress-induced chemical alterations of polymers, freezing and thawing, mastication of natural and synthetic rubber, and mechanochemical synthesis of block and graft copolymers.

The fourth chapter is devoted to "Photodegradation"; here are discussed the light sources, light absorption and quantum yield, excited states, energy transfer and energy migration, degradation in the absence of oxygen, and photooxidation applications.

Degradation by high energy radiation is the object of the fifth chapter. It begins with the types of radiation and the mechanistic

aspects and continues with special aspects of degradation in bulk synthetic polymers (influence of oxygen, of absorbed dose rate, of LET, of temperature, etc.), and radiation effects in biopolymers and plasma chemistry.

"Biodegradation" is the subject of the sixth chapter. Here the author mentions the modes of biological degradation and discusses the enzymatic degradation of polysaccharides, proteins, and nucleic acids; the microbial degradation of synthetic polymers; and the synthesis of biodegradable polymers.

The last chapter is devoted to "Chemical Degradation" and approaches the solvolysis problem, reactions of olefinic double bonds, oxidative degradation, ionic degradation, and reactions with air pollutants.

This volume is a valuable contribution to the scientific knowledge of principles and applications of polymer degradation. It is based on hundreds of references and is recommended to students, engineers, chemists, and researchers in the polymer chemistry and technology field.

Dorel Feldman