may achieve practical results. The author's weak boundary layer theory is the general theme of this volume. That is, a proper adhesive joint is present when a weak boundary layer is absent; conversely, an improper joint indicates the presence of a weak boundary layer. The author stresses the idea that in order to account for the experimental strength of an adhesive joint, it is necessary to know the geometry of an adhint, the texture of the adherends and other macroscopical and mechanical factors associated with the adhesive bond. In line with this reasoning, it is evident to the reader why certain concepts (e.g., van der Waals forces, polarity) have not been included in the book.

This volume is very well organized, and the author is to be complimented for making such a very complex subject so clear to the reader. The text covers, in detail, solid surfaces, adhesive joints, formation of adhints, tack, setting, final strength of adhints, improper adhints, stresses in proper adhints, experimental strength of adhints, testing methods and a practical summary. This book continues to be of importance in explaining the mechanics of adhesive bonding and, therefore, must be included as a standard for the adhesives and coatings technologist.

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Fracture in Polymers. E. H. Andrews. American Elsevier, New York, (Oliver and Boyd Ltd., London), 1968. 204 pp. $10.00.

Chap. 1; 36 pp.; The Nature of Polymeric Solids; long-chain molecules, crosslinks and networks, molecular flexibility, the glass transition, mechanical properties of polymers, microstructure of polymers. Chap. 2; 35 pp.; Fracture Phenomena in Polymers, I; fracture, modes of fracture, fracture under direct loading. Chap. 3; 37 pp.; Fracture Phenomena in Polymers, II; creep fracture, crack propagation, fatigue fracture, corrosion cracking, wear, fracture and the microstructure of polymers. Chap. 4; 22 pp.; Initiation of Fracture; theoretical and actual strengths, flaw theory of fracture, generalization of the flaw theory, time-dependent fracture, fracture in polymers as an initiation-controlled phenomenon. Chap. 5; 44 pp.; Propagation of Fracture; controlled fracture, characteristic fracture energy in elastomers, the distribution of stress around a crack tip, creep fracture and tensile strength in elastomers, fatigue fracture, stress-corrosion cracking in polymers. Chap 6; 21 pp.; Fracture Surfaces; microstructural observations in fracture surfaces, fracture markings involving microstructure and the behavior of the fracture itself, markings caused by behavior of the fracture front, the study of stress-corrosion phenomena by microscopy, summary.

From the author's preface:

"Fracture is, of course, a phenomenon of great scientific interest as well as practical importance, and it is hoped that this book may be of interest and service to the purist as well as the engineering scientist. It may have some appeal even to the metallurgist since a familiarity with material as such is often expected of him today."

"My purpose in writing has been to present a comprehensive, logical and readable account of the subject. These aims are, to a certain extent, conflicting and a balance has had to be struck between exhaustiveness and clarity. If either has been sacrificed, it is the first of these and as a result some excellent research has received less attention than it deserves."

This book is neither a literature review nor a correlative view of the literature, but an attempt at an integrated delivery of the general topic. However, it is not a well-balanced delivery, since the contributions of Hsiao, Sauer, Marin, Dietz, Kolsky, Fedors, R.

Andrews, Nielsen, Salomon, Findley, Eirich, Freudenthal, Higuchi, Nadai, Shand, Coleman, Corten, Mooney, Zhurkov, Yokobori, Kobayashi, Ullman, and a host of equally important builders of the basic literature are ignored (or "sacrificed") while a disproportionately generous attention is placed on the contributions of E. Andrews, Braden, Gent, Berry, Greensmith, Haward, Thomas, and Vincent, all of whom originate from the same small sector of the globe. Moreover, there is a far firmer penetration of the rubber literature than that for fibrous materials or plastics; nothing is provided on structures; and overly brief mention is paid to composite materials.

The volume's restricted length inhibits the author's desired clarity at virtually every step of his delivery. Although the book might serve several of the basic-information needs of the chemist and chemical engineer, it has neither the proper approach nor the proper subject-matter to be as useful to most members of other disciplines.

Nevertheless, this volume is the first written on the topic of fracture of polymers that takes a distinctly instructive approach. It is authoritatively written and maintains a firmly physical or quantitative bearing throughout. A good percentage of the subject matter is correlated for the first time. Despite the omnipresent confinement imposed by its brevity, the book is a fully welcome addition to the summarized literature on a very timely and critically important domain of study. The volume might find application with instructors of this subject but, as a brief and excellent stimulator of interest, it probably will be best suited for library accessibility for the oftentimes overly neglected technical browser or scientific novice. Undoubtedly it will be the forerunner of a number of future books having similar educational objectives.

The volume is expensive for its modest size and style, but is well edited, bound, and reproduced.

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Weatherability of Plastic Materials. Applied Polymer Symposium. M. R. KAMAL, Ed. Interscience, New York, 1967. viii + 306 pp. $7.95.

With the increasing use of plastics as building material and for other outdoor applications, the weathering characteristics become a decisive factor in the selections of plastics. Their importance was recognized by the National Bureau of Standards and the Manufacturing Chemists' Association which sponsored a symposium on this subject in February 1967. This volume contains 19 papers presented by experts in industrial and research testing laboratories.

The simultaneous exposure to ultraviolet light, oxygen, ozone, moisture, thermal energy and air pollution causes discoloration, embrittlement, degradation, chain scission, and crosslinking. Materials under stress crack more readily than annealed ones. Since attack starts at exposed surfaces, thicker test specimens have longer outdoor life. Efforts have been made to correlate outdoor exposures at different locations with accelerated weathering tests. It is shown that one year exposure of polyolefins in Arizona corresponds to 2 years in Oklahoma or to $3^1/_2$ years in Ohio. Daily and seasonal variations in the actinic portion of sunlight have been measured.

Improvements in accelerated weathering tests are reported. Xenon arc light simulates most closely the ultraviolet emission of the sun. Visual effects, like fading, blistering, chalking, cracking, delamination, flaking or darkening, and change of physical properties are discussed. Predictions of the life of formulations in outdoor environments