

Book Reviews

Adhesion—Fundamentals and Practice

The Ministry of Technology (U.K.); Maclaren: London, 1969. 7½ in. × 10 in.
xiii + 308 pp. 130s

THIS book is the report of a conference held at the University of Nottingham in September 1966, and because it is a conference report it will be of only limited value to anyone wishing to gain competence in a new field. Its serious readers will be, in the main, already engaged in research on adhesives. For them, the aid of the book (and of the conference)—to bridge the gap between theoretical concepts of adhesion, and their practical application to adhesive joints—has been amply achieved, as may be judged from the distribution of papers among the topics covered. There are 24 papers grouped into 5 sections under the headings: the adherend surface (6 papers, 55 pages), preparation of the adherend surface (5 papers, 34 pages), the adhesive (5 papers, 57 pages), joint design (4 papers, 49 pages), and methods of testing (4 papers, 53 pages).

The three principal theories of adhesion, the diffusion theory of polymer-polymer adhesion, and the adsorption and the electronic theories of polymer-polymer and polymer-metal adhesion are discussed by VASENIN, SCHONHORN, and DERJAGUIN (the originator of the electronic theory). These three contributions, and those of WEAVER on adhesion to high energy surfaces (e.g. polymer-metal adhesion), and ELEY and RUDHAM on the wetting of metals by adhesives (epoxy polymers-aluminium) are the ones most concerned with the chemistry of adhesion, but the other papers contain much practical information on aspects of adhesion ranging from the high temperature bonding of aluminium to non-destructive testing methods for glued joints.

The book has a curious format. The left hand margin extends a third of the way across the page. Perhaps this extravagance accounts for the high price.

T. B. GRIMLEY

Infra-red Spectra and Structure of Organic Long-chain Polymers

ARTHUR ELLIOTT: Arnold: London, 1969. 5½ in. × 8½ in. 120 pp. 35s

THIS short textbook is intended as an introduction to the infra-red spectra of polymers for those concerned with molecular biology and polymer technology.

The first chapter is a very brief introduction to the principles of infra-red spectroscopy. This is followed in Chapter 2 by a useful up-to-date survey of experimental methods.

Chapter 3 discusses the principles of vibrational assignments. The classic analysis of the polyethylene spectrum by KRIMM, LIANG and SUTHERLAND is reviewed in some detail, together with related work by other investigators on this polymer.

The uses of polarized radiation are considered at length in Chapter 4, and the author goes to some trouble to develop the formal relationship between dichroic ratios and various models for molecular orientation. There is then a discussion of some typical applications of polarized infra-red spectroscopy.

Finally Chapter 5 consists of a review of a few selected topics such as hydrogen bonding, deuteration, and differences between the spectra of crystalline and amorphous polymers.

It can be seen that this book takes the form of an extended review article on the infra-red spectroscopy of polymers, and each individual chapter is a self-contained unit. This will prove an advantage to those who wish to seek Dr ELLIOTT's advice on a particular topic although it does lead to some duplication, e.g. repeated discussion of optical densities in Chapters 1, 3 and 5.

A more serious criticism of the book is that it deals rather briefly or not at all with several topics of major importance. For example, chain folding is only mentioned in a passing phrase, and the whole of the discussion on molecular conformation and stereoregularity is given without one illustration. In the discussion of rotational isomerism there is confusion concerning the terms *gauche* and *cis* and the distinction between rotational isomerism and stereoregularity is not made clear. A notable omission from the text is a discussion of copolymers.

In conclusion, this book presents a number of aspects of the infra-red spectroscopy in polymers, and is at its best in describing the various approaches to band assignments. It will prove valuable as an extended introductory essay on the subject by an acknowledged expert.

I. M. WARD

Autoxidation of Hydrocarbons and Polyolefins. Kinetics and Mechanisms

L. REICH and S. S. STIVALA. Marcel Dekker: New York, 1969. 6 in. × 9 in.
xi + 527 pp. \$29.75

REACTIONS involving molecular oxygen and organic compounds in both the gas and liquid phases are a very important class of chain processes and have been extensively studied both from an academic and a technological point of view. The mechanism of autoxidation in the liquid phase and in solution is the better understood, but overall discussion of the field has been lacking and this book supplies a definite need. Despite the title there is much consideration of the oxidation of organic compounds, such as aldehydes, containing other elements as well as carbon and hydrogen.

After an introductory chapter of a historical and general nature on chain reactions and polymers, the autoxidation and co-oxidation of low molecular weight hydrocarbons (and their derivatives) in the absence and presence of inhibitors and/or accelerators (particularly metal catalysts), involving the formation and subsequent reactions of various types of peroxide, is discussed in detail (Chapters 2-5). Stress is laid on the determination and values of rate coefficients of individual elementary reactions, and there is an interesting section on chemiluminescence during hydrocarbon oxidation. The last three chapters are devoted to the autoxidation of saturated polyolefins, and include methods of investigation (with special reference to polyethylene, polypropylene and polybutene-1) and the effect of the physical properties of the polymer. Problems are included at the ends of some of the chapters. This is an unusual feature in a book of this type, but they provide extra information (often from recent work) and interesting exercises in obtaining kinetic data from raw experimental results.

There is a tendency in some sections to become bogged down in too much detail, and the subject index (only ten pages) could, with advantage, have been much fuller. There are a few minor mistakes, though the correct text is usually obvious. However, all in all this is a most useful book, though the price seems high even for these days.

C. F. H. TIPPER

ANNOUNCEMENT

FIFTEENTH CANADIAN HIGH POLYMER FORUM

The Fifteenth Canadian High Polymer Forum, sponsored by the Macromolecular Sciences Division of the Chemical Institute of Canada and the National Research Council of Canada, is to take place at Queen's University, Kingston, Ontario, 3-5 September 1969. Details are obtainable from Dr R. ST JOHN MANLEY, Pulp and Paper Research Institute, McGill University, Montreal, Quebec, Canada.