

# Book Reviews

## Adhesion and the Formulation of Adhesives

W. C. Wake

Applied Science, London, 1976, pp 325, £15

For the last few years there has existed in the field of adhesion and adhesives a need for a book connecting the theory and the practice. This is the stated objective of this book by Professor Wake and one which is largely achieved.

The book is divided into two sections. The first part is concerned with the fundamental aspects of adhesion science and considers the types of interactions between bodies (including the adhesion of particles to surfaces and the formation of pellets), the role of surface topography and chemistry, theories of adhesion, stress distributions in joints, the relation of viscoelasticity to adhesive joint strength especially with respect to take. The final chapter in the first section looks at modes of failure and contains such diverse topics as the importance of weak boundary layers, the effects of adhesive thickness and strain rate upon joint strength and the creep and long term strength of structural joints. The composition of this first part is excellent but in an attempt to cover the whole field a few areas suffer in that they are not studied in greater depth. For example, some of the more recent work on the analysis of contact angle data could have been included and, while stress distributions in lap joints are well covered, information concerning stresses in other geometries is rather sparse.

The second part of the book deals with the types of polymers used as adhesives and the formulation of commercial adhesive systems. However, it is not the aim of this book to instruct on the detailed formulation of adhesives but rather to give the adhesive user some idea of the materials commonly employed in adhesive formulations and the functions that such materials serve. The various chapters achieve this objective and consider the general types of materials used in adhesive formulations, structural adhesives, sealants, natural polymers as adhesives, adhesion to textiles and the effect of the operating environment on adhesive performance. However, surface preparation is one topic somewhat overlooked and expansion of the small section devoted to this would be of benefit, especially if the author maintained his theme of linking any underlying science to the present technology.

In summary, therefore, this book will be of considerable assistance to those working in technical service or research and development departments of adhesive and polymer manufacturers or in material science departments of polytechnics and universities. Further, it will be of special interest to the graduate new to the adhesion and adhesives area. It will be readily

understood by engineers, chemists and physicists alike.

A. J. Kinloch

## Resinography—an Introduction to the Definition, Identification and Recognition of Resins, Polymers and Fibers

T. G. Rochow and E. G. Rochow  
Plenum Press, New York, 1976, \$30.00

Based on the references in this book, the subject of resinography is more than 20 years old, but to date it has not received much attention, and certainly not in this country. This is a pity, because of its importance in polymer science and technology, and in analytical chemistry. Unfortunately this book, which is the first of its kind, is not as useful as it might be, bearing in mind the standing, experience and enthusiasm of its authors.

This is an elementary book, which whets the appetite without satisfying it, like a dish of Indonesian food with nothing solid to get one's teeth into. It contains a lot of unnecessary material on the structure and properties of polymers which can be found in a host of elementary texts on polymer science. It is written at the level of the first-year undergraduate, which makes it of little use to the practising polymer technologist or analytical chemist needing a book on this subject. What the latter need is a book of narrower scope, written in much more depth.

The first third of the book is general and introductory, and since this is rather a short work, all too little space is left for dealing with resinography proper. It is a pity that the remaining two-thirds is mainly descriptive and qualitative. This can be illustrated by considering the subject of two-phase materials such as composites and semi-crystalline polymers, and their examination under the optical microscope. The things which the technologist wants to know about such materials are the volume fraction of the phases, the particle size and particle size distribution and so on. These are important features of such materials (studied by techniques developed in quantitative metallography) and can be measured easily by optical microscopy. Such parameters can be related to many physical properties. Unfortunately the authors make absolutely no mention of how these simple structural features can be quantified (for example the measurement of volume fraction by linear intercepts). Similarly the microtesting of surfaces is only touched upon, whilst the measurement of birefringence is not mentioned. There is nothing on sample preparation, or on laboratory techniques generally. This is a very great pity, because there is a real need for a text-book

on resinography, and a worthwhile market for a suitable book.

L. Holliday

## Polymer Blends and Composites

J. A. Manson and L. H. Sperling  
Plenum Press, New York, 1976, pp 513, \$47.40

The demand for more versatile materials with novel combinations of properties has led in recent years to the development of a wide range of polymer-based composites. The authors of this monograph present a unified discussion of the field in book form, a task that has not previously been attempted. The coverage is comprehensive, ranging from elastomer blends to polymer-impregnated concretes, and drawing upon a very substantial body of journal and patent literature, including French, German, and Japanese sources. The standpoint adopted is essentially that of the physical chemist, or materials scientist with a background in chemistry. Methods of manufacture, factors affecting morphology, and relationships between structure and properties are discussed for each type of blend or composite considered.

The first two chapters are introductory. Chapter 1 is a brief review of polymer science as applied to homopolymers, and Chapter 2 is concerned with mixing and the properties of polymer mixtures. In this introductory section the treatment is necessarily condensed, and the reader unfamiliar with the subject area might consequently find some difficulties. However, this criticism does not apply to the remainder of the book.

Chapters 3 to 9 are devoted to polymer-polymer composites: rubber-toughened plastics, block copolymers of various types (including segmented polyurethanes and crystallizable block copolymers), miscellaneous graft copolymers, interpenetrating networks, elastomer blends, bicomponent fibre systems, and even wood. The following three chapters are concerned with polymer composites in the broader sense: carbon and silica reinforcement of rubbers, polymer impregnation of wood and concrete, and particle- and fibre-reinforcement of plastics. The final chapter covers current and future fields of interest.

The authors are to be congratulated upon a book that is not only comprehensive, but also readable and stimulating. The work is copiously illustrated, with no fewer than 311 separate diagrams. In general, the format is of a high standard, although one or two of the graphs (e.g. Figures 1.30 and 3.22) would have benefited from being printed on a larger scale. Scientists and technologists with an interest in polymer blends will undoubtedly want to have this book on their shelves.

C. B. Bucknall