

of spectrochemical techniques (ion scattering spectrometry, secondary ion mass spectrometry, Auger electron spectrometry, x-ray photoelectron spectroscopy) combined with microscopy in the 'detective' work of deciding the exact mode of failure of adhesive joints. The information on the chemical nature of the surfaces obtained by the above-mentioned techniques helps in the clarification of the mechanism of failure of adhesively joined substrates.

Also in the first section, A. A. Roche, M. J. Romand and F. Sidoroff describe the use of a three point flexure test on single adherend/adhesive specimens: the supporting evidence shows clearly that this new test is 'sensitive' to the chemical nature and topography of the adherend and, therefore, the material properties of the adherend/adhesive interface.

It is impossible to review each contribution in a volume of almost 1000 pages but I am sure that every reader will find several interesting papers in each of the six parts—whether interest lies in 'Influence of surface roughness on mechanical properties of joints' or 'The effect of surface treatment on the wettability and bondability of low surface energy materials' or a second contribution to the application of 'The three point bend test for adhesive joints' (alternatively known as the short beam test). If interest is in oxide layers, dental adhesion testing or non-destructive testing, there are interesting contributions in this comprehensive (both large and expensive) volume.

V. Vohralik

Pharmacy/thermomechanics/elastomers/telechelics (Advances in polymer science, Volume 76)

Edited by K. Dušek, Springer-Verlag, Berlin, 1986. pp. ix + 191, price DM 118.00, £40.00. ISBN 3-540-15830-8

Volume 76 contains four contributions which bear little relationship to each other.

The first contribution, on 'Polysaccharides in pharmacy', presents the current status of knowledge concerning the different applications of polysaccharides in pharmaceutical systems. After discussion of general properties of polysaccharides and derivatives with industrial applications, the review describes the different classical pharmaceutical systems and future forms for dosage which are currently being developed. The major portion of the text is a listing of the most frequently used polysaccharides and derivatives. This provides information on biological origin, chemical structure and the pharmaceutically useful physicochemical properties. The contribution concludes with a discussion of the effect of structure of biopolymers on the immune system and on the activity of tumour cells.

The second article, 'Thermomechanics of polymers', reviews recent developments, divided into four sections on the theories of thermomechanics of polymers in both crystalline and glassy states; thermomechanics of molecular networks and rubberlike materials such as filled rubbers, block or graft copolymers and bioelastomers; and the thermomechanics of solid polymers in drawn and undrawn states.

The third review, on 'Carbon black: surface properties and interactions with elastomers', is a short account of surface chemical interactions of carbon black, on the properties of filler reinforced rubbers, with the different parameters available for

the characterization of reinforcing fillers; the nature of filler-elastomer interactions; the effects exerted by the filler on stress-strain properties; and the chemical interactions which take place through surface functional groups or reactive hydrogen atoms are discussed. The review is concluded by a brief discussion of the effect exerted by the filler-elastomer bonds in the reinforcement process.

The final contribution, on 'Functionality and molecular weight distribution of telechelic polymers', describes the theory and practice of the assessment of polymers with particular properties. Apart from molecular weight distribution, assessment of these polymers requires characterization via the newly introduced functionality type distribution. The major portion of this contribution deals with a method for assessment of the complicated parameter of functionality type distribution. The further development of the method for the analysis of other types of macromolecular homogeneity is discussed briefly.

The diversity of the subjects within this single volume makes recommendation for purchase by an individual very difficult. It should be purchased by libraries associated with large or diverse groups working in macromolecular chemistry where the various contributions should be read by research workers in these particular fields.

J. F. Kennedy
C. A. White

Fundamentals and applications of chemical sensors

Edited by D. Schuetzle and R. Hammerle, ACS Symposium Series, No. 309, American Chemical Society, Washington, D.C., 1986. pp. x + 394, price \$74.95 (USA & Canada), \$89.95 (rest of world). ISBN 0-8412-0973-1

The science and technology of chemical sensors is a multidisciplinary activity which interfaces with mainstream polymer science. Thus, there are the polymer matrices for physically trapping and for covalent attachment of sensors, protective membranes to promote selectivity and for excluding poisoning agents, and sensitive membranes as in some types of gas sensors which are essential components of the sensors themselves. Therefore, any reader of this book whose prime interest is in polymer science should approach its contents with an eye towards the properties and quality of those polymeric matrices and membranes which are frequently so central in obtaining the best from chemical sensors.

The book itself is the product of a Symposium held in 1984 at Honolulu, although many of the papers were first presented at the ACS Meeting on Microsensors for Chemical Detection, Identification and Analysis held in April 1983. However, the book is not truly representative of the whole field, in view of its restricted size, but is nevertheless, a significant contribution to the science of chemical sensing.

The 23 papers include 7 from Japan, 1 from Canada and the rest from the USA. Apart from an extremely interesting final paper on subcutaneous-type glucose sensors for an implantable or portable artificial pancreas by a group of eight authors from Nagoya, the papers of Japanese origin are on gas sensors. Indeed, gas sensors form the theme of half the papers, with general sensors for liquids and solids (4 papers), environmental sensors (4 papers) and biosensors (3 papers) being the other themes covered. There are 2 general discussions: one covering