In conclusion whereas there are several criticisms about the accuracy of some of the contents of the book (and others could be added to the above list), the reader must not overlook the merits emphasized earlier. The interpretations of yielding phenomena through crazing and shear deformations, and the methodology used to quantify the relative contribution of each of these processes have thrown so much light on the fundamental principles of toughening that they will undoubtedly enable the reader to transfer this knowledge to other situations, such as composites based on particulate and fibrous fillers.

L. Mascia

Proceedings of the Royal Society of London. A. A Discussion on Rubber Elasticity. Volume 351

The Royal Society, London, 1976, 112 pp

This timely discussion meeting, organized by the Royal Society in November, 1975, deals with a branch of physics which has long entered into its second century: rubber elasticity. Indeed, the fundamental contributions made by Joule in 1859, briefly analysed by Price on p 332, may still arouse our admiration. The subject still presents much to challenge both theoreticians and experimentalists.

The introductory remarks by Gee set the scene for the expert and the newcomer, and delineates with precision the interplay between experimental labour and theoretical analysis. The state of play in 1975 is then summarized in one slim volume, from the view-point of mechanics by Treloar, of statistical mechanics by Flory, of thermodynamics by Price, and by Allen from the vantage position of network structure and molecular dynamics. Finally Edwards sets out to dig more deeply to the roots of the physics, where the dynamics of chain molecules and thermodynamic theory meet under the aegis of Boltzmann and Gibbs respectively. The proper treatment of constraints is essential if the Gibbs point of view is not to lead us into paradoxes and controversies, and Edwards sketches how this must be done. The power of the Wiener-integral formalism in compressing an immense amount of algebra is demonstrated by rederiving the Rouse equation and one may hope that more young theoreticians will be led to evaluate the virtues of functional distributions. Edward's point that one needs a really brief mathematical notation in order to proceed, is well taken. Whether this requires the operators to be drawn from the functional calculus, with the implied smoothing of knobbly molecules to continuous and differentiable curves, or whether the discrete world of atoms can furnish the equivalent combinatorial (discrete) operator calculus more directly, will perhaps remain open for some time.

A brief record of exchanges mainly by way of questions and answers, is appended to the lectures. The Discussion is warmly recommended to all who are (or should be!) interested in the rubbery state of matter from the experimental or theoretical angle – including biologists and material scientists, physicists and mathematicians, mechanical engineers and – last not least – chemists.

M. Gordon

Polymer/Physical Chemist

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