book (1976) on polymer solutions, Eisenberg advances the unfashionable opposite viewpoint that light scattering also is a colligative property and only appears otherwise since we convert the expressions into practical ones, where concentration is expressed as mass/volume. It is easy to verify that he is correct. Indeed both Rayleigh ratio and osmotic pressure are proportional ideally to the number of molecules/volume; the former is proportional additionally to the square of the molar mass. Possibly a more appropriate classification of chapters might be one according to the type of molar mass average yielded by the method.

There are many treatises on individual methods, but rather few devoted to the whole field. Of these, the English translations of one Chinese book and a Russian one do not seem to be widely known or available. 'Polymer Molecular Weights' (Ed. P. E. Slade Jr, 1975) covers the same subject matter as the book under review, but does so in two volumes with corresponding increases of 100 and 150% in overall length and cost respectively, which are important considerations. However, even when considered in isolation, Dr. Billingham's book is recommended as a welcome addition to the literature, and deserves a place in every polymer characterization laboratory.

M. B. Huglin

Macromolecules, Volume 1, Structure and Properties; Volume 2, Synthesis and Materials

H. G. Elias (Trsl. J. W. Stafford)

Plenum Press, New York and London, 1977, 1121 pp. $47.40

All who teach polymer science know how welcome a comprehensive text on macromolecular science could be, that dealt with the chemistry, physics and applications in not too elementary a manner. Professor Elias wrote the present work because of the lack he felt when teaching at the famous ETH at Zurich. Being aware of the author's distinction as a researcher, this reviewer approached the two volumes with high hopes of finding a convincing reply to the frequent request from students for such a work.

Alas, these hopes were not fulfilled. True, the coverage is wide, and the sheer learning often quite staggering. As a source book for the established researcher, many sections are serviceable; unfortunately experimental data and graphs are credited to authors by their names only, without bibliographical references. But Elias is not a book I would recommend to undergraduates or raw graduates, because the author's idiosyncrasies seem almost everywhere to obstruct the process of smooth transfer of knowledge which students rightly expect. With characteristic candour, the author has warned us in his preface: 'I take, of course, the blame for factual and conceptual errors, and for the transcription of the Irish 'Queen's English' translation of a Swiss–German text into German–American and any resulting mix-up.' Certainly there are some statements which I would not care for undergraduates to quote in examinations (Volume 1, p 284: 'Gaussian distributions rarely occur in macromolecular science'. Or *Ibid.* p 373: 'Thus, the melting-point really represents a primitive viscometer.') More seriously, graphical material and mathematical arguments are not presented with the requisite clarity. Figure 11–4 purports to explain how, in a Cartesian frame, a rubber chain segment changes shape in response to a macroscopic stretching deformation of the specimen. The direction of stretch is not indicated. The text simply states that the ends of the segment move away from one another. However, more chains segments contract than elongate when a specimen is stretched uniaxially: it matters how their end vector is oriented relative to the direction of stretch. Two pages later, the statement occurs: 'If, on stretching, the chain is elongated in one direction ($\alpha_x = \alpha$) and simultaneously contracted in the two other directions . . .' etc., then the customary equation of state is said to follow. However, no derivation which glosses over the required integration over orientations without mention can be convincing. Figure 7–1 is quite appalling. It is meant to illustrate diffusion across an interface whose position is not indicated. The accompanying text is confusing, and the relevant equation (7–10) lacks a square closing bracket on the left and sports a surplus factor dr on the right. Some percentage errors quoted after equation (6–19) for the two forms of the Stirling approximation are manifestly absurd.

The thermodynamics of polymer solutions is presented at some length, which is not surprising since Elias has made notable research contributions to this field. But the balance is not suitable for students. The re-replacement of mole fractions by volume fractions in the combinatorial entropy, the main result of the Flory–Huggins theory of old, is presented without proof as a necessary requirement, though undergraduate courses generally include a derivation of this approximation. Insufficient guidance is given, e.g. on deriving chemical potentials by differentiation of the free energy of mixing. Here most students are flawed because this free energy is (rightly) given per mole of lattice sites, and not per mole of polymer solution, which requires at least a hint, or even a sample differentiation.

The more factual material in volume two is less open to such criticisms. As one might expect from any author who takes up the challenge to scan such wide horizons, there are occasional misstatements which will irk the specialist. For example, on p 613, the assertion that the viscosity-average molecular weight does not assume high values at the gel point is wrong and contradicts equation (9–174). Despite all such disappointments, it would be churlish not to acknowledge that the work, and particularly the second volume, may prove valuable to establish researchers. It will give them a bird's eye view of those branches of macromolecular science with which they may be less familiar. The expert will take the occasional lapse in his stride; but the student will be better advised to turn to Flory's book published as long ago as 1953, for a balanced and lucid introduction to what he should learn.

M. Gordon

IUPAC Macromolecular Division News Bulletin

The IUPAC Macromolecular Division will sponsor the following meetings to be held in 1978:

25th International Symposium on Macromolecules, Tashkent, USSR, 10–14 October 1978.

Microsymposium on Polymer Dispersions, Dresden (GDR), May 1978.

The 26th IUPAC–International Symposium on Macromolecules will be held in Main (FRG), 17–21 September 1979.

The Commission on Macromolecular Nomenclature has completed an updated version on the Nomenclature of Regular Single-Strand Organic Polymers, which will be published in *Pure and Applied Chemistry*. Tentative recommendations dealing with (a) Stereochemical Definitions and Notations for Macromolecules and (b) Nomenclature and Symbolism of Copolymers, are expected to be issued shortly.

The Commission on Polymer Characterization and Properties which is charged with the coordination of activities of existing working parties and with the creation of new working parties, has decided to continue the various collaborative research programmes carried out by the working party on Molecular Characterization and the working party on Structure and Properties of Commercial Polymers, respectively. The first working party is presently engaged in a collaborative study of polypropylene and a propylene–ethylene copolymer.

The working party on Structure and Properties of Commercial Polymers has finished a study of the tensile properties of rigid PVC, to be published shortly in *Pure and Applied Chemistry*. A study on the effect of fillers on the mechanical properties of rigid PVC has also been completed and prepared for publication. Other collaborative studies in progress are concerned with the melt rheology of a SBS block copolymer and with the effects of molecular orientation in rubber-modified polystyrene.

The working party on Supported Polymer Films is planning to start projects on the analysis of functional groups in amino resins, on solvent–polymer interaction and on adhesion of polymer films.

Finally, a new working party on Thermodynamic Properties will start a collaborative study on the determination of glass transition temperatures. In the programmes of all working parties, university laboratories as well as industrial laboratories and various research institutes from different countries, are involved.

Further information may be obtained from the Secretary of the IUPAC Macromolecular Division: Dr A. J. De Vries, Rhone-Poulenc, Centre de Recherches de la Croix de Berny, 182–184 Avenue Aristide Briand, 92160 Antony, France.