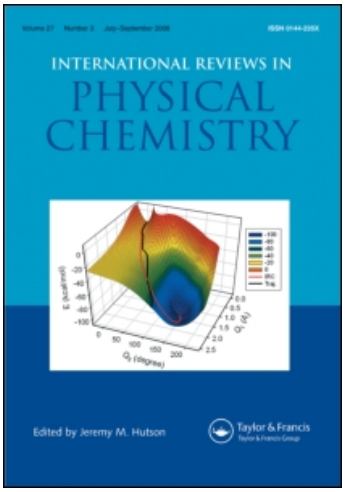

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BOOK REVIEWS

J. N. Murrell and E. A. Boucher. *Properties of Liquids and Solutions.* Chichester: Wiley, 1982. 288 pp. £19.75, $44.50 (hardback). ISBN 0 471 10201 6. £8.90 (softback). ISBN 0 471 10202 4.

The University of Sussex has a set of 'core courses' that are common to a wide range of science undergraduates. This book is based on one of them, and gathers together material that in other universities might be found scattered over (say) an introductory course on the kinetic theory of gases, first- and second-year thermodynamics, electrolytes, solutions, and more specialized third-year courses on the structure of liquids, chromatography, intermolecular forces, polymer solutions, and liquid crystals.

The advantage of the Sussex course is that old and new material is blended in a way that gives it a fresher look, which may be more appealing to students. The authors exploit this advantage by making full use of recent work on intermolecular forces, X-ray and neutron scattering and computer simulation (but not n.m.r.), without overburdening the text with too much difficult theory. A price has to be paid in that the earlier parts of the book are not always the easiest; thus there is a Fourier transform on p. 12, while the Clapeyron-Clausius equation for the latent heat is not reached until p. 82. Nevertheless the authors have clearly thought hard about minimizing such difficulties and the outcome is a book that I intend to try out as a recommended text for some second-year courses. Only at two points—a derivation of the virial equation of state, and the introduction of the chemical potential at the liquid–gas surface—did I think that they had not succeeded in simplifying often difficult theory without misleading the reader. There are also some trivial errors and misprints, but nothing that detracts materially from the usefulness of this ingenious, well-produced and reasonably priced book.

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S. F. Mason. *Molecular Optical Activity and the Chiral Discriminations.* Cambridge University Press, 1982. 273 pp. £20.00. ISBN 0 521 24702 0.

Historical perspectives can be valuable in writing about a field of current science. One must have an author sensitive to the history as well as expert in the science. The reader is here well served in both. Professor Stephen Mason had an early career as historian of science before turning, as it were, from surveying the edifice to helping by research to add to its structure. The result is a book which is more than usually readable and interesting on account of its careful and professional treatment of the development of the subject, and valuable for its specialist content.

The use of the plural *Chiral Discriminations* in the title points to the particular and disparate ways in which the enantiomers of chiral molecules are distinguished from one another in their behaviour in polarized light and in the force fields of other chiral molecules. The differences of interaction energies between two *laevo* molecules, and a *laevo-dextro* pair, are very small except at distances where they are packed tightly, and

even then are dwarfed by the total energies. Finding the difference reminds one of Coulson's description of getting molecular bond energies by subtracting the total for free atoms from the total molecular energy. He said it was like 'weighing the captain by weighing the ship with and without him'. Here, at the worst, we are weighing the captain's cap. The chapters of the book on optical methods however remind us that there we measure only the differences in properties, and not what is common to the optical isomers (i.e., refractivity and absorption coefficient upon which the small differences are built). On the other hand intermolecular discriminations, in $l-l$ and $l-d$ couplings for example, sometimes give differences directly, when displacements from an equilibrium can be measured, and sometimes only by subtraction of one large quantity from another, as in efforts to measure differences of heats of solution of enantiomers in a given optically active solvent.

Professor Mason guides with authority through optical activity, optical rotatory dispersion, circular dichroism, enantiomeric discrimination, and effects such as vibrational optical activity. They are discussed in systems of inherent dissymmetry, and in biaryl dimers, alkaloids, polymers, helical systems and coordination compounds. The style is largely descriptive, with formulae but no derivations. It is almost always lucid, notably so for example in describing the Cahn-Ingold-Prelog rules for assigning chiral sense; there are a few obscurities, as in the dipole-length and dipole-velocity formulae for optical strength, where the discussion of origin dependence in the electric dipole is hard to reconcile with the fact of invariance to origin of the lowest non-vanishing electric moment. Also in a second edition the author will perhaps embrace SI in all respects, not least in writing formulae built on Coulomb's law which, to an increasing number of students and their elders, only looks 'right' as $e_1e_2/4\pi\varepsilon_0 r_{12}$.

The pages are not right-justified. The lines have a life of their own as they jut and probe into the margin. Is this the aesthetic price we pay for new technology? A pity. One hopes that this great press is not pointing the way backward.

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John Shorter. *Correlation Analysis of Organic Reactivity: With Particular Reference to Multiple Regression.* Chichester: Research Studies Press (John Wiley & Sons Ltd.), 1982. 235 pp. £18.50. ISBN 0 471 10479 5.

Since the pioneering days of Hammett in the US (and Burkhardt on this side of the Atlantic), correlation analysis of organic reactivity has grown to cover a tremendously wide field. In this book John Shorter—one of its most respected and discerning practitioners—discusses specifically chemical reactivity, rather than the correlations of spectroscopic properties or biological activity which abound in the current literature. The heart of the book is four major chapters, dealing with the Hammett equation and its various progeny, particularly the Yukawa-Tsuno, Taft and Swain-Lupton treatments; the separation of polar, steric, and what used to be called resonance, effects; correlations of solvent effects; and various attempts to quantify nucleophilicity, including the Bronsted equation. These four chapters are sandwiched between an introduction to the relevant statistical methods, which deals with simple and multiple linear regression, and a final chapter which takes up more difficult associated problems, such as choice and significance of parameters, and goodness of fit.

The author writes for chemists with a first-degree level of knowledge of organic and

physical chemistry, but starts his discussion of the essential statistical methods from the beginning. Furthermore, the treatment is rightly kept as uncomplicated as reasonably possible: the organic chemist wanting to apply correlation analysis to his data, or simply to plan his series of experiments, is much more likely to be concerned with the practicalities of extracting a useful sensitivity parameter than with aspiring to mathematical rigour.

On its own terms the book succeeds admirably. The basic techniques—and problems—are discussed succinctly and clearly, recent developments are critically assessed, and the extensive secondary literature put usefully in context. This is now unquestionably the place to start for anyone wanting to apply correlation analysis to organic reactivity for the first time, and Dr Shorter's book will serve him well. It will also be read with pleasure as well as profit by those already working in the field.

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