Under analysis

D. Thorburn Burns

Quantitative Chemical Analysis.
By Daniel C. Harris.
W.H. Freeman: 1982. Pp.748. $31.95, £27.50.

TEACHERS of analytical chemistry will find this book to be useful and scholarly acquisition for their personal libraries. Whether or not they will recommend it for their courses is less certain as this depends, as for any teaching text, on how closely it fits their views of the subject and their syllabus. Interestingly, the text has already been evaluated by use, as it was developed from a manuscript used for two years at Franklin and Marshall College, mainly by life science majors but with some chemists.

Only a limited number of topics are included: statistics, chemical equilibrium, acid–base chemistry, electrochemical equilibrium, electroanalytical methods spectrophotometry, methods of separation and a set of 18 experiments. The text is beautifully laid out with wide margins, allowing the author to insert extra diagrams, data, side comments, additional explanations etc. without breaking the flow of the main text. Numerous worked (and fully explained) examples and boxes to deal with subsidiary topics (such as logic of approximations, meaning of negative *p*H, descriptions of demonstrations) divide the text into manageable sections.

The discussion of errors and the introduction to statistics are very clear, but the F and $(Chi)^2$ tests should have been included. The clarity and the depth of treatment of solution equilibria and the various applications are particularly commendable. The treatment of electroanalytical chemistry is likewise excellent and includes some very up-to-date items such as photo-assisted electrolysis and optically transparent thin layer electrodes.

By contrast, the sections on spectrophotometry and atomic spectroscopy are less detailed and hence less authoritative, although both contain some useful teaching material. Basic chromatography theory is developed clearly and fundamentally via the Craig countercurrent distribution process, although the discussion of specific forces of interaction in both liquid and gas chromatography is not detailed enough to allow development of separations *ab initio*. Some very interesting experiments are described, and each chapter is supported by a collection of exercises, problems and references to further reading. Overall, within its limits, this text is a refreshing addition to the literature. □

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Questions of insight

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Problems in Molecular Structure.
Edited by G.J. Bullen and D.J. Greenslade.
Pion: 1983. Pp.466. £16, $32.

IN *Problems in Molecular Structure* G.F. Bullen and D.J. Greenslade have compiled an excellent book, one which postgraduates in particular but also senior undergraduates on specialist courses will find to be most useful. An especially attractive feature is that each of the problems considered is accompanied by a very detailed answer; thus the average space devoted to a problem and its solution is in excess of two pages.

In all, 25 subject areas are included with an average of about eight questions and answers on each, the range being from three questions on solid-state nuclear magnetic resonance and on mass spectrometry through to 14 on ultraviolet and visible spectroscopy. The subject areas are further broken down into seven topics — symmetry, diffraction (including electron diffraction by crystals), vibration–rotation spectroscopy, electronic properties (ranging from photoelectron spectroscopy through ORD/CD to electron spin resonance and magnetic and electric multipolar moments), nuclear spectroscopy, mass spectrometry, and structure and energy. The final one of these contains what is possibly the last contribution by the late C.A. Coulson, who has written a section on wave functions and bonding.

In about one-third of the sections there is a brief overview of the subject area which precedes the problems themselves. I found these introductions helpful and would have welcomed more of them, though they may be of less importance to the student seeking problems in a subject area which is currently being studied. In a book such as this it seems inevitable that space will be devoted to the problem of units. And, indeed, in addition to an appendix this is a topic covered in three of the overviews. Both here, and in the notations adopted in different sections, the editors have taken a broad-minded view which has resulted in a number of inconsistencies; these, however, are unlikely to represent a problem of their own.

The book will probably be read in a piecemeal fashion and is written with this in mind — answers tend to be free-standing, with little cross-referencing between sections. Overall, my impression is a very favourable one — even experts in a particular field will gain in insight by working through the relevant section of the book. □

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Physical attributes

John Avery

Basic Physical Chemistry.
By Walter J. Moore.
Prentice-Hall: 1983. Pp.711. Hbk $45.85, £32.25; pbk $25.95, £12.95.

Physical Chemistry, 2nd Edn.
By Ira N. Levine.
McGraw-Hill: 1983. Pp.890. $54.95, £27.75.

Physical Chemistry, 3rd Edn.
By Gilbert W. Castellan.
Addison-Wesley: 1983. Pp.943. Pbk $33.95, £14.95.

G.N. LEWIS once defined the scope of physical chemistry as including "everything that's interesting". Although that may have been an exaggeration, the range of topics covered in these three undergraduate physical chemistry texts is impressively wide. Besides chemical thermodynamics, electrochemistry, statistical mechanics, introductory quantum chemistry and crystallography, we have specialized topics such as biological membranes, bioelectrochemistry, enzyme catalysis, photoelectron spectroscopy, molecular spectroscopy, electron spin resonance, nuclear magnetic resonance, group theory, photochemistry, solid state theory and theory of the liquid state — even nerve conduction (Moore), photosynthesis (Castellan) and nuclear reactions (Levine).

All of this material ought to be part of the general background knowledge of serious students of the physical or biological sciences, but one can sympathize with those of them daunted by such a profusion of topics. In mitigation each of the three authors writes with sympathetic understanding of the difficulties likely to be encountered by undergraduates. They have included hints on methods of study, and two of them (Castellan and Levine) give lists of answers to the exercises. Levine also emphasizes important concepts by the use of bold type, includes a summary at the end of each chapter and leaves space for marginal notes.

All of the books are new versions of respected and widely-used textbooks, Moore's being a shortened and re-written version of his earlier *Physical Chemistry*. Many of the figures from that book reappear here, as does some of the text; but so much has been revised that it is correct to speak of a new book rather than a new edition. Moore's standpoint is closer to chemistry than to physics, and his book contains many tables of chemical properties. His method of exposition is descriptive rather than mathematical, and he often states results without giving theoretical derivations. This makes his book the most elementary of the three. By contrast, Levine, and to an even larger extent, Castellan, formulate the material in a mathematical way, so that the physics