Liquids has deservedly become one of the standard references in this field. [For a review of the first edition, see PHYSICS TODAY, May 1977, page 71.] Thus the appearance of a second edition, summarizing the progress during the past decade, is welcome indeed.

The first six chapters are similar in structure to those of the first edition. Some of the material has been rewritten and some minor errors have been removed.

In contrast, the second half of the book has been rewritten extensively. Regrettably, the chapter on phase transitions, which included discussions of melting and the scaling hypothesis and renormalization-group approach for the liquid–vapor critical point, has been dropped. However, the chapters on time-dependent phenomena have been expanded, and chapters on ionic fluids, liquid metals and molecular liquids have been added. New material on inhomogeneous fluids (that is, interfacial regions) has been added. For my tastes, the treatment is too brief. Also, I would have preferred a separate, even if brief, chapter to having the material divided between the concluding sections of two chapters.

The chapter on ionic fluids is quite good. The Debye–Huckel theory and its extensions, including a brief mention of inhomogeneous ionic fluids, are covered quickly but well in 30 pages. Similarly, the chapter on liquid metals, which includes material on transport in Fermi liquids, is brief but useful.

I have mixed feelings about the final chapter, on molecular liquids. Michael Wertheim's beautiful solution of the mean-spherical-approximation integral equation for hard spheres with embedded point dipoles was the first major advance in the field of polar fluids since Lars Onsager's work four decades earlier. Thus I was pleased to see this work covered in detail and well. On the other hand, I found the discussion of Jack Kirkwood's formula for the dielectric constant of a polar fluid opaque, to say the least. I have yet to find anyone, even a specialist in polar fluids, who can follow this discussion. I would have preferred a derivation based on the asymptotic behavior of the direct correlation functions when test charges are placed in the polar fluid. Such an argument makes clear that all that is involved is Coulomb's law. Also, I question whether interaction-site models of molecular fluids need have been included. Such models when applied to polar fluids give only an ideal-gas treatment of the dielectric constant. The same space plus a few more pages might well have been used to discuss melting or the critical point, however briefly.

The book is not suitable as a text. For example, in a course Wertheim's solution of the Percus–Yevick equation for hard spheres should be covered in detail, both for completeness and to illustrate the Laplace and Fourier-transform techniques used in the solution. Hansen and McDonald do not give the solution, except in an appendix, and there only in part. They only briefly summarize some of Wertheim's results and do not even give his results for the Laplace transform of the radial distribution function, the most valuable result. There are no problem sets. The book should be useful, however, for a mature scientist seeking a guide to the literature in the theory of liquids.

Complaints about the price of a book probably serve no purpose but to indicate the age of the reviewer. However, even by present-day standards this book is expensive, in excess of 15 cents a page. Despite this, I highly recommend Hansen and McDonald's book for any institutional library and for the personal library of any scientist interested in this fascinating branch of statistical mechanics.

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Molecular Reaction Dynamics and Chemical Reactivity

Raphael D. Levine and Richard B. Bernstein
Oxford U. P., New York, 1987. 535 pp. $39.95 hc

ISBN 0-19-504139-9

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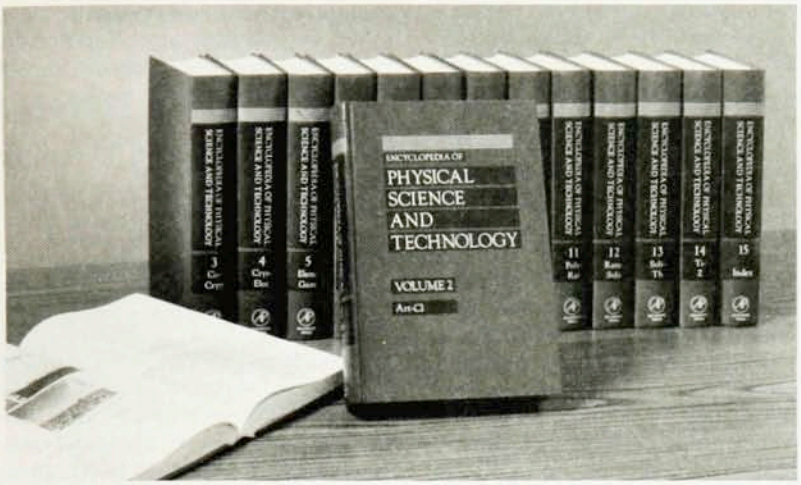

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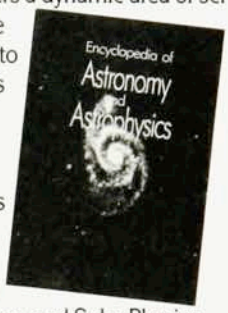

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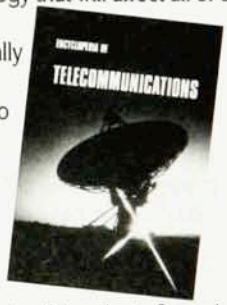

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lar reaction dynamics, and it is a most welcome and useful text for advanced courses in kinetics or molecular collision dynamics.

The authors set themselves the goal of providing an understanding of chemical reactivity and physical rate processes from a microscopic point of view. The emphasis is on phenomena and their conceptual interpretation rather than on the details of experimental techniques or theories. Among the topics discussed are dynamics of molecular collisions; intermolecular potentials and potential energy surfaces; molecular- and ion-beam scattering; "direct" versus "complex" modes of reaction; reagent state selection and product analysis; photofragmentation and multiphoton dissociation; electronic, vibrational and rotational energy transfer; chemical lasers and laser chemistry; van der Waals molecules and clusters; molecule–surface interactions and reactions; and stereospecific dynamics.

The seven chapters of this book will provide a very enjoyable experience for those who are learning chemical reaction dynamics for the first time. The text is exciting to read, and the enthusiasm of the authors for molecular reaction dynamics is both encouraging and contagious. Every subject and every example are treated carefully and presented clearly, and the authors have refrained from injecting their own personal biases into their predictions for future developments. Through detailed and lucid presentations, the authors have successfully included all the basic elements of molecular-level chemical kinetics that one might wish to cover in an advanced chemical kinetics course. More importantly, they provide a very clear picture of what has been accomplished in the past, what is going on at present, and what exciting directions await for us to develop further.

For those who are familiar with the literature of chemical reaction dynamics, this book offers a very useful source of data on reaction mechanisms and an excellent review of this fast-moving field. The extensive and exhaustive collection of references will be of great help to novices who seek a historical perspective as well as a firm grounding in fundamental chemical kinetics.

It is certainly rare to find a book that can serve as a beginning text and at the same time provide an extensive and up-to-date review of the microscopic approach to chemical reactions. This text is clearly the culmination of decades of exceptional research and teaching by both Levine and Bernstein, who have drawn extensively from their experience in writing and editing numerous books on the subject. *Molecular Reaction Dynamics and Chemical Reactivity* should be recommended to every working chemist and every graduate student without reservation.

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Fiber Optic Communications

Joseph C. Palais
Prentice–Hall, Englewood Cliffs, N. J., 1988. Second edition. 291 pp. $30.00 hc
ISBN 0-13-314527-1

Fiberoptic communications continues its significant and rapid expansion in data telecommunications and other applications where photonics-based information processing offers an advantage. This revision of a 1984 book incorporates information on some of the major advances in the field as well as adding problems to each chapter to improve the book's usefulness as an introductory tutorial.

Quite a few books of similar title have appeared over the past decade, with contents ranging from compilations of loosely connected paper reprints to highly theoretical or technical discussions at the lightwave component and system level. Within this spectrum, Joseph Palais's treatment of the subject is a fundamental one, aimed at explaining design and physical operational principles to the person new to the subject. It is easy to read and provides excellent block diagrams and figures to illustrate concepts. The book is organized in a logical manner: The reader first learns the general system elements and their integration, then specific principles and component functions, and finally the considerations that go into designing, specifying and evaluating a fiberoptic system and its components. The problems and their solutions, which are richly embedded throughout the chapters of the book, provide one with an immediate opportunity to test one's understanding.

The book stands as one of the best textbook introductions to fiberoptic systems written to date, and I recommend it for use in the college classroom as well as for scientists and practicing engineers entering the field. The author is a professor of electrical and computer engineering at Arizona State University, and his treatment of the subject results from his extensive experience in delivering short courses. Much of the content is