and *Light Waves and Their Uses* (U. of Chicago Press, 1961), his published papers, or a scientific evaluation of his work, such as J. M. Bennett, D. T. McAllister, and G. M. Cabe, Appl. Opt. 12, 2253 (1973).

Here are some examples of the type of errors the reader will encounter. In chapter 3, "The Speed of Light," Michelson's measurements in air are compared with Foucault's, mostly by means of three illustrations. Unfortunately, one of the two on Foucault's method (figure B, page 51), actually shows a detail of his earlier experiment to determine the relative velocities of light in air and in water, for which he placed the lens in a different position with respect to the rotating mirror; and the legend to the figure on page 52 illustrating Michelson's method includes a misstatement regarding distances. In chapter 4, "The Luminiferous Aether," some of the symbols in the schematic diagram of Fizeau's apparatus for measuring the Fresnel drag coefficient on page 72 do not correspond to those in the legend, making it difficult to understand the principle of the experiment. And a typographical error in the legend to the diagram of the "Michelson interferometer" on page 79 explaining the principle of the ether drift experiment confuses the physics of the entire experiment.

These errors, and others like them, do not detract from the basic value of the book. Its merit lies in the masterful way the author has melded voluminous information from many sources into a sensitive and realistic portrait of Michelson, showing him as a very real person with strengths and weaknesses, and showing his relation to scientists and the science of his period. It is a book well written and well worth reading by physicists and non-physicists alike.

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## Theory of Unimolecular Reactions

**W. Forst**
445 pp. Academic, New York, 1973. $29.50

Statistical theories are quite useful when a full description of the system is impossible or impractical. One such is the Rice-Ramsperger-Kassel-Marcus theory. This book deals with the successful RRKM theory of unimolecular reactions and its relation to internal and external activation systems through the formation distribution function. The book presents an up-to-date treatment along with numerous literature references. Wendell Forst has contributed to the methods of calculating energy-level sums and densities and delineating the role of rotational energy. The book should be helpful to workers in the field who want the formalism and why's of RRKM calculations with less emphasis on experimental systems. Consequently this book should complement the recent and successful *Unimolecular Reactions* by P. J. Robinson and K. A. Holbrook and the compilations of S. W. Benson and H. E. O'Neal *(Kinetic Data of Gas Phase Unimolecular Reactions)*.

The book is divided into two parts composed of 142 and 252 pages, respectively. Part I presents and discusses the formalism of RRKM theory while Part II applies the theory to appropriate systems.

The unimolecular rate constant is defined and discussed in a formal way in the first, the shortest and the most difficult chapter to read—after chapter 1, I enjoyed a downhill reading trip. The presentation of potential-energy surfaces was good, and the addition of the rotational potential to form an effective potential was novel and quite satisfactory. The various methods (exact and approximate) of calculating energy-level densities were presented in a rational and understandable sequence. His discussion of reaction-path degeneracy and symmetry numbers was somewhat abbreviated—adequate for the informed but inadequate for the neophyte.

One of the strengths of the book is the tying together in Part II of thermal reactions, chemical and photochemical activation systems along with the fragmentation of ionized species produced by electron or photon impact, charge exchange, autoionization and field ionization. A discussion on energy partitioning in unimolecular decompositions is also presented from the statistical point of view.

In the last chapter Forst presents a brief discussion of relevant transition states. Simple bond-fission models as described by Forst differ somewhat from those that have been published. His argument "for" or "against" (I could not decide) the reaction-path degeneracy of three assigned by Rabinovitch for the methyl and ethyl isocyanide isomerization was confusing.

An appendix contains listings of computer programs for those interested in calculating sums and densities used for RRKM rate constants.

The book is relatively free of errors. I was somewhat disappointed, however, that Forst used $E^*$ to represent the energy of the activated complex, contrary to the current literature where $E^*$ represents the energy of the energized species and $E^+$ the energy of the activated complex. This will be ini-

tially somewhat confusing to one who is familiar with the literature.

This book could be used successfully as a text for an advanced (graduate-level) course in chemical kinetics dealing specifically with unimolecular reactions. It contains problems at the end of each chapter, most of which are simple but informative. It should also be useful for anyone involved with unimolecular processes and hence I recommend it to kineticists involved in active research pertaining to unimolecular reactions. The book should provide a common language for mass spectroscopists, photochemists and kineticists to discuss their problems and thus develop more communication between these different research-oriented groups.

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## The Liquid State

**F. Kohler, ed.**
256 pp. Crane, Russak, New York, 1972. $32.50

Several monographs on the liquid state have appeared within the past decade, but these are for the most part devoted to the description of the properties of the simplest liquids. *The Liquid State,* edited by Frederich Kohler, is different, being much more like an extended review article. The topics covered range from elementary-thermodynamic considerations, through equilibrium and nonequilibrium statistical mechanics in the distribution-function representation, and include discussion of the properties of complicated hydrogen-bonded liquids. I feel that the general level of discussion is excellent for the purpose of introducing the reader to the key ideas and providing literature references for further research. This is not a volume that one studies to learn in detail about liquids. It is a volume that can be recommended to anyone interested in a broad survey with enough detail to provide interesting examples and to elucidate both successes and difficulties of the current level of understanding. I would have no hesitation in recommending it to first-year graduate students or even good seniors as a source book of information.

Given the above statements, I can find no better way of describing the contents than to list the chapter headings which are: Models for the Liquid State, Computer Experiments, Pair Distribution Function, Pair Potential, Thermodynamic Properties of Liquids, Equilibrium Theories of the Liquid State, Non-Equilibrium Properties: Transport Coefficients, Non-Equilibrium Properties, Liquid Dynamics, Polyatomic Molecules, Molecular Reorientation in Liquids and Associated Liquids. The book belongs in all physics and chemistry departmental libraries.

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## Introduction to Biomechanic Analysis of Sport

**J. W. Northrip, G. A. Logan, W. C. McKinney**
338 pp. William C. Brown, Dubuque, Iowa, 1974. $8.95

Most of us have at least some interest in sports, and if we are interested in physics as well, the mechanics of sport is a fascinating subject. A number of good books on it are available. C. B. Daish's *The Physics of Ball Games* (English Universities Press) is an outstanding book, strongly recommended to readers of PHYSICS TODAY. Geoffrey Dyson's *The Mechanics of Athletics* (U. of London Press) and R. A. R. and B. J. K. Tricker's *The Science of Movement* (Elsevier) are good books designed for readers with little or no knowledge of physics.

*Introduction to Biomechanic Analysis of Sport* is designed for physical educators and coaches. Its aim is to improve their effectiveness as coaches by teaching them to analyse sport movements in physical terms. Examples are taken from numerous sports including baseball, gymnastics, swimming and all branches of athletics.

The book has three sections. The first is concerned with the range of movements of which the human body is capable. The structure of the skeleton is shown in a series of quite detailed drawings. Extreme positions of many joints are illustrated by photographs of athletes; they are often striking and generally clear, but the same points could have been made with less risk of being misunderstood if simple diagrams had been used.

The second section of the book is the longest and the least satisfactory. It is an introduction to the branches of mechanics that can be applied to sport. It is full of facile and potentially misleading attempts to explain physical principles. For instance, a passage about arm movements in running includes the sentence "This force–counterforce relationship of the arms helps maintain the body in an equilibrium position from which the legs can function most effectively to accelerate the runner." A coach needs a sounder and clearer understanding of mechanics