in proof generalize the result to less restricted cases.

The first third of the book is nominally on integration theory but actually covers far more. Linear functionals in L^p and C are covered, as are the Banach-Steinhaus and Hahn-Banach theorems. Finally, positive linear functionals are considered, culminating in the Radon-Nikodym theorem.

The Fredholm integral equation of the second kind is treated in L^2 by the Schmidt method, Fredholm's method, and a more abstract method based on complete continuity. Generalization is then made to Hilbert and Banach spaces, and applications are given. The symmetric case is then treated. Interesting and elegant applications are made to potential theory and almost periodic functions.

The spectral theory for bounded symmetric, unitary, and normal transformations in Hilbert space is given by two methods, the one of Riesz and the other of Nagy. Unbounded transformations are then considered and the spectral decomposition is obtained for self-adjoint transformations followed by extensions of symmetric transformations. The functional calculus of self-adjoint transformations and the perturbation of the spectrum are treated. A chapter on groups and semigroups of transformations follows, including the results of Stone and of Hille-Yosida. Ergodic theory is also presented. The final chapter treats spectral theories for linear transformations of general type giving applications to results of Wiener, Beurling, Gelfand, and von Neumann.

NORMAN LEVINSON
Mathematics Department, Massachusetts Institute of Technology

Gas Kinetics. An introduction to the kinetics of homogeneous gas reactions. A. F. Trotman-Dickenson. Academic Press, New York; Butterworths, London, 1955. 322 pp. Illus. $8.

In this relatively short book, the author gives a useful summary of the working equations of current theories of the rates of homogeneous gas-phase chemical reactions, a critical review and tabular summaries of experimental results (with the exclusion of reactions by molecular oxygen), and a detailed description and evaluation of several recently developed experimental methods.

After an introductory chapter, which includes a few tables of heats of formation, bond energies, and so forth, there is a long chapter on theories of chemical kinetics. This book is the first one to review N. B. Slater's theory of unimolecular reactions, and, after a full presentation of its features but not a derivation, a critical review is given of its advantages and disadvantages. A detailed presentation, again without derivation, of the transition-state theory is given, and use (mostly qualitative) is made of this theory throughout the book. There is a brief presentation of the collision theory of bimolecular reactions with reference to a convenient source of its derivation. The problem of energy transfer between molecules is emphasized and discussed in the language of Slater's theory. The critical presentation of these theories without derivation makes this chapter very full and rich, an excellent source of equations; but the book can hardly be described in terms of its subheading, "an introduction to the kinetics of homogeneous gas reactions."

The author's organization, presentation, and evaluation of experimental results (pp. 64–309) are outstandingly efficient and mature. In a typical family of reactions, there is given a rather detailed description of the experimental apparatus, a full mechanism that the author believes to cover the possibilities, a thorough discussion of the key reaction or else of a typical reaction in the series, an analysis of probable and possible errors both in the experiment and in the mechanism, and finally a complete table (sometimes five entries, sometimes 80) of all reactions in the series. Usually, these useful tables are resolved into elementary reactions, including activation energies and preexponential factors (these two quantities the author defines as "rate factors"); references are given for each entry; and often the author inserts an evaluation of the "reliability." The author has obviously worked through and recalculated a large number of key articles.

In judging a book of this type, which gives a critical condensation of a broad field, another worker in the field may agree or disagree with the author concerning specific evaluations, emphases, or omissions. Personally, I particularly liked Trotman-Dickenson's careful definitions of *elementary reactions, order,* and *mechanism*, but the definition of *rate* was surprisingly clumsy and uncertain; apparently the author is unaware of the well-established de Donder notation for the rate of reaction. The book, to its credit, contains frequent warnings against errors due to surface reactions, especially for slow reactions, low pressures, small bulbs; but there is no warning against the equally serious errors due to thermal gradients [S. W. Benson, *J. Chem. Phys.* **22**, 44 (1954)], which are worst for fast reactions, high pressures, large bulbs. It was a distinct disappointment to see the author on page 271 agree with the old treatment of the reaction $2NO + O_2$ with its out-of-scale 5-A bond lengths which supposedly undergo a grand free internal rotation; with methods of modern molecular spectroscopy one can do much better than this 20-year-old first approximation.

In spite of my disagreement on a few technical details, I regard this as one of the best books in the field.

HAROLD S. JOHNSTON
Department of Chemistry, Stanford University

Active Transport and Secretion. Symposia of the Society for Experimental Biology, No. VIII. R. Brown and J. F. Danielli, Eds. Academic Press, New York, 1954. vi + 516 pp. Illus. $8.

This book is the printed series of papers read at a symposium of the Society for Experimental Biology held in Bangor. It is the eighth of an annual series of symposium reports and combines in a single volume the research and thinking of outstanding investigators in the field of active transport, using both animal and plant material.

The first two reports, by J. A. Ramsay and Hugh Davson, are concerned with water and electrolyte movements in invertebrates and vertebrates, respectively, and the next contains a discussion by Thomas Rosenberg of how "active transport" should be defined. Davson mentions the experimental problem posed by fluids, such as the aqueous humor of the eye, which differ very slightly but significantly from those to be expected in a simple ultrafiltrate of plasma. Rosenberg "does not regard questions of terminology as a mere formality. Hazy definitions . . . are often the main obstacles to attempts to gain further theoretical and practical insight."

The next four papers are concerned primarily with movement of water. J. R. Robinson and J. A. Kitching present experimental data from a number of forms, the latter discussing "Animals without kidneys." Robinson stresses his view of nonequilibrium concentrations of water in extracellular and intracellular fluids in the same animal. J. W. L. Beament discusses water transport through model membranes and in insects, including the phenomenal ability of an ultrathin layer of wax to conserve water. D. C. Spanner suggests a means by which water transport could conceivably occur through temperature gradients while, at the same time, he recognizes the very serious objections to such a view. He is impressed, as others have been, by the very small temperature difference that is equivalent in effect to a large pressure difference.

A group of four papers on active transport in the erythrocyte follows. Paul G. LeFevre considers monosaccharides and