

is largely a collection and systematic presentation of work scattered rather widely through the current literature.

Briefly, the Slater theory attempts to describe the decomposition (or isomerization) of a molecule in terms of the normal modes of the parent molecule and their superpositions along specified directions. It is a successful molecular picture in that no ambiguous concepts are introduced and every parameter descriptive of the reaction rate is uniquely defined in terms of the normal modes of the parent molecule. There are, of course, many difficulties in the theory (i.e., the role of energy transfer between modes due to anharmonicity, the distribution of collisions, etc.) and the question of whether or not there is satisfactory agreement with experiment is still unsettled. However these difficulties alluded to are always well defined in the physical sense—even if one does not believe an approximation to be good it is an advance to know that it is an approximation and how the exact answer should in principle be obtained. In the reviewer's opinion, Slater's theory represents one of the most significant advances in reaction-rate theory in recent years.

The book is written in a charming personalized style all too often lacking in scientific treatises. It undoubtedly belongs on the bookshelves of all physical chemists—student and postgraduate.

**Fonctions sphériques de Legendre et Fonctions sphéroïdales.** By Louis Robin.—Vol. 1, 201 pp., 43.00 NF; Vol. 2, 384 pp., \$12.86; Vol. 3, 289 pp., \$12.42. Gauthier-Villars, Paris, France, 1957, 1958, and 1959. Reviewed by Philip M. Morse, Massachusetts Institute of Technology.

**S**TUDY of the solar system induced an early interest in fields with spherical symmetry and the nuclear atom has ensured a continued interest. Nowadays we cut our mathematical teeth on Legendre functions and we grow up on a diet of spherical harmonics, so to speak. Each of us has his preferred source of spherical formulas and definitions; some the earlier German Handbücher of Heine or the Neumanns, most of us the later English treatises of Ferrers or Hobson. One wonders whether another one is needed.

There have been recent developments, however, and there is still a place for a book which will discuss the details of these important functions and will treat in a consistent manner the interrelations between their various species. The usual authorities are annoyingly unhelpful, for instance, if one actually has to use the half-integer functions appropriate to toroidal coordinates. In these and similar respects the three volumes under review are a welcome and useful addition to the literature.

The first volume concentrates on the functions of integral order, of first and second kind, appropriate to the usual spherical fields. Their properties, their interrelations, their limiting values and zeros, the

expansion of other functions in terms of series of these functions, are all dealt with carefully and in considerable detail. The second volume treats the more refractory functions of nonintegral order, their integral representations, their expansion in hypergeometric series, their behavior near branch-points and singularities and their asymptotic expansions. In addition the general properties of series of Legendre functions are discussed, with a great number of specific examples. The third volume deals first with addition formulas and the zeros of the functions of both kinds and then goes on to discuss the special Legendre functions which are appropriate for the expression of potential fields in prolate and oblate spheroidal, toroidal, and conical coordinates. The last chapter first deals with the relation between Legendre and Gegenbauer functions and then utilizes these results to discuss spheroidal wave functions. Here the treatment, in general, follows the more specialized treatise of Meixner and Schäfer, *Mathieu'sche Funktionen und Sphäroidfunktionen*.

It will take a while to be sure, but this reviewer suspects he will come to use these volumes as a mine of useful formulas for Legendre functions, just as he has long used Watson for Bessel function properties. The text concentrates on the mathematical behavior of the functions; no specific applications are discussed; but within these self-imposed limits the treatment is quite detailed. As with most books printed on the continent, the typography is good and the equations are both readable and aesthetically satisfactory. As with most French texts, the index is quite inadequate.

**Theory of Elasticity.** Vol. 7 of Course of Theoretical Physics. By L. D. Landau and E. M. Lifshitz. Translated from Russian by J. B. Sykes and W. H. Reid. 134 pp. Addison-Wesley Publishing Co., Inc., Reading, Mass., 1959. \$6.50. Reviewed by Ellis H. Dill, University of Washington.

**W**RITTEN by physicists for physicists (as the authors state), this book presents the basic equations governing the deformation of a homogeneous continuum experiencing small displacements. This is a modern, graduate level treatment of the classical theory of elasticity. A knowledge of vector calculus is required; indicial notation and the summation convention are used throughout. Tensor quantities are identified but little use is made of the properties of a tensor. In particular, when curvilinear coordinates are used, physical components are introduced with elaboration.

In the presentation of fundamental relations, the authors are careful to reconcile the concept of stress in a continuous medium with the real nature of matter, i.e., the short-range action of the forces of interaction between molecules. The stress-strain law is derived from the principles of the macroscopic theory of thermodynamics based on the assumption that the deformation is a thermodynamically reversible process.