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Book Reviews

R. Levine, J. Jortner: Molecular Energy Transfer. Chichester, Sussex: John Wiley & Sons 1976. 310 pp., price: £15.40 ($30.80)

The present book is based on the presentations at the Israel Research Conference on Molecular Energy Transfer at Ein Bokek in December 1973. Through skilful editing and a very excellent though brief introduction the well-known editors Levine and Jortner present a publication which is of great interest to the chemical physicist in the experimental and theoretical field of molecular dynamics, with emphasis on the acquisition, transfer and disposal of energy from the molecular point of view.

The book is organized as a series of 14 papers (R. Levine and J. Jortner; J. P. Toennies; J. J. M. Beenakker; R. G. Gordon and J. I. Steinfeld; I. W. M. Smith; M. J. Berry; R. Bersohn; S. Leach; J. Jortner and S. Mukamel; R. Lefebvre and J. Savolainen; E. W. Schlag and W. E. Howard; B. Raz, O. Cheshnovsky and J. Jortner; D. Huppert and P. M. Rentzepis; and R. M. Hochstrasser) which develop molecular energy transfer in the order of increasing complexity of the molecular processes, starting with binary collisions of simple atoms and molecules, continuing with electronic excitation and decay processes of small up to very large molecules and ending up discussing electronic energy transfer in condensed phases.

The book starts with an introductory contribution by Levine and Jortner giving a record of the progress in the field and setting a frame for the following chapters.

Highly detailed comparison between experiment and basic theory is possible for collision processes between simple molecules, where the intermolecular potential, and especially the non-spherical part reflecting the internal structure of the molecule, can be determined experimentally or *ab initio*. The most direct probe of the intermolecular potential may be obtained through the study of energy transfer in molecular beam experiments (Toennies). In some situations one is able to compare experimentally determined transition probabilities with the corresponding theoretical predictions based either on *ab initio* or semi-empirical hypersurfaces.

Inelastic processes involving either vibrational or rotational energy exchange or both are discussed in the following three papers by Beenakker, Gordon and Steinfeld, and Smith. Of special importance is the nature of the intermolecular forces in the study of energy disposal in collisions which are either reactive (see Berry) or potentially so (see Smith). In recent years the information-theoretical analysis of final state distributions of scattered molecules has gained in importance and is referred to in several papers (Levine and Jortner, Gordon and Steinfeld, Toennies) in this book. The method is based on a comparison of the actual distribution of final states at a given energy either experimentally observed or calculated through scattering theory, with the corresponding microcanonical equilibrium distribution. The relative deviation from the *a priori* reference (equilibrium) distribution is expressed by a thermodynamic-like variable, called surprisal. This analytical method may prove useful for summarizing trends in molecular energy transfer processes using a minimum amount of experimental information.

The book also strongly emphasizes radiationless transitions, both from the experimental (Huppert and Rentzepies) and the theoretical point of view (Jortner and Mukamel, Lefebvre and Sovolainen). In this context Jortner and Mukamel provide a formalism for the dynamics of time-resolved photon scattering from large molecules, whereas Lefebvre and Savolainen address themselves to the recurrence problem in a dense spectrum. Howard and Schlag consider different intrastate, anharmonic type vibrational coupling regimes, and propose a statistical approach to the intramolecular decay problem.

Hochstrasser considers general spectrocopic aspects of the dynamics of the triplet state in organic solids, while Raz, Cheshnovsky and Jortner treat radiative and non-radiative decay processes in solid and liquid rare gases.

In summary, the present book represents an excellent spectrum of the present research activities in the field of molecular dynamics spanning the entire range of molecular complexity. The editor's intentions of giving an integrated review of molecular energy transfer is perturbed slightly by the fact that V-V and V-T energy transfer of polyatomics is not explicitly included.

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Announcement

International Academy of Quantum Molecular Sciences

The 12th meeting of the International Academy of Quantum Molecular Sciences took place in Menton, France, on July 10–11, 1976. During the meeting the Bureau of the Academy for the years 1976–1979 has been elected. It is composed of:

Professor Bernard Pullman, President
Professor Robert Parr, Vice President
Professor John Pople, Secretary General
Professor Ruben Pauncz, Treasurer
Professor Raymond Daudel