



EIXHMYΘ-ITE

ΣΕΜΙΝΑΡΙΟ

- ΟΜΙΛΗΤΗΣ: Apl.Professor Dr.Uwe Hohm
Institut für Physikalische und Theoretische Chemie
der Technischen Universität Carolo-Wilhelmina zu Braunschweig
- ΘΕΜΑ: Collision-Induced Light Scattering in Gases
- ΤΟΠΟΣ: Αίθουσα Σεμιναρίων EIXHMYΘ-ITE
- ΗΜΕΡΟΜΗΝΙΑ: Τετάρτη, 25 Οκτωβρίου 2000
- ΩΡΑ: 19:00

ΠΕΡΙΛΗΨΗ

Collision-induced light scattering (CILS) is a supermolecular Raman process that arises from the interaction-induced variations of the polarizability of a binary, ternary, clusters of atoms or molecules. At low density, the pair properties that give rise to the collision-induced spectra are directly measurable. Non-reactive atoms or molecules in thermal (non-violent) collisions largely preserve their character throughout the encounter. The collisional complex may be viewed as a supermolecule which for the duration of the interaction possesses properties which differ from the sum of properties of the participating, well separated molecules. Specifically, the total polarizability α_{12} of the complex differs slightly from the sum ($\alpha_1 + \alpha_2$) of the permanent polarizabilities of its parts. This effect gives also rise to a variation of the optical properties (e.g. refractive index) of gases.

Collision-induced light scattering spectroscopy is concerned with the frequency-, density-, polarization- and temperature-dependencies of the supermolecular Raman process. The collision-induced spectrum is very sensitive to the intermolecular interaction potential $U(R)$ and to the linear, non-linear and higher order polarizabilities of the atoms or molecules under study. By using suitable theories it is, therefore, possible to obtain some of these important molecular parameters from the observed spectra.

In this lecture we will discuss recent theories of the collision-induced pair-polarizability tensor α_{12} . We will show that in the case of molecules the collision-induced rotational Raman scattering (CIRR) gives another contribution to the observed CILS spectrum. As a specific example collision-induced light scattering of the highly symmetric P_4 – cluster at elevated temperatures will be discussed. Higher-order dipole-polarizabilities as well as the intermolecular interaction potential of P_4 are extracted from the spectra. Some problems common to the analysis of the CILS spectra are demonstrated with adamantane ($C_{10}H_{16}$).