QUANTUM SYMMETRY RESTRICTIONS IN STATE-TO-STATE INELASTIC SCATTERING FROM S_1 GLYOXAL

SAMUEL M. CLEGG, CHARLES S. PARMENTER, *Department of Chemistry, Indiana University, Bloomington, IN 47405*.

A laser pump-dispersed fluorescence probe approach has been used to monitor state-to-state inelastic scattering in S_1 (^1A_u) *trans*-glyoxal (CHO-CHO) by a variety of collision partners. These experiments have been benchmarks for the fully quantal three-dimensional theoretical calculations of Clary, Kroes and coworkers. Their azimuthal and vibrationally close-coupled, infinite-order-sudden (AVCC-IOS) calculations predict that excitation of the low frequency torsional mode must also involve a change in angular momentum. This selection rule is derived directly from symmetry arguments in the close-coupled matrix elements. Experiments were designed to investigate these predictions further, and involve glyoxal 0^0K^n + H_2 or He where n = 0, 2 and 3. The results show that quantum symmetry effects are present but not to the extent of the theoretical predictions.

G.-J. Kroes and R. P. H. Rettschnick, *J. Chem. Phys.* 94, 360-370 (1991).
G.-J. Kroes, R. P. H. Rettschnick, and D. C. Clary, *Chem. Phys.* 148, 359-379 (1990).