PREDISSOCIATION OF THE CN-H_2 COMPLEX VS. CN+H_2 COLLISIONAL ENERGY TRANSFER: A COMPARISON OF RESONANT AND NON-RESONANT SCATTERING EVENTS [a]

YALING CHEN, MICHAEL C. HEAVEN, *Department of Chemistry, Emory University, Atlanta, GA 30322*.

Electronic predissociation of CN($A^2\Pi$)-H_2/D_2 was examined by characterizing action spectra and product state distributions. Both spin-orbit (CN($A^2\Pi_{1/2}$)-H_2→ CN($A^2\Pi_{3/2}$)+H_2) and internal conversion (CN($A^2\Pi_{3/2}$)-H_2 → CN($X^2\Sigma^+$) + H_2) decay channels were observed. For comparison with the predissociation data, CN(A) + H_2 collisional energy transfer was examined at low temperatures (near 10 K). The product state distributions resulting from collisions showed symmetry propensities that were not evident in the distributions resulting from predissociation. Furthermore, the symmetry propensity exhibited by spin-orbit transfer was the opposite of that seen in A → X transfer. We argue that the lack of symmetry preference in the predissociation dynamics is indicative of resonant scattering processes. The results may be explained by considering the symmetry properties of the intermolecular potential energy surfaces, and the regions of these surfaces that are sampled by predissociation and collisional transfer events.

[a] Work supported by the National Science Foundation