SPECTROSCOPIC FINGERPRINTS: USING A VARIETY OF SPECTROSCOPIC METHODS TO ELUCIDATE COMPLEX REACTION DYNAMICS

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A very wide variety of spectroscopic techniques have been used to investigate chemical mechanisms in photodissociation dynamics. One outcome is that we have a pretty good idea of what to expect when the mechanism involves one potential energy surface (or even better a limited range of one PES), and involves a specific set of products. If the reaction involves products evolving on multiple PESs or multiple products on one PES (or both!), then the "mechanism" is much more complicated, and likewise are the spectral fingerprints of the products.

In this talk we shall present recent results that probe both of these complications in formaldehyde and acetaldehyde. Of specific interest is i) untangling the role of S_0 and T_1 states in the production of HCO from H_2CO, ii) in discovering the quantum yield and dynamics of HCO, CH_3, CH_4, and CO production on the ground state of acetaldehyde and iii) in providing more evidence to support or refute the "roaming" channel in acetaldehyde that has been postulated recently.[1] Many spectroscopic techniques have been employed in this work, including LIF, phofex, ion imaging and IR fluorescence; some or all of which will be discussed in this talk.

[1] P.L. Houston and S.H. Kable, PNAS, 103, 16079 (2006).