VIBRATIONAL ENERGY DISPOSAL AND RELATIVE REACTIVITY FOR THE VIBRATIONALLY DRIVEN REACTION OF CH_3D WITH Cl IN THE C-H C-D COMBINATION REGION

CHRISTOPHER ANNESLEY, ROBERT J. HOLIDAY, CHAN HO KWON, F. FLEMING CRIM, *Department of Chemistry, University of Wisconsin-Madison, Madison, Wisconsin 53706*.

Product state distributions and action spectra for the reaction of vibrationally state selected $\mathrm{CH_3D}$ with Cl, $\mathrm{CH_3D}(\nu) + \mathrm{Cl} \longrightarrow (\mathrm{CH_2D} + \mathrm{HCl})$ or $(\mathrm{CH_3} + \mathrm{DCl})$, reveal the extent to which vibrational energy initially deposited in the reactant survives in the $\mathrm{CH_2D}$ and $\mathrm{CH_3}$ products as well the reactivity of different excited vibrational states. There have been several studies of various deuterated methanes with different bonds excited. Most recently, our lab studied the C-H stretch overtone in the 6000 cm^{-1}region, where we found further support for the spectator model. We found that one C-H oscillator survived into the products from states that are composed of 2 separate C-H oscillators as opposed to an overtone in one oscillator. We are studying the lower energy 5000 $\mathrm{cm}^{-1}$to 5500 cm^{-1}region, where we can excite combination bands that involve C-H and C-D motion to determine the relative effect on reactivity of each vibrational mode in this region.